RAYALASEEMA UNIVERSITY

(UGC 2 (f) & 12B, accredited by NAAC with 'B' Grade)

KURNOOL

Prof. N. T. K. Naik
Dean (Academic Affairs)

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No:RU/Academic Affairs/Engg. College/BoS-Meeting/2020-21/3 Date:22-11-2021

Sir / Madam,

Greetings from Rayalaseema University, Kurnool!!!

I am by direction of the Hon'ble Vice Chancellor of **Rayalaseema University, Kurnool** to inform you that the 3rd **Virtual Board of Studies (BoS) meeting** has been scheduled on **27-November-2021 (Saturday)** from **10:30 AM** onwards.

In this regard, all the Chairpersons and Members of different Boards of Studies are hereby invited and requested to attend the meeting.

Agenda of the meeting:

To discuss and approve the following in respect of B.Tech courses in **Civil Engineering, Computer Science & Engineering, Electronics & Communication Engineering** and **Mechanical Engineering.**

(i) **Course Structure & Detailed Syllabi for B.Tech II Year Courses under RU20 regulations.**

(ii) **Course Structure & Detailed Syllabi for B.Tech III & IV Year Courses under RU19 regulations.**

An online meeting link for the Common Boards of Studies meeting will be shared to you at least one hour before commencement of meeting on 27-11-2021.

Individual Chairpersons are requested to create a meeting link for their respective Boards and share the same well in advance to the members concerned to convene the virtual meeting for their respective board.

Also, the chairpersons are requested to coordinate with their respective members to have informal discussion at least a day before the meeting.

However, the common BoS meeting will commence at 10:30 AM. Soon after the completion of the common Boards of Studies meeting, the individual Boards of Studies may proceed for virtual meeting of their respective boards through the links already created & shared by them.

Thanking you,

DEAN (Acad. Affairs)

DEAN
ACADEMIC AFFAIRS
RAYALASEEMA UNIVERSITY
KURNOOL - 518007 (A.P.)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
Course Structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20 onwards)

ELECTRONICS & COMMUNICATION ENGINEERING

INDUCTION PROGRAM (3 weeks duration)
❖ Physical activity ❖ Creative Arts ❖ Universal Human Values ❖ Literary ❖ Proficiency Modules ❖ Lectures by Eminent People ❖ Visits to local Areas ❖ Familiarization to Dept./Branch & Innovations

B. Tech – I Semester (Theory – 4, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9901	Mathematics – I	3	1	0	4	30	70	100
2	BS	19ABS9902	Engineering Physics	3	0	0	3	30	70	100
3	ES	19AES0201	Basic Electrical and Electronics Engineering	3	0	0	3	30	70	100
4	MC	19AMC9902	Environmental Sciences	3	0	0	0	30	-	30
PRACTICAL										
5	ES	19AES0301	Engineering Drawing Lab	1	0	4	3	30	70	100
6	BS	19ABS9903	Engineering Physics Lab	0	0	3	1.5	30	70	100
7	LC	19ALC0301	Engineering & IT Workshop Lab	0	0	3	1.5	30	70	100
8	ES	19AES0202	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5	30	70	100
			TOTAL:	**13**	**01**	**13**	**17.5**	**240**	**490**	**730**

B. Tech – II Semester (Theory – 5, Lab – 3)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9906	Mathematics – II	3	1	0	4	30	70	100
2	BS	19ABS9904	Engineering Chemistry	3	0	0	3	30	70	100
3	ES	19AES0501	C Programming	3	1	0	4	30	70	100
4	HS	19AHS9901	Communicative English	2	0	0	2	30	70	100
5	MC	19AMC9901	Human Values & Professional Ethics	3	0	0	0	30	-	30
PRACTICAL										
6	BS	19ABS9905	Engineering Chemistry Lab	0	0	3	1.5	30	70	100
7	ES	19AES0502	C Programming Lab	0	0	3	1.5	30	70	100

8	HS	19AHS9902	Communicative English Lab	0	0	3	1.5	30	70	100
			TOTAL:	**14**	**02**	**09**	**17.5**	**240**	**490**	**730**

B. Tech – III Semester (Theory – 7, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9907	Complex Variables and Transforms	3	0	0	3	30	70	100
2	ES	19AES0203T	Electrical Technology	2	0	0	2	30	70	100
3	ES	19AES0503T	Data Structures	2	0	0	2	30	70	100
4	PC	19APC0401	Network Theory	3	0	0	3	30	70	100
5	PC	19APC0402	Signals & Systems	3	0	0	3	30	70	100
6	PC	19APC0403T	Electronic Devices and Circuits	2	0	0	3	30	70	100
7	PC	19APC0404	Digital Electronics and Logic Design	3	0	0	3	30	70	100
PRACTICAL										
8	ES	19AES0203P	Electrical Technology Lab	0	0	3	1.5	30	70	100
9	ES	19AES0503P	Data Structures Lab	0	0	2	1	30	70	100
10	PC	19APC0403P	Electronic Devices and Circuits Lab	0	0	3	1.5	30	70	100
11	PC	19APC0405	Basic Simulation Lab	0	0	2	1	30	70	100
			TOTAL:	**19**	**0**	**10**	**24**	**300**	**700**	**1000**

B. Tech – IV Semester (Theory – 8, Lab – 3)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9911	Probability Theory and Stochastic Processes	3	0	0	3	30	70	100
2	ES	19AES0505T	Python Programming for Engineers	3	0	0	3	30	70	100
3	HS	19AHS9905	Managerial Economics and Financial Analysis	3	0	0	3	30	70	100
4	PC	19APC0406	Computer Architecture and Organization	3	0	0	3	30	70	100
5	PC	19APC0407	Control Systems	3	0	0	3	30	70	100
6	PC	19APC0408	Electromagnetic Waves and Transmission lines	3	0	0	3	30	70	100
7	PC	19APC0409T	Electronic Circuits – Analysis and Design	3	0	0	3	30	70	100

8	MC	19AMC9903	Biology for Engineers	3	0	0	0	30	0	30
PRACTICAL										
9	ES	19AES0505P	Python Programming for Engineers Lab	0	0	2	1	30	70	100
10	PC	19APC0409P	Electronic Circuits – Analysis and Design Lab	0	0	3	1.5	30	70	100
11	HS	19AHS9906	Advanced English Language Communication Skills Lab	0	0	3	1.5	30	70	100
			TOTAL:	**24**	**00**	**08**	**25**	**330**	**700**	**1030**

B. Tech – V Semester (Theory – 7, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC	19APC0410T	Integrated Circuits and Applications	2	0	0	2	30	70	100
2	PC	19APC0411	Antennas and Wave Propagation	3	0	0	3	30	70	100
3	PC	19APC0412T	Communication Systems	3	0	0	3	30	70	100
4	PC	19APC0413T	Digital System Design through Verilog	3	0	0	3	30	70	100
5	PE		**Professional Elective-I**	3	0	0	3	30	70	100
		19APE0513	Operating Systems							
		19APE0401	Data Communications and Networks							
		19APE0402	Introduction to Internet of Things							
6	OE		**Open Elective-I**	3	0	0	3	30	70	100
		19AOE0101	Experimental stress analysis.							
		19AOE0102	Building Technology							
		19AOE0401	Principles of Communication							
		19AOE0402	Basic Electronic Systems							
		19AOE0503	Computer Graphics and Multimedia Animation							
		19AOE0303	Optimization Techniques							
		19AOE9901	Technical Communication and Presentation Skills							
7	MC	19AMC9905	Essence of Indian Knowledge Tradition	3	0	0	0	30	--	30
PRACTICAL										
8	PC	19AP0410P	Integrated Circuits and Applications Lab	0	0	3	1.5	30	70	100
9	PC	19APC0412P	Communication Systems Lab	0	0	3	1.5	30	70	100
10	PC	19APC0413P	Digital System Design through Verilog	0	0	2	1	30	70	100
11	PR	19APR0401	Socially Relevant Project (15 Hrs. /Sem)	0	0	1	0.5	50	--	50
			TOTAL:	**20**	**00**	**09**	**21.5**	**350**	**630**	**980**

B. Tech – VI Semester (Theory – 7, Lab – 3)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week L	T	P	Credits	Scheme of Examination (Max. Marks) CIE	SEE	Total
THEORY										
1	PC	19APC0414T	Microprocessors and Microcontrollers	3	0	0	3	30	70	100
2	PC	19APC0415T	Digital Signal Processing	3	0	0	3	30	70	100
3	PC	19APC0416	Electronic measurements and Instrumentation	3	0	0	3	30	70	100
4	PE		**Professional Elective – II**	3	0	0	3	30	70	100
		19APE0514	Object Oriented Programming through JAVA							
		19APE0403	Cellular & Mobile Communications							
		19APE0404	Radar Systems							
5	OE		**Open Elective – II**	3	0	0	3	30	70	100
		19AOE0404	Basics of VLSI							
		19AOE0405	Industrial Electronics							
		19AOE0407	Wavelet Transforms & its applications							
		19AOE9902	Soft Skills							
6	HS	19AHS9907	Entrepreneurship & Incubation	3	0	0	3	30	70	100
7	MC	19AMC9906	Research Methodology	3	0	0	0	30	--	30
PRACTICAL										
8	PC	19APC0414P	Microprocessors and Microcontrollers Lab	0	0	3	1.5	30	70	100
9	PC	19APC0415P	Digital Signal Processing Lab	0	0	2	1.0	30	70	100
10	PR	19APR0402	Socially Relevant Project (15 Hrs. /Sem)	0	0	1	0.5	50	--	50
			TOTAL:	**21**	**00**	**06**	**21.0**	**320**	**560**	**880**
Mandatory Industrial Training / Skill Development/Research Project for 4 weeks duration during Summer Vacation										

B. Tech – VII Semester (Theory – 6, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week L	T	P	Credits	Scheme of Examination (Max. Marks) CIE	SEE	Total
THEORY										
1	PC	19APC0417T	Microwave Engineering and Optical Communication	3	0	0	3	30	70	100
2	PC	19APC0418T	VLSI Design	3	0	0	3	30	70	100
3	PE		**Professional Elective-III**	3	0	0	3	30	70	100
		19APE0405	Embedded Systems							
		19APE0406	Satellite Communication							
		19APE0407	Image Processing							
4	OE		**Open Elective-III**	3	0	0	3	30	70	100

		19AOE0409	Microprocessors and Microcontrollers							
		19AOE0410	Principles of Digital Signal Processing							
		19AOE0511	Unix Programming							
		19AOE0510	Soft Computing							
5	HS	19AHS9908	Management Science	2	0	0	2	30	70	100
6	MC	19AMC9904	Indian Constitution and Society	3	0	0	0	30	--	30
			PRACTICAL							
7	PC	19APC0417P	Microwave and Optical Communications Lab	0	0	3	1.5	30	70	100
8	PC	19APC0418P	VLSI Design Lab	0	0	3	1.5	30	70	100
9	PR	19APR0403	Project Stage - I	0	0	4	2	50	--	50
10	PR	19APR0404	Industrial Training / Skill Development/Research Project*	0	0	--	1.5	50	--	50
			TOTAL:	**17**	**00**	**10**	**20.5**	**340**	**490**	**830**

B. Tech – VIII Semester (Theory – 2, Project – 1)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
			THEORY							
1	PE		**Professional Elective-IV**	3	0	0	3	30	70	100
		19APE0408	4G and 5G Wireless Mobile Communications							
		19APE0409	Biomedical Instrumentation							
		19APE0515	Machine Learning							
2	OE		**Open Elective-IV**	3	0	0	3	30	70	100
		19AOE0412	Image Processing							
		19AOE0414	Electronic Measurements and Instrumentation							
		19AOE0513	Introduction to Data Science and Analytics							
3	PR	19APR0405	Project Stage – II	-	-	-	07	60	140	200
			TOTAL:	**06**	**00**	**00**	**13**	**120**	**280**	**400**

DETAILED SYLLABUS

B. TECH – I SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CSE, ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19ABS9901	3	1	0	4	CIA	30 M
Course Title	:	MATHEMATICS – I					SEE	70 M

COURSE OBJECTIVES:

1. To enlighten the learners in the concept of differential equations, matrices and multivariable calculus.
2. To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

COURSE OUTCOMES:

After the completion of this course, the students will be able to:

1. Understand the effective mathematical tools for the solutions of differential equations that model physical processes.
2. Identify the essential characteristics of linear differential equations with constant coefficients and solve the linear differential equations with constant coefficients by appropriate method.
3. Solving systems of linear equations, using technology to facilitate row reduction determine the rank, Eigen values and Eigen vectors, diagonal form and different factorizations of a matrix.
4. Translate the given function as series of Taylor's and McLaren's with remainders and analyze the behavior of functions by using mean value theorems.
5. Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies and acquire the Knowledge maxima and minima of functions of several variables.

Unit I

Ordinary Differential Equations of First Order: Formation of the ordinary differential equations (ODEs) – Solution of an ordinary differential equation – Equations of the First Order and First Degree – Linear Differential Equation – Bernoulli's Equation – Exact Differential Equations – Equations Reducible to exact equations-Orthogonal Trajectories.

Ordinary Differential Equations of First Order but not First Degree: Equations solvable for p – Equations solvable for x – Equations solvable for y – Equations do not contain x(or y) – Clairaut's Equations.

Unit II

Ordinary Differential Equations of Higher Orders: Solutions of Linear Ordinary Differential Equations with Constant Coefficients – Rules for finding the Complimentary Functions – Rules for finding the particular integral – Method of variation of parameters – Cauchy's linear equation – Legendre's Linear Equation.

Unit III

Matrices: Inverse and rank of a matrix – System of linear equations; Symmetric, skew – symmetric and orthogonal matrices – Eigen values and Eigen vectors and their properties, Cayley – Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley – Hamilton theorem, diagonalization of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Unit IV

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), indeterminate forms and Hospital's rule; Maxima and minima.

Unit V

Multivariable Calculus: Limit, continuity and partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd.
2. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
3. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19ABS9902	3	0	0	3	CIA	30 M
Course Title	:	ENGINEERING PHYSICS					SEE	70 M

COURSE OBJECTIVES:

1. To disseminate knowledge in basic concepts of mechanics and to understand the basic ideas of damping and resonance.
2. To interpret the significant concepts of magnetic materials which leads to potential applications and basics of electromagnetic waves.
3. To identify the importance of the optical phenomenon i.e., interference, diffraction andpolarization related to its Engineering applications.
4. To teach the concepts related to laser, fiber optics and superconductivity which lead to their fascinating applications.
5. To familiarize the concept of Quantum mechanics and semiconductors relevant to engineering branches.

UNIT I

MECHANICS AND OSCILLATIONS: Basic laws of vectors and scalars-rotational frames – conservative forces; F = – grad V, torque andangular momentum - Newton's laws in inertial and linear accelerating non-inertial frames ofreference.
Simple Harmonic motion –Characteristics of SHM; Damped harmonic motion – over-damped, critically damped and lightly damped oscillators; Forced oscillations and resonance.

UNIT II

ELECTROMAGNETISM AND MAGNETIC PROPERTIES OF MATERIALS: Divergence of Electric and Magnetic Fields – Gauss theorem for divergence – Curl of Electric and Magnetic Fields – Stokes theorem for curl – Maxwell's Equations – Electromagnetic wave propagation (conducting and non-conducting media) – Poynting's Theorem.

Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Classification of Magnetic materials – Domain Concepts of ferromagnetism – Hysteresis – soft and hard magnetic materials – Magnetic device applications.

UNIT III

WAVE OPTICS: Interference: Principle of superposition – Young's Experiment – Coherence – Interference in thin films, Wedge shaped film, Newton's Rings – Determination of wavelength.
Diffraction: Diffraction, differences between interference and diffraction, Fraunhofer diffraction due to Single slit
Polarization: Polarization by double refraction – Plane polarized light by Nicol's Prism – Half wave and Quarter wave plate – Engineering applications of Polarization.

UNIT IV

LASERS AND FIBER OPTICS: Introduction, spontaneous and stimulated emissions, population inversions, pumping, Ruby laser, Gas laser (He-Ne Laser), Semiconductor laser, Applications of lasers.

Optical Fiber and Total Internal Reflection, Acceptance Angle and cone of a fiber, Numerical aperture, Fiber optics in communications, Types of Optical Fibers, Applications of optical fibers.

SUPERCONDUCTIVITY: Super conductivity, Meissner Effect, Basics of BSC theory, Types of Superconductors and Applications of Superconductors.

UNITV

QUANTUM MECHANICS: Introduction, Photoelectric Effect, de – Broglie's hypothesis, Wave – particle duality Heisenberg's Uncertainty principle, Schrodinger's time independent wave equation, Particle in one dimensional box.

SEMICONDUCTOR PHYSICS: Energy bands in solids, Types of electronic materials: metals, semiconductors, and insulators**.** Intrinsic and Extrinsic semiconductors, Direct and Indirect band gap semiconductors Hall effect – Applications of Hall effect – Drift and Diffusion currents – Continuity equation– Applications of Semiconductors.

COURSE OUTCOMES:

After the completion of this course, the student will be able to:

1. ExtendNewton's second law for inertial and non – Inertial frame of reference and analyze the concept of resonance.
2. Applythe Gauss' theorem for divergence and Stokes' theorem for curl andclassifythe magnetic materials based on susceptibility
3. Interpret the differences between interference and diffraction, illustrate the concept of polarization of light and its applications and classify ordinary polarized light and extraordinary polarized light.
4. Applyelectromagnetic wave propagation in different Optical Fibers, the lasers concepts in various applicationsand explainMeissner's effect, BCS theory.
5. Interpretthe direct and indirect band gap in semiconductors and identify the type of semiconductor using Hall Effect.
   Analyze the behavior of particles at very microscopic level by using wave nature of particles.

TEXT BOOKS:

1. Gaur R.K. and Gupta S.L., "Engineering Physics"-Dhanpat Rai publishers, 2012
2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Krshisagar - S. Chand publications, 11^{th} Edition 2019.
3. Fundamentals of Physics by David Halliday and Robert Resnick – Part I and Part II - Wiley.
4. H.K. Malik & A.K. Singh "Engineering Physics" - McGraw Hill Publishing Company Ltd.
5. "Engineering Physics", K.Thyagarajan - McGraw Hill Publishing Company Ltd., 2015.
6. D.Kleppner and Robert Kolenkow "An introduction to Mechanics"- II - Cambridge University Press, 2015.

REFERENCE TEXT BOOKS:

1. M K Varma "Introduction to Mechanics"-Universities Press-2015.
2. I. G. Main, "Vibrations and waves in physics", 3^{rd}Edn., Cambridge University Press
3. D.K. Bhattacharya and A. Bhaskaran, "Engineering Physics"- Oxford Publications-2015
4. David J. Griffiths, "Introduction to Electrodynamics"- 4/e, Pearson Education, 2014
5. P.K. Palaniswamy, "Engineering Physics" Scitech Publications
6. Shatendra Sharma, Jyotsna Sharma, "Engineering Physics" Pearson Education, 2018

7. D.Kleppner and Robert Kolenkow "An introduction to Mechanics" – II – Cambridge University Press, 2015.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CE, ME and ECE & II Semester CSE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0201	3	0	0	3	CIA	30 M
Course Title	:	BASIC ELECTRICAL AND ELECTRONICS ENGG.					SEE	70 M

COURSE OBJECTIVES: -

1. To introduce basics of simple electric circuits.
2. To impart knowledge on measuring devices for voltages and currents.
3. To provide comprehensive idea about working principle, operation and applications of PN junction diode & knowledge about semiconductors
4. To teach applications of electronic principles which are used in Engineering
5. To give knowledge about Special purpose diodes and applications

COURSE OUTCOMES: -

1. Able to recall Simple electrical connections.
2. Knowledge about the Measuring Instruments
3. Learning operation and properties of semiconductors
4. Useful knowledge on PN diode and simple applications.
5. Working and construction of Analog Electronic devices.

UNIT I

ELECTRICAL CIRCUITS: Basic Electrical Circuit elements – (R-L-C) – Ohms Law – Kirchhoff's Law –Introduction to AC Circuits – and DC Circuits – Series connection – parallel connections, Analysis of single – phase ac circuits consisting of RL – RC – RLC series circuits – Nodal Analysis-Mesh Analysis.

UNIT II

MEASURING INSTRUMENTS: Moving coil and moving iron instruments (Ammeter and voltmeter) –Cathode ray oscilloscope – cathode ray tube – Regulated power supply – Digital Multi Meter (DMM) – MeggerInstrument-Introduction to Electric and magnetic fields – Thermistor – Linear Mode power supply.

UNIT III

SEMICONDUCTORS: Classification of semiconductors – Intrinsic semiconductors – Extrinsic semiconductors – conductivity of Intrinsic and Extrinsic semiconductors – P-type semiconductor – N-type semiconductor – Qualitative theory of P-N junction – V-I characteristics of PN junction diode – and simple applications – Light Emitting Diode (LED).

UNIT IV

RECTIFIERS AND FILTERS: Introduction to Rectifiers – Half Wave Rectifiers – Full Wave Rectifiers –Bridge rectifier – Advantages of Bridge rectifier – Comparison of Rectifiers – Harmonic components in a Rectifier circuit – Introduction to Filters – Inductor Filter – capacitor Filter – LC or L-section Filter – Types of Voltage regulators – series voltage regulator – shunt voltage regulator – Clippers and Clampers.

UNIT V

ANALOG ELECTRONICS: Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, Breakdown mechanism – Avalanche Zener Breakdown – special purpose diodes: Schottky diode, tunnel diode, varactor diode, photodiode, phototransistor, Introduction to Bipolar Junction Transistor – BJT construction, operation, configurations – CB, CE, CC. – Introduction to Basic Logic Gates.

Text Books: -

1. D.P. Kothari, I.J.Nagrath, Basic Electrical and Electronics Engineering, 2nd Edition, McGraw Hill Education (India) Private Limited.
2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2nd edition, Pearson India Private Limited.

Reference Books: -

1. Principles of Electrical Engineering and Electronics, V.K. Mehta & Rohit Mehta, S.Chand publications.
2. Electronic Devices and Circuit Theory by Robert L.Boylestad and Louis Nashelsky., Pearson.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AMC9902	3	0	0	0	CIA	30 M
Course Title	:	ENVIRONMENTAL SCIENCES					SEE	--

COURSE OBJECTIVES: -

1. Creating basic awareness on environment
2. Understanding the importance of ecological balance for sustainable development.
3. Creating awareness on biodiversity and its conservation
4. Understanding the impacts of developmental activities and mitigation measures.
5. Understanding the environmental policies and regulations.

COURSE OUTCOMES:

Based on this course, the Engineering graduate will understand / evaluate / develop technologies on the basis of ecological principles and environmental regulations which in – turn helps in sustainable development.

UNIT I

Ecosystems: Definition, Scope and Importance ecosystem. Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Energy flow in the ecosystem, Biogeochemical cycles, Bioaccumulation, ecosystem value, derives and carrying capacity, Field visits.

UNIT II

Natural Resources: Classification of Resources: Living and Non – Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problem, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable energy source, and case studies.

UNIT III

Biodiversity and its Conservation: Introduction – Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Conservation of biodiversity: In-situ and Ex-situ conservation. National Biodiversity Act.

UNIT IV

Environmental Pollution and Control Technologies: Environmental Pollution & Control: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and industrial pollution, Ambient air quality standards. Water pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid Waste management composition and characteristics of e - Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, Secondary Tertiary.

Overview of air pollution control technology, Concept of bioremediation. Global Environmental Problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montreal Protocol.

UNIT V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio – economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl Human Health, Environmental Ethics, Concept of Green Building, Ecological foot print, Life Cycle Assessment(LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCES:

1. Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.
2. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela. 2008 PHI Learning Pvt Ltd.
4. Environmental Science by Daniel B. Botkin & Edwards A. Keller, Wiley INDIA edition.
5. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AES0301	1	0	4	3	CIA	30 M
Course Title	:	ENGINEERING DRAWING LAB					SEE	70 M

COURSE OBJECTIVES:

1. To gain and understanding of the basics of geometrical constructions of various planes and solids, understanding system of graphical representation of various objects and various views to draft and read the products to be designed and eventually for manufacturing applications.
2. To learn about various projections, to understand complete dimensions and details of object.
3. Ultimately student must get imaginary skill to put an idea of object, circuit, assembly of parts in black & white, to design a product and to understand the composition, which can be understood universally.

COURSE OUTCOMES:

1. Drawing 2D and 3D diagrams of various objects.
2. Learning conventions of Drawing, which is a Universal Language of Engineers.
3. Drafting projections of points, planes and solids.

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance – Conventions in Drawing – Lettering – BIS Conventions.
Curves used in Engineering Practice: (a) Conic Sections including the Rectangular Hyperbola – General method only, (b) Cycloid, Epi-cycloid and Hypocycloid, (c) Involutes.

UNIT II

Scales: Plain, Diagonal and Vernier.
Projection of Points: Principles of orthographic projection – Convention – First angle projections, projections of points.

UNIT III

Projections of Lines: Lines inclined to one or both planes, Problems on projections, Finding True lengths.
Projections of Planes: Projections of regular plane surfaces- plane surfaces inclined to both planes.

UNIT IV

Projections of Solids: Projections of Regular Solids with axis inclined to both planes.
Developments of Solids: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid, Cone.

UNIT V

Isometric and Orthographic Projections: Principles of isometric projection – Isometric Scale – Isometric Views – Conventions – Isometric Views of lines, Planes, Simple solids (cube, cylinder and cone). Isometric projections of spherical parts. Conversion of isometric Views to Orthographic Views.

Text Books:

1. Engineering Drawing, N.D. Bhatt, Charter Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, SciTech Publishers, Chennai

References:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal /New age Publishers
4. Engineering Graphics, K.C. John, PHI,2013
5. Engineering Drawing, B.V.R. Gupta, J.K. Publishers

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19ABS9903	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING PHYSICS LAB					SEE	70 M

COURSE OBJECTIVES:

1. To understand the phenomenon of interference and diffraction using Travelling Microscope and spectrometer.
2. To analyze the interaction of electromagnetic fields.
3. To understand the concept of polarization and classify polarized and unpolarized lights.
4. To realize the laws of resistance by using Carey Foster's bridge.
5. To analyze the frequencies of electrically maintained tuning fork by Melde's apparatus.

COURSE OUTCOMES:

After completion of this course, the students will be able to:

1. Apply the knowledge of optics to calculate geometrical parameters of thickness of thin object and radius of curvature of a lens.
2. Plot the intensity of the magnetic field of circular coil carrying current with varying distance.
3. Evaluate the Planck's constant value practically and analyze the characteristics of photo electric cell and Cauchy's constants.
4. Determine coefficient of thermal Conductivity of a Bad Conductor.

LIST OF EXPERIMENTS:

1. Determination of Radius of Curvature of a given Convex Lens By forming Newton's Rings.
2. Determination of Wavelength of Spectral Lines in the Mercury Spectrum by Normal Incidence method.
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying Circular Coil.
4. Determination of Cauchy's Constants of a Given Material of the Prism using Spectrometer.
5. Determination of Refractive Index of Ordinary ray μ_o and extraordinary$\mu_e$ray.
6. Determination of Thickness Given Paper Strip by Wedgeshape Method.
7. Calibration of LowRange Voltmeter.
8. Calibration of LowRange Ammeter.
9. Determination of Magnetic Moment and Horizontal Component of Earth's Magnetic Field.
10. Lees Method – Coefficient of thermal Conductivity of a Bad Conductor.
11. Carey Foster's Bridge – Verification of laws of Resistance and Determination of Specific Resistance.
12. Melde's Apparatus – Frequency of electrically maintained Tuning Fork.
13. Photoelectric cell – Characteristics.
14. Planks Constants.
15. Determination of Wavelength of Mono chromatic source using LASERdiffraction

Reference Books:

1. S.Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics" – S.Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Laboratory Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19ALC0301	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING & IT WORKSHOP LAB					SEE	70 M

ENGINEERING WORKSHOP LAB

COURSE OBJECTIVES:

4. The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially, he should know the labor involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

COURSE OUTCOMES:

1. Acquires basic knowledge of various tools and their uses in different sections of manufacturing.
2. Apply wood working skills in real world applications.
3. Design and model various basic prototypes in the trade of fitting.
4. Able to perform various basic House Wiring techniques.

TRADES FOR EXERCISES:

(a) Carpentry: Bench Work, tools used in carpentry.

Jobs for Class work: (i) Half lap joint (ii) Mortise and Tenon joint (iii) Bridle joint (iv) Corner dovetail joint

(b) Fitting: Tools used in fitting work, Different files, chisels, hammers and bench vice.

Jobs for class work: (i) Vee Fit (ii) Square Fit (iii) Dovetail Fit (iv) Half Round Fit

(c) House Wiring: Tools used in house wiring work.

Jobs for class work: (i) Series / Parallel Connection with three bulbs
(ii) Tube Light Connections (iii) Stair Case Connections
(iv) Measurement of Earth Resistance / Godown Wiring

Note: At least two exercises to be done from each trade.

TRADES FOR DEMONSTRATION:

a) Plumbing
b) Machine Shop

REFERENCE BOOKS:

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
2. Work shop Manual / P.Kannaiah/ K. L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

IT WORKSHOP LAB

COURSE OBJECTIVES:

1) Understand the basic components and peripherals of a computer.
2) To become familiar in configuring a system.
3) Learn the usage of productivity tools.
4) Acquire knowledge about the netiquette and cyber hygiene.
5) Get hands on experience in trouble shooting a system

COURSE OUTCOMES:

At the end of the course the students can able to

1) Assemble and disassemble the systems
2) Use the Microsoft Office Tools
3) Install various software
4) Know about various search engines
5) Trouble shoots various Hardware and Software problems.

LIST OF EXERCISES

1. System Assembling, Disassembling and identification of Parts / Peripherals
2. Operating System Installation – Install Operating Systems like Windows, Linux along with necessary Device Drivers. The system should be configured as dual boot with both windows and Linux.
3. MS – Office / Open Office
   a) Word – All Toolbars, Page Setup, Page Background, Font, Para Graph, Page Borders, Headers & Footers, Mail Merge, Tables, Symbols, Equations, Saving, and Reviewing.
   b) Excel / Spread Sheet – All Toolbars, Cell Formatting, Grid Lines, Font, Page Setup, Organize data, Functions, Formulae, Headers & Footers, Tables, Graphs and Charts.
   c) Power Point Presentation – Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets, Numbering, Slide Show, Animations, Hyperlinks, Inserting – Images, Clip Art, Shapes, Objects, Tables and Charts, Audio, and Video files.
   d) Access - creation of database, validate data.
4. Network Configuration & Software Installation – Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.
5. Internet and World Wide Web Search Engines, Types of search engines, netiquette, cyber hygiene.
6. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

Reference Books:

1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.
2. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition by Gary B. Shelly, Misty E. Vermaat and Thomas J. Cashman (2007, Paperback).
3. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Rudra Prathap, Oxford University Press, 2002.
4. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008.

5. The Complete Computer upgrade and repair book, 3/e, Cheryl A Schmidt, Dreamtech.
6. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
7. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AES0202	0	0	3	1.5	CIA	30 M
Course Title	:	BASIC ELECTRICAL & ELECTRONICS ENGG. LAB					SEE	70 M

COURSE OBJECTIVES:
1. Get exposure to common electronic components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand usage of common electrical measuring instruments.
4. Determine performance characteristics of PN Junction diodes and applications.
5. Understanding simple Network connections Like series circuits

COURSE OUTCOMES:
1. To learn about the simple Logic gates functions.
2. Understanding the simple configurations of the Transistor.
3. Useful for the simple applications of PN diode.
4. To give knowledge about PN diode characteristics.
5. Knowledge about simple Network Analysis

BASIC ELECTRICAL ENGINEERING LAB

List of Experiments:
1. Verification of Ohms Law
2. Verification of KCL and KVL Laws
3. MESH analysis
4. NODAL analysis
5. Verification of RC and RL Parallel Resonance
6. Verification of R-L-C Series Resonance

BASIC ELECTRONICS ENGINEERING LAB

List of Experiments:
1. V-I Characteristics of PN DIODE
2. Half Wave Rectifier
3. Full Wave Rectifier
4. BJT Configuration of CB, CE, CC
5. ZENER Diode Characteristics
6. Basic LOGIC gates

B.TECH – II SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to II Semester CSE, ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19ABS9906	3	1	0	4	CIA	30 M
Course Title	:	MATHEMATICS – II					SEE	70 M

COURSE OBJECTIVES:
1. To familiarize the prospective engineers with techniques in multivariate integration and partial differential equations.
2. To equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

COURSE OUTCOMES:
After the completion of this course, the students will be able to:
1. Understand beta and gamma functions and its relations and conclude the use of special function in evaluating definite integrals.
2. Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and apply double integration techniques in evaluating areas bounded by region.
3. Apply Del to Scalar and vector point functions and illustrate the physical interpretation of Gradient, Divergence and Curl.
4. Find the work done in moving a particle along the path over a force field and evaluate the rates of fluid flow along and across curves.
5. Apply a range of techniques to find solutions of standard PDEs and outline the basic properties of standard PDEs.

Unit I
Sequences and Series: Convergence of sequence and series, tests for convergence;
Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit II
Special Functions: Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions, evaluation of improper integrals.

Unit III
Multiple Integrals: Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves, Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates.

Unit IV
Vector Calculus: Scalar and vector point functions, vector operator del, del applies to scalar point functions Gradient, del applied to vector point functions – Divergence and Curl, vector identities.

Line integral – circulation – work done, surface integral – flux, green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Unit V

Partial Differential Equations: First order partial differential equations, solutions of first order linear and non – linear PDEs. Solutions to homogenous and non – homogenous higher order linear partial differential equations.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd.
2. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
3. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19ABS9904	3	0	0	3	CIA	30 M
Course Title	:	ENGINEERING CHEMISTRY					SEE	70 M

COURSE OBJECTIVES:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.

COURSE OUTCOMES:

At the end of the course the students will be able to:

1. To impart the concept of soft and hard waters, softening methods of hard water.
2. Explain the importance of polymers in our daily life and mechanism of conduction in the conducting polymers.
3. To analyze the fuel and methods for preparation of synthetic fuels.
4. To understand the basics of electrochemistry, conductometry and batteries.
5. To familiarizes the Engineering materials.

Unit I

Water Technology: Sources of Water, Impurities and their Influence on Living Systems, Soft Water and Hardness of Water, Estimation of Hardness by EDTA Method, Boiler Troubles – Scale and Sludge, Industrial Water Treatment Internal Treatment Methods(Phosphate Conditioning, Calgon Conditioning), Water softening Methods (Zeolite and Ion-Exchange Processes), Specifications for Drinking Water, Bureau of Indian Standards(BIS) and World Health Organization(WHO), Municipal Water Treatment, Desalination of Brackish Water, Reverse Osmosis (RO) and Electrodialysis.

Unit II

Polymer Chemistry: Introduction to Polymers, Types of Polymerizations (Addition & Condensation), Mechanism of Addition Polymerization (Ionic and Radical).

Plastics: Thermoplastics and Thermosetting. Preparation, Properties and Applications of Bakelite, Nylon – 66.

Elastomers: Buna-S, Buna – N–Preparation, Properties and Applications.

Conducting Polymers: Polyacetylene, Polyaniline, Mechanism of Conduction and Applications.

Unit III

Fuel Technology: Fuels –Classification of fuels.

Solid Fuels: Wood and Coal, Ranking of Coal-Analysis (Proximate and Ultimate), Coke Manufacture Otto Hoffman Process.

Liquid Fuels: Petroleum Origin, Extraction, and Refining. Motor Fuels Petrol, Diesel Oil, Knocking Octane Number and Cetane Number; Synthetic petrol – Fischer – Tropsch's& Bergius process.

Gaseous Fuels: Composition and Uses of Natural Gas, LPG, and CNG. Flue gas analysis and its significance.

Unit IV

Electrochemistry: Introduction to Electrochemistry (Conductors, Semi-Conductors, Insulators, Conductance). Electrodes, Reference Electrodes, Electrochemical Cell, Nernst Equation, Cell Potential and its Calculations, Numerical Problems. Principle and Applications of Potentiometry, Conductometry.

Batteries: Primary Batteries – Zinc – Air Battery.

Secondary Batteries –Lithium-Ion Batteries – Working of the Batteries including Cell Reactions.

Fuel Cell – Hydrogen – Oxygen.

Unit V

Materials of Engineering Chemistry:

Building materials: Portland cement, Constituents, Phases and Reactivity of Clinker, Setting and Hardening of Cement.

Refractories: Classification, Properties, Factors affecting the Refractory Materials and Applications.

Lubricants: Classification of Lubricants with examples. Definition and Significance of the following Characteristics of a Good Lubricating Oil – Viscosity, Viscosity Index, Flash & Fire Point, Acid Number, Saponification Value, Pour Point and Cloud Point.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Shashi Chawla, A Reading of Engineering Chemistry, 3rd Edition, Dhanpat Rai and Co., New Delhi, 2011,3rd edition.
3. Puri, Sharma and Pathania "Principles of Physical Chemistry". Vishal Publishing Co., Jalandhar.1991, 31st edition
4. Gowariker*et al.*, Polymer Science and Technology, Prentice Hall of India Pvt. Ltd., New Delhi, 2004, 10th reprint.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AES0501	3	1	0	4	CIA	30 M
Course Title	:	C PROGRAMMING					SEE	70 M

COURSE OBJECTIVES:

1. Introduce the internal parts of a computer, and peripherals.
2. Introduce the Concept of Algorithm and use it to solve computational problems
3. Identify the computational and non – computational problems
4. Teach the syntax and semantics of a C Programming language
5. Demonstrate the use of Control structures of C Programming language

COURSE OUTCOMES:

1. Illustrate the working of a computer and apply algorithmic approach for solving a problem.
2. Recognize the importance of programming language independent constructs
3. Select the control structure to solve computational problems
4. Design and implement programs to analyze the array applications.
5. Structure the individual data elements to simplify the solutions.

Unit I

Introduction to Computer Programming Languages: Evolution of Computer Programming languages – Machine, Symbolic and high – level languages. Fundamentals of Algorithms (Pseudo Codes) and Flowcharts, Compiler, Interpreter, Loader, and Linker.
Creating and Running Programs: Writing, Editing, Compiling, Linking and Executing.
Program Control Structures: Sequence, Selection and Iteration. Software Development Method.

Unit II

Introduction to C Language: Background,Basic Structure of a C Program – Steps to execute a C Program – Character Set of C Language – Basic I/O Statements – Basic Data Types and Sizes – C – Tokens: Identifiers, Keywords, Constants, and Variables. Sample Programs.
Input and output: standard input and output, formatted output – printf, formatted input – scanf.

Unit III

Operators: Arithmetic, Relational, Logical, Increment and decrement, Conditional, Assignment, Bitwise – Operator Precedence – Expressions – Type Conversions, Conditional Expressions – Precedence and Order of Evaluation. Sample Programs.
Control Flow / Control Statements: Selection & Making Decisions – Logical Data and Operators – Two-way Selection, Multi-way selection – Standard Statements and blocks – Non-iterative Statements: (if, if-else, null else, nested if-else, if-else ladder, else-if, switch) – Repetitive / Iterative Statements: Concept of loop – Pre-test and post-test loops – While loop, do-while loop, and for loops, initialization and updating, event and counter controlled loops. Branching: break, continue, and Goto. – Sample programs on applications.

Unit IV

Arrays in C language: Concept – Definition – Declaration – Types of arrays – One Dimensional, two dimensional, multidimensional – initialization of arrays – Storing and assessing elements – Array applications.

Strings: Definition, Declaration, Initialization – Basic operations – String manipulations – String handling functions – Arrays using strings

Unit V

Pointers and arrays: Concept –Definition, Declaration, Initialization, pointer to pointer, functions and pointers, arrays and pointers, pointer as function arguments (call-by-reference), pointers and strings.

Functions: Concept –Definition, Declaration, Types of functions – parameter passing – passing arrays to functions, passing pointers to functions, Recursion – returning non-integers, external variables, scope variables, header variables, register variables, block structure. User defined functions – Standard Library Functions.

Structures: Definition –Declaration – Initialization - Accessing the structure elements – arrays of structures, Array with in structures, pointers to structures, Passing Structure to functions – nested structures, self-referential structures, unions, typedef.

Text Books:

1. Pradip Dey, and Manas Ghosh, “Programming in C”, 2018, Oxford University Press.
2. R.G. Dromey, “How to Solve it by Computer”. 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, “The C Programming Language”, 2^{nd}Edition, Pearson.

Reference Books:

1. RS Bichkar “Programming with C”, 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, “Information Technology in Theory”, 2017, Cengage Learning.
3. Byron Gottfried and Jitender Kumar Chhabra, “Programming with C”, 4th Edition, 2019, McGraw Hill Education.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AHS9901	2	0	0	2	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH					SEE	70 M

COURSE OBJECTIVES:

Reading Skills
- Addressing explicit and implicit meanings of a text on current topics.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

Writing Skills
- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, emails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

Interactive Skills
- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

Life Skills
- Examining self-attributes and identifying areas that require improvement: self-diagnosis and self-motivation.
- Adapting to a given situation and developing a functional approach to finding solutions: adaptability and problem solving.
- Understanding the importance of helping others: community services and enthusiasm.

COURSE OUTCOMES:

1. The student will acquire basic proficiency in English using all LSRW skills.
2. Read and explore for enrichment of works from various genres (Poems, essays etc.)
3. Make correct usage of grammar and Vocabulary in writing and speaking.
4. To make them develop Linguistic competence.
5. To make them understand the concept of redundancies in writing skills.

UNIT I

Reading : *On the conduct of life:* William Hazlitt
Grammar : Prepositions
Vocabulary : Word Formation I: Introduction to Word Formation
Writing : Clauses and Sentences
Life skills : **Values and Ethics**
If: Rudyard Kipling

UNIT II

Reading : *The Brook:* Alfred Tennyson
Grammar : Articles
Vocabulary : Word Formation II: Root Words from other Languages
Writing : Punctuation
Life skills : **Self – Improvement**
How I Became a Public Speaker: George Bernard Shaw

UNIT III

Reading : *The Death Trap*: Saki
Grammar : Noun-Pronoun Agreement
Subject- Verb Agreement
Vocabulary : Word Formation III: Prefixes and Suffixes
Writing : Principles of Good Writing
Life skills : **Time Management**
On saving Time: Seneca

UNIT IV

Reading : *ChinduYellama*
Grammar : Misplaced Modifiers
Vocabulary : Synonyms; Antonyms
Writing : Essay Writing
Life skills : **Innovation**
Muhammad Yunus

UNIT V

Reading : *Politics and the English Language*: George Orwell
Grammar : Clichés; Redundancies
Vocabulary : Common Abbreviations
Writing : Writing a Summary
Life skills : **Motivation**
The Dancer with a White Parasol: Ranjana Dave

Prescribed Textbook: *Language and Life: A Skills Approach* Board of Editors, Orient Black Swan Publishers, India. 2018.

Suggested Readings

- Practical English Usage. Michael Swan. OUP. 1995.
- Remedial English Grammar. F.T. Wood. Macmillan.2007
- On Writing Well. William Zinsser. Harper Resource Book. 2001
- Study Writing. Liz Hamp – Lyons and Ben Heasly. Cambridge University Press. 2006.
- Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
- Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AMC9901	3	0	0	0	CIA	30 M
Course Title	:	HUMAN VALUES AND PROFESSIONAL ETHICS					SEE	--

COURSE OBJECTIVES: -This introductory course input is intended.

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

UNIT I

Course Introduction –Need, basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self-Exploration – what is it? – its content and process; 'Natural Acceptance' and Experiential Validation – as the mechanism for self-exploration. Continuous Happiness and Prosperity – A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities – The basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly – A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT II

Understanding Harmony in the Human Being – Harmony in Myself! Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' – Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT III

Understanding Harmony in the Family and Society – Harmony in Human – Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human – human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay – tripti;

Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society – Undivided Society (Akhand Samaj), Universal Order (SarvabhaumVyawastha) – from family to world family!

UNIT IV

Understanding Harmony in the nature and Existence – Whole existence as Co – existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature – recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astiva) of mutually interacting units in all – pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order,
b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order.

a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b. At the level of society: as mutually enriching institutions and organizations.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

REFERENCE BOOKS:

1. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
9. E G Seebauer& Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajan, S Natrajan& V. S Senthil kumar, Engineering Ethics (includingHumna Values), Eastern Economy Edition, Prentice Hall of India Ltd.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. AI Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19ABS9905	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING CHEMISTRY LAB					SEE	70 M

COURSE OBJECTIVES:

1. To Verify the fundamental concepts with experiments

COURSE OUTCOMES: At the end of the course, the students will be able to

1. **Prepare** of various Solutions
2. **Determine** the hardness of water
3. **Analysis** of water
4. **Calculate the** cell constant and conductance of solutions
5. **Determine** the physical properties like viscosity, acid number, saponification number
6. **Estimate** the Iron and Calcium in cement

LIST OF EXPERIMENTS:

1. Preparation of Primary Standard (sodium carbonate) Solution.
2. Estimation of Hardness of Water by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method.
4. Estimation of Available Chlorine in Bleaching Powder.
5. Estimation of Ferrous ion in the given Mohr Salt by using KMnO4 Solution
6. Determination of Strength of an Acid in Pb – Acid Battery.
7. Preparation of Polymer (Bakelite).
8. Determination of Cell Constant and Conductance of Solutions
9. Determination of Strength of Acid by Conductometric Titrations.
10. Estimation of Calcium in Port land Cement.
11. Determination of Iron in Cement Sample by Colorimeter.
12. Determination of Viscosity of Lubricating Oil using Ostwald Viscometer.
13. Determination of Average Molecular Mass of given Polymer (Polyvinyl Alcohol) by Using Ostwald Viscometer.
14. Determination of acid number of given lubricating oil.
15. Determination of Saponification number of given lubricating oil.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AES0502	0	0	3	1.5	CIA	30 M
Course Title	:	C PROGRAMMING LAB					SEE	70 M

COURSE OBJECTIVES:

1. To learn about the computer systems, computing environments, developing a computer program and structure of C.
2. To gain Knowledge of the operators, control statements in C.
3. To learn about the design concepts of arrays, strings and their usage.
4. To assimilate about pointers and dynamic memory allocation.

COURSE OUTCOMES:

1. Acquire skills to write, compile and debug programs in c language.
2. Be able to use different operators, data types and write programs
3. Acquire knowledge to select the best loop construct for a given problem.
4. Design and implement programs to analyze the array applications.
5. Design and implement C programs with Functions.

Exercise: 1

a) Write a C program to print a given statement.
b) Write a C program for exchanging (interchanging) values of two variables.
c) Write a C program to find the reverses of a given Number.

Exercise: 2

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program to find the second maximum number among the given list of numbers.
c) Write a C program to find the kthsmallest number among the given list of numbers.

Exercise: 3

a) Write a C program to demonstrate various operators (Arithmetic operator, increment & decrement operator, Relational operator, and Assignment operator).
b) Write a C Program, to counts number of positive and negative numbers separately and also compute the sum ofthem.

Exercise: 4

a) Write a C program to generate the first ‘n’ terms in the sequence of Fibonacci series.

Exercise: 5

a) Write a C program to generate all the prime numbers between 1 and n, where ‘n’ is the value given by the user.
b) Write a program which Prints the following patterns.

```
ABCDEFGFEDCBA          0
ABCDEF FEDCBA         111
ABCDE   EDCBA        22222
ABCD     DCBA       3333333
ABC       CBA      444444444
AB         BA
A           A
```

c) Write a C program to generate Pascal’s triangle.
d) Write a C program to construct a pyramid of numbers.

Exercise: 6

a) Write a C program, for the arithmetic operators using switch case (which takes two integer operands and one operator from the user, performs the specified operation and then prints the result. (Consider the operators +,- ,*, /, % and use Switch Statement)
b) Write a program to find G.C.D (Greatest Common Divisor) of two numbers using recursion and non-recursion.
c) Write a program to find factorial of a number using recursion and non-recursion.

Exercise: 7

a) Write a C program to calculate distance between two points.
b) Write a program to find Roots of quadratic equation.

Exercise: 8

a) Write a C program to perform Matrix Addition
b) Write a C program to perform Matrix Multiplication
c) Write a C program to perform inverse of a Matrix.
d) Write a C program to find the transpose of a given matrix.

Exercise: 9

a) Write a C program for any numerical method.
b) Write a C program to make a simple calculator.

Exercise: 10

a) Write a C program to solve Towers of Hanoi problem by using recursive function.
b) Write a C program to know if the given string is a palindrome or non-palindrome.
c) Write a C program to find whether the given year is a leap year or not.

Exercise: 11

a) Write a C program to insert a sub-string in to the given main string.
b) Write a C program to demonstrate the parameter passing mechanism using: call-by-value, call-by-reference.

Exercise: 12

a) Implement the sorting algorithm: Insertion sort and Selection sort.
b) Write a C program to access elements of an array using pointers
c) Write a C program to find the sum of numbers with arrays and pointers.

Exercise: 13

a) Implementation of string using operations.
   i) Copy
   ii) Concatenate
   iii) Length
   iv) Compare

Exercise: 14

a) Write a C program to find the position of a substring.
b) Write a C program to represent complex numbers using structure.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AHS9902	0	0	3	1.5	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH LAB					SEE	70 M

COURSE OBJECTIVES:
1. Students will be exposed to a variety of self-instructional, learner friendly modes of language learning
2. Students will cultivate the habit of reading passages from the computer monitor. Thus, providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
3. Students will learn better pronunciation through stress, intonation and rhythm
4. Students will be trained to use language effectively to face interviews, group discussions, public speaking
5. Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

COURSE OUTCOMES:
1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
2. Apply communication skills through various language learning activities.
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional settings.
5. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Unit I
1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

Learning Outcomes: At the end of the module, the learners will be able to
- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit II
1. JAM
2. Small talks on general topics
3. Debates

Learning Outcomes: At the end of the module, the learners will be able to
- Produce a structured talk extemporarily
- Comprehend and produce short talks on general topics
- Participate in debates and speak clearly on a specific topic using suitable discourse markers

Unit III
1. Situational dialogues – Greeting and Introduction
2. Summarizing and note making
3. Vocabulary Building

Learning Outcomes: At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- Summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- Replenish vocabulary with one-word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

Unit IV

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

Learning Outcomes: At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- Understand non-verbal features of communication

Unit V

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

Learning Outcomes: At the end of the module, the learners will be able to

- Make formal oral presentations using effective strategies
- Learn different techniques of précis writing and paraphrasing strategies
- Comprehend while reading different texts and edit short texts by correcting common errors.

B.TECH – III SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to III Semester CE, ECE & ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19ABS9907	2	1	0	3	CIA	30 M
Course Title	:	COMPLEX VARIABLES AND TRANSFORMS					SEE	70 M

COURSE OBJECTIVES: -

- This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables. The student develops the idea of using continuous/discrete transforms.

Unit I: Complex Variable – Differentiation

Introduction to functions of complex variable – concept of Limit & continuity – Differentiation, Cauchy –Riemann equations, analytic functions (exponential, trigonometric, logarithm), harmonic functions, finding harmonic conjugate – construction of analytic function by Milne Thomson method – Conformal mappings – standard and special transformations (sin z, e^z, cos z, z^2) Mobius transformations (bilinear) and their properties.

Learning Outcomes: Students will be able to:

- Understand functions of Complex variable and its properties.
- Find derivatives of complex functions.
- Understand the analyticity of complex functions.
- Understand the conformal mappings of complex functions.

Unit II: Complex Variable – Integration

Line integral – Contour integration, Cauchy's integral theorem, Cauchy Integral formula, Liouville's theorem (without proof) and Maximum – Modulus theorem (without proof);power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi-circle with f(z) not having poles on real axis).

Learning Outcomes: Students will be able to

- Understand the integration of complex functions.
- Apply Cauchy's integral theorem and Cauchy's integral formula.
- Understand singularities of complex functions.
- Evaluate improper integrals of complex functions using Residue theorem.

Unit III: Laplace Transforms

Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

Learning Outcomes: Students will be able to

- Understand the concept of Laplace transforms and find the Laplace transforms of elementary functions.
- Find the Laplace transforms of general functions using its properties.
- Understand Laplace transforms of special functions (Unit step function, Unit Impulse & Periodic).

- Apply Laplace transforms to solve Differential Equations.

Unit IV: Fourier series

Determination of Fourier coefficients (Euler's) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity – Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions – typical wave forms – Parseval's formula – Complex form of Fourier series.

Learning Outcomes: Students will be able to

- Understand finding Fourier series expression of the given function.
- Determine Fourier coefficients (Euler's) and identify existence of Fourier series of the given function.
- Expand the given function in Fourier series given in half range interval.
- Apply Fourier series to establish Identities among Euler coefficients.
- Find Fourier series of wave forms.

Unit V: Fourier transforms& Z Transforms:

Fourier integral theorem (without proof) – Fourier sine and cosine integrals-complex form of Fourier integral. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem.

Z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

Learning Outcomes: Students will be able to

- Find Fourier Sine and cosine integrals.
- Understand Fourier transforms.
- Apply properties of Fourier transforms.
- Understand Z transforms.
- Apply properties of Z transforms.
- Apply Z transforms to solve difference equations.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Advanced Engineering Mathematics, by R.K.Jain and S.R.K.Iyengar, Alpha Science International Ltd. Pangboume England.

REFERENCE BOOKS:

1. Higher Engineering Mathematics, by B.V.Ramana, McGraw Hill publishers.
2. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

COURSE OUTCOMES:

After the completion of course, students will be able to

1. Understand the analyticity of complex functions and conformal mappings.
2. Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
3. Understand the usage of Laplace Transforms, Fourier Transforms and Z transforms.
4. Evaluate the Fourier series expansion of periodic functions.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester ECE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AES0203T	2	0	0	2	CIA	30 M
Course Title	:	ELECTRICAL TECHNOLOGY					SEE	70 M

COURSE OBJECTIVES: -

- The constructional features of DC machines, different types of DC machines and their characteristic.
- The constructional details of single-phase transformer and their performance characteristics by conducting suitable tests.
- The analysis of three phase balanced and unbalanced circuits, three phase induction motors and their characteristics.
- The constructional feature and operation of synchronous machines.

Unit I: D.C. Generators

D.C. Generators – Principle of Operation – Constructional Features – E. M.F Equation– Numerical Problems – Methods of Excitation – Separately Excited and Self Excited Generators – Build-Up of E.M.F – Critical Field Resistance and Critical Speed – Load Characteristics of Shunt, Series and Compound Generators – Applications

Learning Outcomes: After completing this unit, the student will be able to:

- To know about principle of operation of a DC machine working as a generator
- To distinguish between self and separately excited generators and classification
- To know how EMF is developed
- To distinguish between critical field resistance and critical speed
- To know about various characteristics of different types of generators

Unit II: D.C. Motors

D.C Motors – Principle of Operation – Back E.M.F.–Torque Equation – Characteristics and Application of Shunt, Series and Compound Motors-Speed Control of D.C. Motors: Armature Voltage and Field Flux Control Methods. Three Point Starter-Losses – Constant & Variable Losses – Calculation of Efficiency – Swinburne's Test.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand the concept of network reduction techniques and Network Theorems. (L1)
- Solve various circuits using Network theorems and network reduction techniques. (L2)
- To know about principle of operation of DC machine working as a motor
- To know about torque developed
- To know about how to control speed of DC shunt motor
- To know about necessity of starter
- To know about various load characteristics of various types of DC motors

Unit III: Single Phase Transformers & Three Phase A.C. Circuits

Introduction – Single Phase Transformers – Constructional Details– EMF Equation – Operation on No Load and on Load – Phasor Diagrams – Equivalent Circuit – Losses and Efficiency – Regulation – OC and SC Tests – Predetermination of Efficiency and Regulation. Analysis of Balanced Three Phase Circuits – Phase Sequence – Star and Delta Connection – Relation between Line and Phase Voltages and Currents in Balanced Systems – Measurement of Active and Reactive Power in Balanced and Unbalanced Three Phase Systems.

Learning Outcomes: After completing this unit, the student will be able to:

- To understand the principle of operation of 1-ϕ transformer
- To understand computation and predetermination of regulation of a 1-ϕ transformer
- To know about basics of three phase circuits
- To distinguish between phase voltages, currents, line values and phase values
- To distinguish between balanced and unbalanced three phase circuits and power measurement

Unit IV: 3-Phase Induction Motors

Poly-phase Induction Motors – Construction Details of Cage and Wound Rotor Machines – Principle of Operation – Slip – Rotor EMF and Rotor Frequency – Torque Equation – Torque Slip Characteristics – Losses and efficiency.

Learning Outcomes: After completing this unit, the student will be able to:

- To know about principle of operation of three phase induction motor
- To distinguish between squirrel cage and slip ring induction motors
- To know about various losses and computation of efficiency of induction motor
- To know about the torque developed by the induction motor
- To understand various characteristics of induction motor

Unit V:Synchronous Machines

Principle and Constructional Features of Salient Pole and Round Rotor Machines – E.M.F Equation – Voltage Regulation by Synchronous Impedance Method – Theory of Operation of Synchronous Motor.

Learning Outcomes: After completing this unit, the student will be able to:

- To know about principle of working of alternator
- To distinguish between salient pole and cylindrical rotor machines
- To know about EMF equation
- To know about predetermination of regulation of alternator by synchronous impedance method
- To know about principle of operation of synchronous motor

TEXT BOOKS:

1. I.J.Nagrath & D.P.Kothari,"Electric Machines",7th Edition,Tata Mc Graw Hill, 2005
2. T.K.Nagsarkar and M. S. Sukhija, "Basic Electrical Engineering", 3rd Edition, Oxford
    a. University Press 2017.

REFERENCE BOOKS:

1. B. R. Gupta & Vandana Singhal, "Fundamentals of Electric Machines", 3rd Edition, New age International Publishers, 2005.
2. S. Kamakashiah, "Electromechanics – III", overseas publishers Pvt. Ltd.
3. V.K. Mehta and Rohit Mehta, "Principles of Electrical Engineering", S.Chand Publications, 2005.

COURSE OUTCOMES: After successful completion of the course, the students will be able to

CO1: Able to calculate the EMF generated on DC Generator also able to control speed of different DC motors.

CO2: Able to conduct open circuit and short circuit tests on single phase transformer for knowing their characteristics.

CO3: Able to analyse three phase circuits, three induction motor operating principle and know their torque slip characteristics.

CO4: Able to have knowledge on synchronous machine with which he/she can able to apply the above conceptual things to real – world problems and applications.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester CE, CSE & ME)

(For III Semester ECE weekly 02 hrs. with 02 Credits only)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AES0503T	3	0	0	3	CIA	30 M
Course Title	:	DATA STRUCTURES					SEE	70 M

COURSE OBJECTIVES: -

- To teach the representation of solution to the problem using algorithm
- To explain the approach to algorithm analysis
- To introduce different data structures for solving the problems
- To demonstrate modeling of the given problem as a graph
- To elucidate the existing hashing techniques

Unit I: Introduction

Algorithm Specification, Performance analysis, Performance Measurement. Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions. Sorting: Motivation, Insertion sort, Quick sort, how fast can we sort, Merge sort, Heap sort.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Analyze the given algorithm to find the time and space complexities. (L4)
- Select appropriate sorting algorithm (L4)
- Design a sorting algorithm (L6)

Unit II: Stack, Queue and Linked lists

Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Evaluate expressions (L5)
- Develop the applications using stacks and queues (L3)
- Construct the linked lists for various applications (L6)

Unit III: Trees

Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, Counting Binary Trees, Optimal Binary search Trees, AVL Trees. B-Trees: B-Trees, B + Trees.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain the concept of a tree (L2)
- Compare different tree structures (L4)
- Apply trees for indexing (L3)

Unit IV: Graphs and Hashing

The Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure.

Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Recognize the importance of Graphs in solving real world problems (L2)
- Apply various graph traversal methods to applications (L3)
- Design a minimum cost solution for a problem using spanning trees (L6)
- Select the appropriate hashing technique for a given application (L5)
- Design a hashing technique (L6)

Unit V: Files and Advanced sorting

File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization.

Advanced sorting: Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.

Learning Outcomes: Students will be able to

- Organize files (L3)
- Design the algorithms which sort the elements which doesn't fit in main memory (L6)

TEXT BOOKS:

1. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures in C", 2nd Edition, Galgotia Book Source, Pvt. Ltd., 2004.
2. ALAN L. THARP, "File Organization and Processing", Wiley and Sons, 1988.

REFERENCE BOOKS:

1. D. Samantha, "Classic Data Structures", 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
2. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016
3. Richard F.Gilberg, Behrouz A.Forouzan," Data Structures A Pseudo Code Approach with C", Second Edition, Cengage Learning 2005.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Select Appropriate Data Structure for solving a real-world problem. (L4)
2. Select appropriate file organization technique depending on the processing to be done. (L4)
3. Construct Indexes for Databases. (L6)
4. Analyze the Algorithms.(L4).
5. Develop Algorithm for Sorting large files of data.(L3).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0401	3	0	0	3	CIA	30 M
Course Title	:	NETWORK THEORY					SEE	70 M

COURSE OBJECTIVES: -

- To study about basic laws that govern flow of current, different sources of voltage and currents
- To understand basic concepts on basic RLC circuits and analyze.
- To study and apply circuit theorems
- To know the behavior of the steady states and transients' states in RLC circuits and analyze them.
- To study the basic Laplace Transforms techniques and principles of coupling
- To understand the two port network parameters & network functions

Unit I: Basic Circuit Analysis

Review of Kirchhoff's laws, Nodal and Mesh Analysis. Network Topology: Graph of a network, Concept of tree and co – tree, incidence matrix, f – circuit matrix and f – cutset matrix, Tie set and Cut – set Matrices for planar networks.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand Nodal and Mesh Analyses and various Network topologies. (L1)
- Solve network problems using Nodal and Mesh Analyses. (L2)

Unit II: Network reduction techniques & Theorems

Series, parallel, series-parallel, star-to-delta, delta-to-star transformation, source transformation. Network Theorems such as Thevenin's, Norton's, Superposition, Maximum Power Transfer, Reciprocity, Milliman, Miller and Tellegan's Theorems.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand the concept of network reduction techniques and Network Theorems. (L1)
- Solve various circuits using Network theorems and network reduction techniques. (L2)

Unit III: Transient Analysis

Transient analysis of RC, RL and RLC Circuits, Circuits with switches, step response, 2nd order series and parallel RLC Circuits. Analysis of transient circuits with Laplace Transform technique for step, impulse and exponential excitations.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand basic characteristics of passive elements and associated circuits in transient analysis. (L1)
- Problem solving ability using conventional and Laplace Transform techniques in the transient analysis of RLC circuits. (L2)

Unit IV: Single Phase AC Circuits

Review of AC circuit fundamentals, R-L-C circuits, Impedance, Average & RMS values of an ac signal, Real and Apparent Powers, Coupled Circuits: Magnetic Circuits, Self and Mutual inductances, dot convention, impedance, reactance concept, Impedance transformation and coupled circuits, co-efficient of coupling, equivalent T for Magnetically coupled circuits, Ideal Transformer. Series and Parallel Resonance Circuits – Concept of resonance, Q-factor, bandwidth, voltage amplifier, current amplifier, different combinations of R L C circuits.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand the fundamentals of AC circuits and calculate the different parameters of the signal. (L1)
- Derive resonant frequency and bandwidth of series and parallel RLC circuits. (L3)

Unit V:Two Port Networks

Two port network parameters, Z, Y, ABCD, h and g parameters, Relationship between parameter sets, Interconnection of two port networks. Characteristic impedance, Image transfer constant, image and iterative impedance. Network functions: Driving point and transfer functions – using transformed (S) variables, Poles and Zeros.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand the concept of two port networks and determine network parameters for given two port networks. (L1)
- Analyze the transfer functions for a given network. (L3)

TEXT BOOKS:

1. Engineering circuit analysis – by William Hayt and Jack E. Kemmerly, 6th Edition, McGraw Hill Company.
2. M E Van Valkenburg, “Network Analysis”, Prentice – Hall of India Pvt. Ltd, New Delhi.

REFERENCE BOOKS:

1. Millek P. Groover, “Fundamentals of Modern Manufacturing”: “Materials, Processes and Systems”, 4th edition, John Wiley and Sons Inc, 2010.
2. Sharma P.C., “A Text book of Production Technology”, 8th edition, S Chand Publishing, 2014.
3. Linear circuit analysis (time domain phasor and Laplace transform approaches) – 2nd Edition by Raymond A. De-Carlo and Pen-Min-Lin, Oxford University Press-2004.
4. Network Theory by N.C. Jagan& C. Lakshmi Narayana, B.S. Publications.
5. Network Theory by Sudhakar, Shyam Mohan Palli, TM

COURSE OUTCOMES: After successful completion of the course, the students will be able to

CO1: Understand the characteristics of passive elements (R, L, C) for both DC and AC excitations, basic concepts of Network Topologies, Theorems, Nodal and Mesh Analyses,

CO2: Apply different network theorems, and Kirchhoff’s Laws to electrical circuits for solving problems

CO3: Analyze the RLC circuits for different excitations (both DC, and AC), two port networks with their equivalent representations using two port parameters.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0402	3	0	0	3	CIA	30 M
Course Title	:	SIGNALS AND SYSTEMS					SEE	70 M

COURSE OBJECTIVES: -

- To introduce students to the basic idea of signal and system analysis and its characterization in time and frequency domains.
- To present Fourier tools through the analogy between vectors and signals.
- To teach concept of sampling and reconstruction of signals.
- To analyze characteristics of linear systems in time and frequency domains.
- To understand Laplace and z-transforms as mathematical tool to analyze continuous and discrete-time signals and systems.

Unit I: Signals & Systems

Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Analogy between vectors and signals-Orthogonality, mean square error, Fourier series: Trigonometric & Exponential, Properties of Fourier series, concept of discrete spectrum, Illustrative Problems.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand different types of signals and systems. (L1)
- State principles of vector spaces and concept of Orthogonality. (L2)
- Describe continuous time signal and discrete time signal. (L2)
- Analyze the periodic signals by applying Fourier series. (L3)

Unit II: Continuous Time Fourier Transform

Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform. Statement and proof of sampling theorem of low pass signals, Illustrative Problems.

Learning Outcomes: After completing this unit, the student will be able to:

- Identify system properties based on impulse response and Fourier analysis. (L1)
- Analyze the spectral characteristics of signals. (L3)
- Illustrate signal sampling and its reconstruction. (L2)
- Apply Fourier transform to solve problems. (L2)

Unit III: Discrete Time Fourier Transform

Definition, Computation and properties of Discrete Time Fourier transform for different types of signals and systems, Illustrative Problems.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand the properties of the discrete-time Fourier transform. (L1)
- Analyze the spectral characteristics of signals using Fourier transform. (L3)
- Evaluate the Fourier transform of Discrete-time signals. (L2)

Unit IV: Signal Transmission Through Linear Systems

Linear system, impulse response, Response of a linear system for different input signals, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between bandwidth and rise time, Energy and Power spectral densities, Illustrative Problems.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand the impulse response, transfer characteristics of LTI system and various filters. (L1)
- Analyze filter characteristics and physical realization of LTI system. (L3)
- Apply the relation between bandwidth and rise time & energy and power spectral densities in various applications. (L2)

Unit V: Laplace Transforms and Z - Transforms

Laplace Transform: Definition, ROC, Properties, Inverse Laplace transforms, the S-plane and BIBO stability, Transfer functions, System Response to standard signals, Solution of differential equations with initial conditions.

Z–Transform: Definition, ROC, Properties, Poles and Zeros in Z-plane, The inverse Z-Transform, System analysis, Transfer function, BIBO stability, System Response to standard signals, Solution of difference equations with initial conditions, Illustrative Problems.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand the limitations of Fourier transform and need for Laplace transform and develop. (L1)
- Apply transform techniques to analyze discrete-time signals and systems. (L2)
- Evaluate response of linear systems to known inputs by using Laplace transforms. (L2)
- Analyze the continuous-time and discrete-time signals and systems using Laplace and Z- transforms. (L3)

TEXT BOOKS:

1. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, “Signals and Systems”, 2nd Edition, PHI, 2009.
2. Simon Haykin and Van Veen, “Signals & Systems”, 2nd Edition, Wiley, 2005.

REFERENCE BOOKS:

1. BP Lathi, “Principles of Linear Systems and Signals”, 2nd Edition, Oxford University Press, 015.
2. Matthew Sadiku and Warsame H. Ali, “Signals and Systems A primer with MATLAB”, CRC Press, 2016.
3. Hwei Hsu, “Schaum's Outline of Signals and Systems”, 4thEdition, TMH, 2019.

COURSE OUTCOMES: After successful completion of the course, the students will be able to

- **CO1:** Understand the mathematical description and representation of continuous-time and discrete-time signals and systems. Also understand the concepts of various transform techniques. (L1)
- **CO2:** Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems. (L2)
- **CO3:** Analyze the frequency spectra of various continuous-time and discrete-time signals using different transform methods. (L3)
- **CO4:** Classify the systems based on their properties and determine the response of them. (L4)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0403T	3	0	0	3	CIA	30 M
Course Title	:	ELECTRONIC DEVICES AND CIRCUITS					SEE	70 M

PREREQUISITES: Semiconductor Physics
Emphasis on this terminology: Energy band diagram of Insulators, Semiconductors and Metals, Mobility and Conductivity, Electrons and Holes in Intrinsic semiconductor, Donor and Acceptor impurities, drift and diffusion currents, charge densities and semiconductor. Fermi – Dirac function, Carrier concentrations, Fermi level in an intrinsic semiconductor, Fermi level in a semiconductor having impurities.

COURSE OBJECTIVES: -
- To introduce different types of semiconductor devices, viz., diodes and special diodes,
- To explain application of diodes as rectifiers, clippers, clampers and regulators
- To describe operation and characteristics of Bipolar Junction Transistor& Field Effect Transistor.
- To educate the procedure to design amplifier circuits using BJTs & FETs.

Unit I: Semiconductor Devices
Review of semiconductors - construction, characteristics, and operation of PN junction diodes, Principle of operation and characteristics of Tunnel diode with the help of Energy band diagram, Photo diode, LED, PIN diode and Varactor diode, Silicon Controlled Rectifier (SCR) and its V-I characteristics, DIAC, TRIAC, Schottky Barrier diode, solar cell, Uni – Junction Transistor (UJT) and its V-I Characteristics, Problem solving.

Learning Outcomes: After completing this unit, the student will be able to:
- Understand the working principle of various solid state semiconductor devices. (L1)
- To solve simple problems based on the concepts related to all the active devices. (L2)
- Study the characteristics and operation of p-n junction diodes(L1)
- Analyze performance of rectifiers with and without filters (L3)
- Design half wave and full wave rectifier circuits, clippers, clampers (L4)
- Understand the characteristics & applications of Zener diode, and other special devices (L1)

Unit II: Diode Applications
Diode as switch, Rectifier – Half wave and Full wave rectifier, Bridge rectifier, Ripple factor, PIV, Filters – Inductor and Capacitor Filter, L-section filter, pi-Filter, Zener as voltage regulator, Clipping and Clamping circuits, Detector, Voltage doubler, Problem solving related to diode applications.

Learning Outcomes: After completing this unit, the student will be able to:
- Analyze performance of rectifiers with and without filters (L3)
- Design half wave and full wave rectifier circuits, clippers, clampers (L4)
- Understand the characteristics and applications of Zener diode (L1)

Unit III: Bipolar Junction Transistor (BJT)

Review of BJT basic characteristics in different configurations (PNP and NPN transistors) – Active mode of operation, Transistor equations, Transistor as an amplifier, DC analyses of Common Base, Common Emitter and Common collector circuits.

BJT Biasing: Load line and modes of operations, operating point, Bias stability, fixed bias, self-bias, stabilization against variations in I_{co}, V_{BE}, β, Bias compensation, Thermal runaway, condition for Thermal stability, Problem solving.
Applications: As a switch, as an amplifier.

Learning Outcomes: After completing this unit, the student will be able to:

- Explain principle, operation & applications of Bipolar Junction Transistor (L1)
- Describe input and output Characteristics of Bipolar Junction Transistor (L1)
- Apply BJT as a Switch and Amplifier (L2)
- Analyze the different circuits CB, CC, CE (L3)

Unit IV: FIELD – EFFECT TRANSISTORS

Metal Oxide Semiconductor Field-effect Transistor (MOSFET) - structures and V-I characteristics of n-channel Enhancement mode MOSFET, p-channel Enhancement mode MOSFET, n-channel depletion mode MOSFET, p-channel depletion mode MOSFET, symbols and conventions, Complementary MOSFETs (CMOSFETs) – structure, V-I characteristics, symbols and conventions, structure and V-I characteristics of n-channel and p-channel Junction Field Effect Transistors (JFET), Problem solving.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand construction and principle of operation all MOSFET transistors (L1)
- Finding important parameters of MOSFETs from the characteristics (L2)

Unit V:Biasing Circuits using MOSFETs and JFETs

Different configurations using MOSFETs and JFET, load line and modes of operation, different biasing circuits (self-bias, bias with source resistance, voltage divider bias) using MOSFETs and JFETs, DC Analysis of n-channel and p-channel MOSFETs (both Enhancement and Depletion modes), DC analysis of n-channel and p-channel JFETs,
Applications: MOSFETs, JFET as switch and small signal amplifier, CMOS as a switch.

Learning Outcomes: After completing this unit, the student will be able to:

- Explain principle, operation&application of Field Effect Transistor(L1)
- Describe input and output Characteristics of Field Effect Transistor(L1)
- Apply FET as amplifier and Switch(L2)

TEXT BOOKS:

1. Adel S. Sedra and Kenneth C. Smith, "Micro Electronic Circuits", Oxford University Press International, 6th Edition (2013).
2. Donald A Neamen, "Electronic Circuits – analysis and design", 3rdEdition, McGraw Hill (India), 2019.
3. J. Milliman and C Halkias, "Integrated electronics", 2nd Edition, Tata McGraw Hill, 1991.

REFERENCE BOOKS:

1. Behzad Razavi, "Microelectronics", Second edition, Wiley, 2013.
2. R.L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits," 9th Edition, Pearson, 2006.

3. Jimmie J Cathey, "Electronic Devices and Circuits," Schaum's outlines series, 3rd edition, McGraw-Hill (India), 2010.

COURSE OUTCOMES: After successful completion of the course, the students will be able to

CO1: Describe basic operation and characteristics of various semiconductor devices.
CO2: Analyze diode circuits for different applications such as rectifiers, clippers and clampers also analyze low frequency and high frequency models of BJT and FET.
CO3: Understand principle, operation, characteristics and applications of Bipolar Junction Transistor and Field Effect Transistor.
CO4: Design BJT and FET amplifier circuits.
CO5: Determine performance parameters of BJT & FET amplifiers.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0404	3	0	0	3	CIA	30 M
Course Title	:	DIGITAL ELECTRONICS AND LOGIC DESIGN					SEE	70 M

COURSE OBJECTIVES: -

- To teach significance of number systems, conversions, binary codes and functionality of logic gates.
- To discuss different simplification methods for minimizing Boolean functions.
- To impart knowledge on operation, characteristics and various configurations of TTL and CMOS logic families.
- To outline procedures for the analysis and design of combinational and sequential logic circuits.
- To introduce programmable logic devices.

Unit I:

Number Systems and Codes: Decimal, Binary, Octal, and Hexa – decimal number systems and their conversions, ASCII code, Excess -3 codes, gray code.
Binary codes Classification, Error detection and correction – Parity generators and checkers – Fixed point and floating – point arithmetic.

Boolean Algebra& Logic Gates: Boolean operations, Boolean functions, Algebraic manipulations, Min-terms and Max-terms, Sum-of-products and Product-of-sum representations, Two-input logic gates, NAND /NOR implementations.

Minimization of Boolean Functions: Karnaugh map, Don't-care conditions, Prime implicants, Minimization of functions using Quine – McCluskey method.

Learning Outcomes: After completing this unit, the student will be able to:

- Summarize advantages of using different number systems. (L2)
- Explain usefulness of different coding schemes and functionality of logic gates. (L2)
- Apply basic laws and De Morgan's theorems to simplify Boolean expressions. (L3)
- Compare K- Map and Q-M methods of minimizing logic functions. (L5)

Unit II:

Combinational Circuits: Introduction, Analysis of combinational circuits, Design Procedure–Binary Adder-Subtractor, Decimal Adder, Multiplier, Comparator, Code Converters, Encoders, Decoders, Multiplexers, Demultiplexers, Illustrative examples.

Sequential Circuits-1: Introduction, Latches –RS latch and JK latch, Flip-flops-RS, JK, T and D flip flops, Master-slave flip flops, Edge-triggered flip-flops, and Flip-flop conversions.

Learning Outcomes: After completing this unit, the student will be able to:

- Apply Boolean algebra for describing combinational digital circuits. (L2)
- Analyze standard combinational circuits such as adders, subtractors, multipliers, comparators etc. (L4)
- Design various Combinational logic circuits. (L4)
- Implement logic functions with decoders and multiplexers. (L5)

Unit III:

Sequential Circuits – 2: Analysis and Design of Synchronous Sequential Circuits: Moore and Mealy machine models, State Equations, State Table, State diagram, State reduction & assignment, Synthesis using flip flops, Elements of Design style, Top–down design, Algorithmic state Machines (ASM), ASM chart notations.

Registers and Counters: Registers, shift registers, Ripple counters, Synchronous counters, Modulus-n Counter, Ring counter, Johnson counter, Up-Down counter.

Learning Outcomes: After completing this unit, the student will be able to:
- Describe behavior of Flip-Flops and Latches. (L2)
- Compare Moore and Mealy machine models. (L5)
- Design synchronous sequential circuits using flip flops and construct digital systems using components such as registers and counters (L4)
- Utilize concepts of state and state transition for analysis and design of sequential circuits (L3)

Unit IV: Memory and Programmable Logic

RAM, Types of Memories, Memory decoding, ROM, Types of ROM, Programmable Logic Devices (PLDs): Basic concepts, PROM as PLD, Programmable Array Logic (PAL) and Programmable Logic Array (PLA), Design of combinational and sequential circuits using PLDs.

Learning Outcomes: After completing this unit, the student will be able to:
- Define RAM, ROM, PROM, EPROM and PLDs. (L1)
- Describe functional differences between different types of RAM & ROM. (L2)
- Compare different types of Programmable Logic Devices. (L5)
- Design simple digital systems using PLDs. (L4)

Unit V:

Digital Logic Families: Unipolar and Bipolar Logic Families, Transistor-Transistor Logic (TTL): Operation of TTL, Current sink logic, TTL with active pull up, TTL with open collector output, Shockley TTL, TTL characteristics, I^2L, ECL logic Families.

CMOS: CMOS Inverter, CMOS characteristics, CMOS configurations - Wired Logic, Open drain outputs, Interfacing: TTL to CMOS and CMOS to TTL, Tristate Logic, Characteristics of Digital ICs: Speed, power dissipation, figure of merit, fan-out, Current and voltage parameters, Noise immunity, operating temperature range, power supply requirements.

Learning Outcomes: After completing this unit, the student will be able to:
- Summarize significance of various TTL, I^2L, ECL and CMOS subfamilies. (L2)
- Examine Interface aspects of TTL & CMOS logic families. (L5)
- Explain characteristics of digital ICs such as speed, power dissipation, figure of merit, fan-out, noise immunity etc. (L2)
- Compare bipolar and MOS logic families. (L5)

TEXT BOOKS:

1. M. Morris Mano and Michael D. Ciletti, “Digital Design", 4th Edition,Pearson Education, 2013.
2. Z. Kohavi and N. K. Jha, “Switching and Finite Automata Theory”, 3rdEdition, Tata McGraw Hill, 2010.
3. R. P. Jain, "Modern Digital Electronics", 4th edition, McGraw Hill Education (India Private Limited), 2012.

REFERENCE BOOKS:

1. Wakerly J.F., "Digital Design: Principles and Practices", 4th Edition, Pearson India, 2008.
2. Charles H Roth (Jr), Larry L. Kinney, "Fundamentals of Logic Design", 5thEdition, Cengage Learning India Edition, 2010.
3. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.

COURSE OUTCOMES: After successful completion of the course, the students will be able to

CO1: Understand various number systems, error detecting, correcting binary codes, logic families, combinational and sequential circuits.

CO2: Apply Boolean laws, k-map and Q-M methods to minimize switching functions. Also describe the various performance metrics for logic families.

CO3: Compare different types of Programmable logic devices and logic families.

CO4: Design combinational and sequential logic circuits.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AES0203P	0	0	3	1.5	CIA	30 M
Course Title	:	ELECTRICAL TECHNOLOGY LAB					SEE	70 M

COURSE OBJECTIVES: -
- To do experiments on DC generators
- To do experiments on DC motors
- To do experiments on 1-ϕ transformer
- To do power measurements in 3-ϕ balanced and unbalanced circuits
- To do tests on 3-ϕ Induction motors
- To do experiment on Alternator
- To do experiment on Synchronous motor

Note: Student has to perform at least 10 experiments

List of Experiments:
1. OCC of a separately excited DC generator
2. Load characteristics of DC shunt generator
3. Load characteristics of DC shunt motor
4. Swinburne's test
5. Speed control of DC shunt motor
6. OC & SC tests on a 1-ϕ transformer
7. Measurement of Active and reactive powers in a 3-ϕ balanced circuit
8. Measurement of 3-ϕ power using two wattmeter method in unbalanced circuit
9. Load test on Squirrel cage Induction motor
10. Load test on Slip ring Induction motor
11. Predetermination of regulation of alternator by Synchronous impedance method
12. V and Inverted V curves of Synchronous motor

COURSE OUTCOMES:

CO1: Understand various characteristics of DC generators and DC motors, and Transformers

CO2: Experiment on the Electrical Machines and verify the results

CO3: Analyze the DC generators, Transformers and DC motors and verify the efficiency of them

CO4: Compare the experimental results with the analytical values.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to III Semester CE, CSE & ME)
(For III Semester ECE weekly 02 hrs. with 01 Credits only)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AES0503P	0	0	3	1.5	CIA	30 M
Course Title	:	DATA STRUCTURES LAB					SEE	70 M

COURSE OBJECTIVES: -

- To introduce to the different data structures
- To elucidate how the data structure selection influences the algorithm complexity
- To explain the different operations that can be performed on different data structures
- To introduce the different search and sorting algorithms.

LIST OF EXPERIMENTS:

1. String operations using array of pointers
2. Searching Algorithms (With the Number of Key Comparisons) Sequential, Binary and Fibonacci Search Algorithms.
3. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort. Using the system clock, compute the time taken for sorting of elements. The time for other operations like I/O etc should not be considered while computing time.
4. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List
5. Stack implementation using arrays
6. Stack implementation using linked lists
7. Queue implementation using arrays. Implement different forms of queue. While implementing you should be able to store elements equal to the size of the queue. No positions should be left blank.
8. Queue implementation using linked lists
9. Creation of binary search tree, performing operations insertion, deletion, and traversal.
10. Breadth first search
11. Depth first search
12. Travelling sales man problem
13. File operations
14. Indexing of a file

OPTIONAL:

15. Reversing the links (not just displaying) of a linked list.
16. Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using 'Ladies first' principle. You may create new linked lists if necessary.
17. An expression can be represented in three ways: infix, prefix and postfix. All the forms are necessary in different contexts. Write modules to convert from one form to another form.
18. A table can be defined as a collection of rows and columns. Each row and column may have a label. Different values are stored in the cells of the table. The values can be of different data types. Numerical operations like summation, average etc can be performed on rows/columns which contain numerical data. Such operations are to be prevented on data which is not numeric. User may like to insert row/columns in the already existing table. User may like to remove row/column. Create table data type and support different operations on it.

COURSE OUTCOMES: After successful completion of this Lab, the students will be able to:

1) Select the data structure appropriate for solving the problem (L5)
2) Implement searching and sorting algorithms (L3)
3) Design new data types (L6)
4) Illustrate the working of stack and queue (L4)
5) Organize the data in the form of files (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0403P	0	0	3	1.5	CIA	30 M
Course Title	:	ELECTRONIC DEVICES AND CIRCUITS LAB					SEE	70 M

COURSE OBJECTIVES: -

- To verify the theoretical concepts practically from all the experiments.
- To analyze the characteristics of diodes, UJT, BJT, FET, SCR.
- To Model the electronic circuits using tools such as PSPICE/Multisim.

Note: All the experiments shall be implemented using both Hardware and Software. **Student has to perform all experiments.**

LIST OF EXPERIMENTS:

1. Verify the Volt Ampere characteristics of SCR experimentally and **determine holding current and break over voltage** from the graph.
2. Study and draw the Volt Ampere characteristics of UJT and determine **η, I_P, I_v,V_P, &V_v** from the experiment.
3. Design a full wave rectifier for the given specifications with and without filters, and verify the given specifications experimentally. Vary the load and find ripple factor. Draw suitable graphs.
4. Verify various clipping and clamper circuits using PN junction diode and draw the suitable graphs.
5. Design a Zener diode-based**voltage regulator** against variations of supply and load. Verify the same from the experiment.
6. Study and draw the **output** and **transfer** characteristics of MOSFET (Enhance mode) in Common Source Configuration experimentally. Find **Threshold voltage (V_T), g_m, & K** from the graphs.
7. Study and draw the **output** and **transfer** characteristics of MOSFET (Depletion mode) or JFET in Common Source Configuration experimentally. Find **I_{DSS}, g_m, & V_P** from the graphs.
8. Verification of the input and output characteristics of BJT in **Common Emitter** configuration experimentally and find required **h – parameters** from the graphs.
9. Study and draw the input and output characteristics of BJT in **Common Base** configuration experimentally, and determine required **h – parameters** from the graphs.
10. Design and analysis of voltage- divider bias/self-bias circuit using BJT.
11. Design and analysis of voltage- divider bias/self-bias circuit using JFET.
12. Design and analysis of self-bias circuit using MOSFET.

Tools / Equipment Required: Software Tool like Multisim / Pspice or Equivalent, DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices

COURSE OUTCOMES:

CO1: Understand the basic characteristics and applications of basic electronic devices. (L1)
CO2: Observe the characteristics of electronic devices by plotting graphs. (L2)
CO3: Analyze the Characteristics of UJT, BJT, FET, and SCR. (L3)

CO3: Design FET based amplifier circuits/BJT based amplifiers for the given specifications. (L4)
CO4: Simulate all circuits in PSPICE /Multisim. (L5).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0405	0	0	2	1	CIA	30 M
Course Title	:	BASIC SIMULATION LAB					SEE	70 M

COURSE OBJECTIVES: -

- To provide practical exposure with generation and simulation of basic signals using standardized tools.
- To teach analyzing signals and sequences using Fourier, Laplace and Z-transforms.
- To enable to write programs for signal processing applications.

Note: All the experiments are to be simulated using MATLAB or equivalent software.

LIST OF EXPERIMENTS:

1. Write a program to generate various Signals and Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc function.
2. Perform operations on Signals and Sequences: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
3. Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings- Plot the discrete spectrum of the signal.
4. Write a program to find Fourier transform of a given signal. Plot its amplitude and phase spectrum.
5. Write a program to convolve two discrete time sequences. Plot all the sequences.
6. Write a program to find autocorrelation and cross correlation of given sequences.
7. Write a program to verify Linearity and Time Invariance properties of a given Continuous/Discrete System.
8. Write a program to generate discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
9. Write a program to find magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
10. Write a program to find response of a low pass filter and high pass filter, when a speech signal is passed through these filters.
11. Write a program to generate Complex Gaussian noise and find its mean, variance, Probability Density Function (PDF) and Power Spectral Density (PSD).
12. Generate a Random data (with bipolar) for a given data rate (say 10kbps). Plot the same for a time period of 0.2 sec.
13. To plot pole-zero diagram in S-plane/Z-plane of given signal/sequence and verify its stability.

COURSE OUTCOMES:

CO1: Understand the basic concepts of programming in MATLAB and explain use of built-in functions to perform assigned task.

CO2: Generate signals and sequences, Input signals to the systems to perform various operations

CO3: Analyze signals using Fourier, Laplace and Z-transforms.

CO4: Compute Fourier Transform of a given signal and plot its magnitude and phase spectrum.

CO5: Verify Sampling theorem, Determine Convolution and Correlation between signals and sequences.

B.TECH – IV SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(IV Semester ECE)

Course Category	:	Basic Sciences Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19ABS9911	3	0	0	3	CIA	30 M
Course Title	:	PROBABILITY THEORY AND STOCHASTIC PROCESSES					SEE	70 M

COURSE OBJECTIVES: -

- To gain the knowledge of the basic probability concepts and acquire skills in handling situations involving more than one random variable and functions of random variables.
- To understand the principles of random signals and random processes.
- To be acquainted with systems involving random signals.
- To gain knowledge of standard distributions that can describe real life phenomena.

Unit I: PROBABILITY INTRODUCED THROUGH SETS AND RELATIVE FREQUENCY

Experiments and Sample Spaces, Discrete and Continuous Sample Spaces, Events, Probability Definitions and Axioms, Mathematical Model of Experiments, Probability as a Relative Frequency, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events, Problem Solving.

Definition of a **Random Variable**, Conditions for a Function to be a Random Variable, Discrete, Continuous, Mixed Random Variable, Distribution and Density functions, Properties, Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh, Conditional Distribution, Methods of defining Conditioning Event, Conditional Density, Properties, Problem Solving.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Understand the fundamental concepts of probability theory, random variables and conditional probability (L1).
- Study the different probability distribution and density functions (L1).

Unit II:

OPERATIONS ON SINGLE RANDOM VARIABLE: Introduction, Expectation of a random variable, Moments - Moments about the origin, Central moments, Variance and Skew, Chebyshev's inequality, Moment generating function, Characteristic function, Transformations of random variable.

MULTIPLE RANDOM VARIABLES: Vector Random Variables, Joint Distribution Function, Properties of Joint Distribution, Marginal Distribution Functions, Conditional Distribution and Density – Point Conditioning, Interval conditioning, Statistical Independence, Sum of Two Random Variables, Sum of Several Random Variables, Central Limit Theorem, (Proof not expected), Unequal Distribution, Equal Distributions.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Apply the knowledge to the sum of random variables, central limit theorem in communication system (L2).
- Evaluate the single and multiple random variable concepts to expectation, variance, and moments (L4).

Unit III: OPERATIONS ON MULTIPLE RANDOM VARIABLES

Expected Value of a Function of Random Variables, Joint Moments about the Origin, Joint Central Moments, Joint Characteristic Functions, Joint Gaussian Random Variables – Two Random Variables case, N Random Variable case, Properties of Gaussian random variables, Transformations of Multiple Random Variables, Linear Transformations of Gaussian Random Variables.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Apply the different operations to multiple random variables (L2).
- Understand the concepts of linear transformation of Gaussian random variables (L1).

Unit IV:

RANDOM PROCESSES-TEMPORAL CHARACTERISTICS: The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence, First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, N-Order and Strict-Sense Stationarity, Time Averages and Ergodicity, Mean-Ergodic Processes, Correlation-Ergodic Processes, Autocorrelation Function and its Properties, Cross-Correlation Function and its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process.

RANDOM PROCESSES-SPECTRAL CHARACTERISTICS: The Power Density Spectrum and its Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum and its Properties, Relationship between Cross-Power Spectrum and Cross-Correlation Function.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Understand and analyze continuous and discrete-time random processes (L1).
- Analyze the concepts and its properties of auto correlation, cross correlation functions and power spectral density (L3).

Unit V:

RANDOM SIGNAL RESPONSE OF LINEAR SYSTEMS: System Response – Convolution, Mean and Mean squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output, Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output, Band pass, Band-limited and Narrowband Processes, Properties.

NOISE DEFINITIONS: White Noise, colored noise and their statistical characteristics, Ideal low pass filtered white noise, RC filtered white noise.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Describe the theory of stochastic processes to analyze linear systems (L2).
- Apply the knowledge to linear systems; low pass and band pass noise models for random processes (L2).

TEXT BOOKS:

1. Peyton Z. Peebles, “Probability, Random Variables & Random Signal Principles”, TMH, 4thEdition, 2002.
2. Athanasios Papoulis and S. Unnikrishna Pillai, “Probability, Random Variables and Stochastic Processes”, PHI, 4th Edition, 2002.

REFERENCE BOOKS:

1. Simon Haykin, “Communication Systems”, Wiley, 3rd Edition, 2010.
2. Henry Stark and John W.Woods, “Probability and Random Processes with Application to Signal Processing,” Pearson Education, 3rd Edition.
3. George R. Cooper, & Clave D. Mc. Gillem, “Probability Methods of Signal and System Analysis,” Oxford, 3rd Edition, 1999.

COURSE OUTCOMES: After successful completion of the course, the students will be able to

CO1: Understand the concepts of Probability, Random Variables, Random Processes and their characteristics learn how to deal with multiple random variables, conditional probability, joint distribution and statistical independence.

CO2: Formulate and solve the engineering problems involving random variables and random processes.

CO3: Analyze various probability density functions of random variables.

CO4: Derive the response of linear system for Gaussian noise and random signals as inputs.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to III Semester ME & IV Semester CE and ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AES0505T	3	0	0	3	CIA	30 M
Course Title	:	PYTHON PROGRAMMING FOR ENGINEERS					SEE	70 M

COURSE OBJECTIVES: -

- To teach the fundamentals of Python
- To elucidate problem-solving using a Python programming language
- To introduce a function-oriented programming paradigm through python
- To develop the skill of designing Graphical user Interfaces in Python
- To learn how to use lists, tuples, and dictionaries in Python programs.

Unit I:
Introduction: What is a program, running python, Arithmetic operators, Value and Types?

Variables, Assignments and Statements: Assignment statements, Script mode, Order of operations, string operations, comments.

Functions: Function calls, Math functions, Composition, adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.

Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.

Learning Outcomes: After successful completion of this unit, the students will be able to

- List the basic constructs of Python (L1)
- Solve the problems by applying modularity principle (L3)

Unit II:
Conditionals and Recursion: Floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.

Fruitful Functions: Return values, Incremental development, Composition, Boolean functions, more recursion, Leap of Faith, Checking types

Iteration: Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms.

Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Apply the conditional execution of the program (L3)
- Apply the principle of recursion to solve the problems (L3)

Unit III:

Case Study: Reading word lists, Search, Looping with indices.

Lists: List is a sequence, Lists are mutable, traversing a list, List operations, List slices, List methods, Map filter and reduce, deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.

Tuples: Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Use the data structures Lists, Dictionaries, and Tuples (L3)
- Design programs for manipulating strings (L6)

Unit IV:

Files: Persistence, Reading and writing, Format operator, Filename and paths, catching exceptions, Databases, Pickling, Pipes, Writing modules.

Classes and Objects: Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.

Classes and Functions: Time, Pure functions, Modifiers, Prototyping versus Planning

Classes and Methods: Object oriented features, Printing objects, The INIT method, The STR method, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation

Inheritance: Card objects, Class attributes, comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Apply object orientation concepts (L3)
- Organize data in the form of files (L6)

Unit V: Overview of Packages for Scientific and Data Processing

Introduction to Machine Learning-History and Evolution, Artificial intelligence Evolution, Different Forms, Machine learning categories, Machine learning Python packages, Data Analysis packages, Machine learning core libraries.

Learning Outcomes: Students will be able to

- Understand Machine learning fundamentals (L2)
- Apply python packages for solving machine learning and data analysis problems (L3)

TEXT BOOKS:

1. Allen B. Downey, “Think Python”, 2nd edition, SPD/O’Reilly, 2016.
2. Manohar Swamynathan, “Mastering Machine learning with Python in Six steps”, Apress.

REFERENCE BOOKS:

1. Martin C.Brown, “The Complete Reference: Python”, McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, “Fundamentals of Python”, CENGAGE, 2015.
3. R. Nageswara Rao, “Core Python Programming”, 2nd edition, Dreamtech Press, 2019

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Explain the features of Python language (L2)
2. Select appropriate data structure of Python for solving a problem (L4)
3. Design object-oriented programs for solving real-world problems (L6)
4. Use Python packages (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to IV Semester CSE & ECE)

Course Category	:	Humanities Sciences Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19ABS9905	3	0	0	3	CIA	30 M
Course Title	:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS					SEE	70 M

COURSE OBJECTIVES: -

- To inculcate the basic knowledge of micro economics and financial accounting analysis
- To understand fundamentals of Production & Cost Concepts to take certain business decisions in the processes of optimum utilization of resources.
- To know various types of Market Structures & pricing methods and its strategies, and Trade Blocks.
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements & analysis for effective business decisions.

Unit I: INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND

Managerial Economics – Definition – Nature & Scope – Contemporary importance of Managerial Economics – Demand Analysis –Concept of Demand –Demand Function – Law of Demand – Elasticity of Demand – Significance – Types of Elasticity -Measurement of Elasticity of Demand - Demand Forecasting – Factors governing Demand Forecasting – Methods of Demand Forecasting – Relationship of Managerial Economics with Financial Accounting and Management.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the nature and scope of Managerial Economics and its importance
- Understand the concept of demand and its determinants
- Analyze the Elasticity and degree of elasticity
- Evaluate Demand forecasting methods
- Design the process of demand estimation for different types of demand

Unit II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function– Least-cost combination – Short-run and Long-run Production Function – Isoquants and Isocosts, MRTS – Cobb-Douglas Production Function - Laws of Returns – Internal and External Economies of scale – **Cost &Break-Even Analysis**– Cost concepts and Cost behavior – Break-Even Analysis (BEA) – Determination of Break-Even Point (Simple Problems) – Managerial significance and limitations of Break-Even Analysis.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the production function, Input-Output relationship and different cost concepts
- Apply the least-cost combination of inputs
- Analyze the behavior of various cost concepts
- Evaluate BEA for real time business decisions
- Develop profit appropriation for different levels of business activity

Unit III: INTRODUCTION MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets – Perfect and Imperfect Competition – Features of Perfect Competition – Monopoly – Monopolistic Competition – Oligopoly – Price – Output Determination - Pricing Methods and Strategies

Forms of Business Organizations– Sole Proprietorship – Partnership – Joint Stock Companies – Public Sector Enterprises – New Economic Environment – Economic Liberalization – Privatization – Globalization – Trade Blocks (SAARC, EU, NAFTA, BRICS) – EXIM Policy – International Economic Environment.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the structure of markets, features of different markets and forms of business organizations
- Apply the price output relationship in different markets
- Analyze the optimum output levels to maximize profit in different markets
- Evaluate price-output relationship to optimize cost, revenue and profit
- Interpret Pricing Methods and Strategies

Unit IV: CAPITAL AND CAPITAL BUDGETING

Concept of Capital – Significance –Types of Capital –Components of Working Capital - Sources of Short-term and Long-term Capital – Estimating Working capital requirements – Cash Budget –**Capital Budgeting** – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the concept of capital budgeting and its importance in business
- Contrast and compare different investment appraisal methods
- Analyze the process of selection of investment alternatives using different appraisal methods
- Evaluate methods of capital budgeting for investment decision making and for maximizing returns
- Design different investment appraisals and make wise investments

Unit V:INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Accounting Concepts and Conventions – Introduction to Double – Entry Book Keeping, Journal, Ledger, Trial Balance – Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis–Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios – Du Pont Chart.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the concept, convention and significance of accounting
- Apply the fundamental knowledge of accounting while posting the journal entries
- Analyze the process and preparation of final accounts and financial ratios
- Evaluate the financial performance of an enterprise by using financial statements

Data Books Required: Present Value Factors table

TEXT BOOKS:

1. Varshney &Maheshwari: “Managerial Economics”, Sultan Chand, 2013.
2. Arya Sri: “Business Economics and Financial Analysis”, 4th edition, MGH, 2019

REFERENCE BOOKS:

1. Ahuja Hl “Managerial economics” 3rd edition, Schand, ,2013
2. S.A. Siddiqui and A.S. Siddiqui: “Managerial Economics and Financial Analysis”, New Age International, 2013.
3. Joseph G. Nellis and David Parker: “Principles of Business Economics”, 2nd edition, Pearson, New Delhi.
4. Domnick Salvatore: “Managerial Economics in a Global Economy”, Cengage, 2013.

COURSE OUTCOMES: After successful completion of the course, the students will be able to

1. Analyze the fundamentals of Economics viz., Demand, Elasticity, forecasting, Production, cost, revenue and markets (L4)
2. Apply concepts of production, cost and revenues for effective business decisions (L3)
3. Identify the influence of various markets, the forms of business organization and its International Economic Environment (L1)
4. Analyze how to invest adequate amount of capital in order to get maximum return from selected business activity (L4)
5. Prepare and analyze accounting statements like income & expenditure statement, balance sheet apart from the fundamental knowledge, to understand financial performance of the business and to initiate the appropriate decisions to run the business profitably (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(IV Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0406	3	0	0	3	CIA	30 M
Course Title	:	COMPUTER ARCHITECTURE AND ORGANIZATION					SEE	70 M

COURSE OBJECTIVES: -

- To discuss organization and design of a digital computer.
- To explain how to use RTL to represent memory and Arithmetic/ Logic/ Shift operations
- To introduce computer languages, machine, symbolic and assembly levels
- To present organization of central processing unit and concepts of micro-programmed control
- To explain how input-output devices communicate with the other components and methods of data transfer
- To teach different types of addressing modes and memory organization.

Unit I:
Data Representation: Data Types, Complements, Fixed-Point Representation, Conversion of Fractions, Floating-Point Representation, Other Binary Codes
Register Transfer and Micro-operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro-operations, Logic Micro-operations, Shift Micro-operations, Arithmetic Logic Shift Unit

Learning Outcomes: After completing this unit, the student will be able to:

- Represent various data types found in digital computers in binary form (L2)
- Emphasize representation of numbers employed in arithmetic operations and on binary coding of symbols used in data processing (L5)
- Express micro-operations in symbolic form by using register transfer language (L2)
- Develop composite arithmetic logic shift unit to show hardware design of micro-operations (L3)

Unit II:
Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input-Output and Interrupt, Complete Computer Description, Design and Accumulator Logic.
Programming the Basic Computer: Machine Language, Assembly Language, the Assembler, Program Loops, programming arithmetic and logic operations

Learning Outcomes: After completing this unit, the student will be able to:

- Describe organization and design of a basic digital computer (L2)
- Illustrate techniques used in assembly language programming (L2)
- Show translation from symbolic code to an equivalent binary program using basic operations of an assembler (L2)

Unit III:
Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer (RISC).

Learning Outcomes: After completing this unit, the student will be able to:

- Develop execution unit to show general register organization of a typical CPU (L3)
- Explain operation of a memory stack (L2)
- Illustrate various instruction formats together with a variety of addressing modes (L2)
- Discuss characteristics and advantages of reduced instruction set computer (RISC) (L6)

Unit IV:

Micro-programmed Control: Control Memory, Address Sequencing, Micro-program example, Design of Control Unit.

Computer Arithmetic: Introduction, Addition and Subtraction, Multiplication Algorithms, Division Algorithms, Floating-Point Arithmetic Operations

Learning Outcomes: After completing this unit, the student will be able to:

- Develop specific micro-programmed control unit to show how to write microcode for a typical set of instructions (L3)
- Design control unit including the hardware for the micro-program sequencer (L6)
- Show procedures for implementing arithmetic algorithms for addition, subtraction, multiplication and division with digital hardware (L2)
- Discuss algorithms to specify the sequence of micro-operations and control decisions required for implementation (L6)

Unit V:

Input-Output Organization: Peripheral Devices, Input-Output Interface, Asynchronous Data Transfer, Modes of Transfer, Priority Interrupt, Direct Memory Access (DMA), Input-Output Processor (IOP), Serial Communication.

Memory Organization: Memory Hierarchy, Main Memory, Auxiliary Memory, Associative Memory, Cache Memory, Virtual Memory.

Learning Outcomes: After completing this unit, the student will be able to:

- Explain how processor interacts with external peripherals through Interface units (L2)
- Compare different modes of data transfer (L4)
- Illustrate procedures for serial data transmission (L2)
- Describe concept of memory hierarchy composed of cache memory, main memory, and auxiliary memory (L2)
- Explain organization and operation of associative memories (L2)

TEXT BOOKS:

1. M. Morris Mano, “Computer System Architecture”, 3rdedition, Pearson Education,2017.

REFERENCE BOOKS:

2. Carl Hamacher, ZvonkoVranesic and SafwatZaky, “Computer Organization”, 5th Edition McGraw Hill,
3. John D. Carpinelli, “Computer Systems Organization and Architecture”, 15threprint Pearson Education, 2018,
4. William Stallings, “Computer Organization and Architecture: Designing for Performance”, 8th Edition, Pearson

COURSE OUTCOMES: After successful completion of the course, the students will be able to

CO1: Conceptualize basics of organizational and architectural issues of a digital computer

CO2: Emphasize representation of data types, numbers employed in arithmetic operations and binary coding of symbols used in data processing

CO3: Analyze various issues related to memory hierarchy, and evaluate various modes of data transfer between CPU and I/O devices

CO4: Design basic computer system using the major components

CO5: Develop low-level programs to perform different basic instructions

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(IV Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0407	3	0	0	3	CIA	30 M
Course Title	:	CONTROL SYSTEMS					SEE	70 M

COURSE OBJECTIVES: -

- Merits and demerits of open loop and closed loop systems; the effect of feedback
- The use of block diagram algebra and Mason's gain formula to find the overall transfer function
- Transient and steady state response, time domain specifications and the concept of Root loci
- Frequency domain specifications, Bode diagrams and Nyquist plots
- State space modeling of Control system

Unit I: CONTROL SYSTEMS CONCEPTS

Open loop and closed loop control systems and their differences- Examples of control systems – Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs – Reduction using Mason's gain formula, Principle of operation of DC and AC Servo motor, Transfer function of DC servo motor – AC servo motor, Synchro's.

Learning Outcomes: After completing this unit, the student will be able to:

- Write the differential equations for mechanical and electrical systems
- Obtain the transfer function from block diagrams, servo motors and signal flow graphs

Unit II: TIME RESPONSE ANALYSIS

Step Response – Impulse Response – Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems – Time domain specifications – Steady state response – Steady state errors and error constants, P, PI, PID Controllers.

Learning Outcomes: After completing this unit, the student will be able to:

- Analyze the time domain specifications
- Calculate the steady state errors
- Understand about Proportional, Integral and Derivative controllers along with combinations

Unit III: STABILITY ANALYSIS IN TIME DOMAIN

The concept of stability – Routh's stability criterion, Stability and conditional stability, limitations of Routh's stability, The Root locus concept – construction of root loci-effects of adding poles and zeros to G(s) H(s) on the root loci.

Learning Outcomes: After completing this unit, the student will be able to:

- Analyze the concept of stability in time domain
- Apply the concept of Routh's stability and Root locus in time domain

Unit IV: FREQUENCY RESPONSE ANALYSIS

Introduction, Frequency domain specifications – Bode diagrams – Determination of Frequency domain specifications and transfer function from the Bode Diagram – Stability Analysis from Bode Plots, Polar Plots – Nyquist Plots – Phase margin and Gain margin – Stability Analysis.

Compensation techniques – Lag, Lead and Lag-Lead Compensator design in frequency domain.

Learning Outcomes: After completing this unit, the student will be able to:

- Evaluate the frequency domain specifications from Bode, Polar and Nyquist plots
- Design Compensators for various systems
- Deducing transfer functions from Bode Plots
- Understand difference between Phase and Gain margins

Unit V:STATE SPACE ANALYSIS OF CONTINUOUS SYSTEMS

Concepts of state, state variables and state model, state models - differential equations & Transfer function models – Block diagrams, Diagonalization, Transfer function from state model, solving the Time invariant state Equations – State Transition Matrix and it's Properties, System response through State Space models, The concepts of controllability and observability, Duality between controllability and observability.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand the concept of state space, controllability and observability
- Obtain the transfer function from sate space and vice versa
- Understand the state transition method of solving time invariant state equations

TEXT BOOKS:

1. Katsuhiko Ogata, "Modern Control Engineering",5thedition, Prentice Hall of India Pvt. Ltd., 2010.
2. I.J. Nagrath and M. Gopal, "Control Systems Engineering", 5th edition, New Age International (P) Limited Publishers, 2007.

REFERENCE BOOKS:

1. M. Gopal, "Control Systems Principles & Design", 4th Edition, Mc Graw Hill Education, 2012.
2. B. C. Kuo and FaridGolnaraghi, "Automatic Control Systems",8th edition, John wiley and sons, 2003.
3. Joseph J Distefano III, Allen R Stubberud& Ivan J Williams, "Feedback and Control Systems", 2nd Edition, Schaum's outlines, Mc Graw Hill Education, 2013.
4. Graham C. Goodwin, Stefan F. Graebe and Mario E. Salgado, "Control System Design" Pearson, 2000.
5. Gene F. Franklin, J.D. Powell and Abbas Emami-Naeini, Feedback "Control of Dynamic Systems", 6th Edition, Pearson, 2010.

COURSE OUTCOMES: After successful completion of the course, the students will be able to

- CO1: Understand the concepts of control systems classification, feedback effect, mathematical modelling, time response and frequency response characteristics, state space analysis
- CO2: Apply the concepts of Block diagram reduction, Signal flow graph method and state space formulation for obtaining mathematical and Root locus, Bode, Nyquist, Polar plots for stability calculations, controllability and observability and demonstrate the use of these techniques.
- CO3: Analyse time response analysis, error constants, and stability characteristics of a given mathematical model using different methods.
- CO4: Design and develop different compensators, controllers and their performance evaluation for various conditions. Implement them in solving various engineering applications.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(IV Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0408	3	0	0	3	CIA	30 M
Course Title	:	ELECTROMAGNETIC WAVES AND TRANSMISSION LINES					SEE	70 M

COURSE OBJECTIVES: -

- To introduce fundamentals of static and time varying electromagnetic fields.
- To teach problem solving in Electromagnetic fields using vector calculus.
- To demonstrate wave concept with the help of Maxwell's equations.
- To introduce concepts of polarization and fundamental theory of electromagnetic waves in transmission lines and their practical applications.
- To analyze reflection and refraction of electromagnetic waves propagated in normal and oblique incidences.

Unit I:

Vector Analysis: Coordinate systems and transformation-Cartesian, Cylindrical and Spherical coordinates

Vector Calculus: Differential length area and volume, line surface and volume integrals, Del operator, gradient, divergent and curl operations.

Coulomb's Law, Electric Field Intensity – Fields due to Different Charge Distributions, Electric Flux Density, Gauss Law and Applications, Divergence Theorem, Electric Potential, Relations Between E and V, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Convection and Conduction Currents, Dielectric Constant, Isotropic and Homogeneous Dielectrics, Continuity Equation, Relaxation Time, Poisson's and Laplace's Equations, Capacitance – Parallel Plate, Coaxial, Spherical Capacitors, Illustrative Problems.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand basic laws of static electric field. (L1)
- Derive the Maxwell's equations for electrostatic fields. (L3)
- Solve problems applying laws of electrostatics. (L3)

Unit II:

Biot-Savart Law, Ampere's Circuital Law and Applications, Magnetic Flux Density, Maxwell's Two Equations for Magneto static Fields, Magnetic Scalar and Vector Potentials, Forces due to Magnetic Fields, Magnetic dipole, Ampere's Force Law, Inductances and Magnetic Energy, Illustrative Problems.

Faraday's Law and Transformer e.m.f, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's equations for time varying fields, Maxwell's Equations in Different Final Forms and Word Statements, Illustrative Problems

Learning Outcomes: After completing this unit, the student will be able to:

- Understand basic laws of static magnetic field. (L1)
- Derive the Maxwell's equations for magnetic fields. (L3)
- Solve problems applying laws of magneto statics. (L3)
- Derive the Maxwell's equations for electromagnetic fields. (L3)
- Apply the boundary conditions of electromagnetic fields at the interface of different media. (L2)

Unit III:

Boundary Conditions of Electromagnetic fields: Dielectric-Dielectric and Dielectric-Conductor Interfaces, Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations between E & H, Sinusoidal Variations, Wave Propagation in Lossless and Conducting Media, Conductors & Dielectrics – Characterization, Wave Propagation in Good Conductors and Good Dielectrics, Polarization, Illustrative Problems.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand concept of wave propagation through the Maxwell's equations. (L1)
- Derive wave equations for different media. (L3)
- Explain concept of polarization of electromagnetic wave. (L2)

Unit IV:

Reflection and Refraction of Plane Waves – Normal and Oblique Incidences, for both Perfect Conductor and Perfect Dielectrics, Brewster Angle, Critical Angle and Total Internal Reflection, Surface Impedance, Poynting Vector, and Poynting Theorem – Applications, Power Loss in a Plane Conductor, Illustrative Problems.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand principles of reflections and refraction for different incidences. (L1)
- State concept of power flow using Poynting vector. (L2)
- Calculate Brewster angle, power flow and surface impedance. (L3)

Unit V:

Transmission Lines: Introduction, Transmission line parameters, Transmission line equivalent circuit, Transmission line equations and their solutions in their phasor form, input impedance, standing wave ratio, Transmission of finite length- half wave, quarter wave transmission line, Smith chart, graphical analysis of transmission lines using Smith chart, stub matching- single and double stub matching, Illustrative Problems.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand the principles of transmission lines and concept of smith chart. (L1)
- Derive the input impedance of transmission line. (L3)
- Finding the line parameters through problem solving. (l4)
- Study the applications of different lengths of transmission lines. (L2)

TEXT BOOKS:

1. Matthew N.O. Sadiku, "Elements of Electromagnetics", 4th edition. Oxford Univ. Press, 2008.
2. William H. Hayt Jr., and John A. Buck, "Engineering Electromagnetics", 7thedition. TMH, 2006.

REFERENCE BOOKS:

1. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", 2nd Edition, PHI, 2000.
2. John D. Krauss, "Electromagnetics", 4th Edition, McGraw- Hill publication, 1999.
3. Electromagnetics, Schaum's outline series, 2nd Edition, Tata McGraw-Hill publications, 2006.

COURSE OUTCOMES: After successful completion of the course, the students will be able to

CO1: Explain basic laws of electromagnetic fields and know the wave concept. Describes the transmission lines with equivalent circuit and explain their characteristic with various lengths.

CO2: Solve problems related to electromagnetic fields in free space, guided EM waves. Also solve the problems related to Transmission lines at Radio Frequencies.

CO3: Analyze electric and magnetic fields at the interface of different media.

CO4: Derive Maxwell's equations for static and time varying fields and give the analogy between electric and magnetic fields.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(IV Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0409T	3	0	0	3	CIA	30 M
Course Title	:	ELECTRONIC CIRCUITS – ANALYSIS AND DESIGN					SEE	70 M

COURSE OBJECTIVES: -

- To design and analyze single and multi-stage amplifiers using BJT & FET at low and high frequencies.
- To discuss cascading of single stage amplifiers.
- To explain effect of negative feedback on amplifier characteristics.
- To teach basic principles for analyzing RC & LC oscillator circuits.
- To introduce different types of large signal amplifiers and tuned amplifiers.

Unit I: Small Signal Amplifier Analysis

Small Signal Amplifiers Using MOSFETS: Graphical analysis, Load line and small signal parameters, small signal equivalent circuit, small signal analysis of Common Source, Common Drain, Common Gate amplifiers, Comparison of the three basic amplifier configurations, Design the small signal amplifier circuits for the given specifications.

BJT Small Signal Models: Bipolar linear amplifier, Graphical and ac equivalent circuit, small signal hybrid-π equivalent circuit, Hybrid-π equivalent circuit including the early effect, other small signal parameters and equivalent circuits-h-parameters.

Small Signal Analysis: Basic CE amplifier circuit, Circuit with Emitter resistance, ac load line analysis, maximum symmetrical swing, small signal analysis-input and output impedances, Voltage gain, Current gain of CB, CC amplifiers, Design the small signal amplifier circuits for the given specifications.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand the concepts and equivalent circuit models of small signal amplifiers. (L1)
- Analyze low frequency and high frequency models of BJT and FET. (L3)
- Design BJT and FET amplifiercircuits. (L4)
- Determine performance parameters of BJT and FET amplifiers. (L2)

Unit II:

Frequency Response: Amplifier frequency response-different ranges, short circuit and open circuit time constants, time response, transistor amplifiers with circuit capacitors-coupling capacitor effects, load capacitor effects, Bypass capacitor effects, Problem solving, combined effects of coupling and bypass capacitor, high-frequency response model for BJT and MOSFETs, short circuit current gain, Miller effect and its applications, unity-gain bandwidth in BJT and FET amplifiers, CE and CS circuits, CB and CG circuits, Cascode amplifier analysis, emitter and source follower circuits, high frequency response- design application.

Learning Outcomes: After completing this unit, the student will be able to:

- Analyze the frequency response of single stage amplifiers using BJT & FET at high and low frequencies. (L3)
- Design of single stage amplifiers using BJT and FET with and without coupling capacitors. (L4)

- Explore the various effects of load, bypass and coupling capacitor on the performance of amplifier circuits. (L5)

Unit III:

Differential and Multistage Amplifiers: Differential amplifier, basic BJT differential pair and its qualitative description, DC transfer characteristics, small signal equivalent circuit analysis, CMRR, differential and common mode gains, differential and common mode input impedances.

Basic differential FET pair, small signal equivalent circuit analysis, JFET differential amplifier, differential amplifier with active load, MOSFET differential amplifier with active load, two stage RC coupled amplifier, Darlington pair and simple emitter follower output, voltage gain, input and output impedances.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand basic concepts and need of Differential and multistage amplifiers. Also, various inter-stage coupling in multi-stage amplifiers. (L1)
- Analyze and examine few common two stage transistor amplifier circuits' viz., Cascade amplifiers, Cascade amplifiers, Darlington pairs. (L3)
- Design multiple stage amplifier circuits. (L4)

Unit IV:

Feedback Amplifiers: General Considerations, Properties of Negative Feedback, Types of Amplifiers, Sense and Return Techniques, Polarity of Feedback, Feedback Topologies, Effect of Nonideal I/O Impedances, Stability in Feedback Systems, Analysis of a feedback Amplifiers - Voltage – Series, Current Series, Current-shunt and Voltage-shunt, Illustrative problems.

Oscillators: General Considerations, LC Oscillators, Phase Shift Oscillator, Wien-Bridge Oscillator, Crystal Oscillators, Illustrative Problems.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand concept of different feedback topologies. (L1)
- Determine the effect of feedback on amplifier characteristics. (L2)
- Analyze characteristics of various types of feedback configurations (L3)
- Explore working principle of oscillator. Also examine different types of oscillators, RC & LC, with detailed mathematical analysis and illustrations. (L2)

Unit V:

Power Amplifiers:

Classes of amplifiers – Operations of Class A, B, AB, C, class-A: Inductively coupled amplifier, transformer – coupled common emitter amplifier, transformer-coupled emitter-follower amplifier,

Class-AB Push-pull complementary output stages-class-AB output stage with diode biasing, class-AB biasing using the V_{BE} multiplier, class-AB output stage with input buffer transistors, class –AB output stage utilizing the Darlington configuration, Illustrative Problems.

Tuned Amplifiers:

Introduction to tuned amplifiers, Role of Q-Factor, Single-tuned, Double-tuned and Stagger-tuned amplifiers.

Learning Outcomes: After completing this unit, the student will be able to:

- Know most common classes of power amplifier and their basic characteristics. (L2)

- Understand various distortions of amplifiers and the concept of heat sink. (L1)
- Analyze complementary symmetry topologies. (L3)
- Evaluate conversion efficiency of various topologies. (L4)
- Analyze different types of distortions in power amplifiers. (L3)
- Evaluate the resonant frequency for tuned amplifiers. Analyze characteristics of tuned amplifiers (L5)

TEXT BOOKS:

1. Donald A Neamen, "Electronic Circuits – Analysis and Design," 3rd Edition, McGraw Hill (India), 2019.
2. J. Millman, C Chalkias, "Integrated Electronics", 4th Edition, McGraw Hill Education (India) Private Ltd., 2015.
3. K.Lal Kishore, "Electronic Circuit Analysis", 2nd Edition, B S Publications, 2008.

REFERENCE BOOKS:

1. Behzad Razavi, "Fundamentals of Micro Electronics", Wiley, 2010.
2. Millman and Taub, Pulse, "Digital and Switching Waveforms", 3rd Edition, Tata McGraw-Hill Education, 2011
3. Robert L. Boylestad and Louis Nashelsky, "Electronic Devices and Circuits Theory", 9th Edition, Pearson/Prentice Hall, 2006.

COURSE OUTCOMES: After successful completion of the course, the students will be able to

CO1: Understand the working principle of multistage amplifiers, Feedback amplifiers, power amplifiers, tuned amplifiers, Multivibrators and Time base generators

CO2: Analyze multistage amplifiers, multistage amplifiers, feedback amplifiers, power amplifiers, tuned amplifier and Multivibrators.

CO3: Design multistage amplifiers, feedback amplifiers, oscillators, Multivibrator, power amplifiers and tuned amplifiers for given specification.

CO4: Evaluate efficiency of large signal (power) amplifiers and voltage regulators.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to III Semester CE & ME and IV Semester CSE & ECE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AMC9903	3	0	0	0	CIA	30 M
Course Title	:	BIOLOGY FOR ENGINEERS					SEE	--

COURSE OBJECTIVES: -

- ToprovidebasicunderstandingaboutlifeandlifeProcess. Animalandplant systems.Tounderstandwhatbiomolecules, are,theirstructuresarefunctions.Applicationof certainbiomoleculesinIndustry.
- Briefintroductionabouthumanphysiologyandbioengineering.
- Tounderstandhereditaryunits,i.e.,DNA(genes)andRNAandtheirsynthesisinliving organism.
- HowbiologyPrinciplescanbe appliedinourdailylifeusingdifferenttechnologies.
- Briefintroductiontotheproductionoftransgenicmicrobes,Plantsandanimals.

Unit I: IntroductiontoBasicBiology
CellasBasicunitoflife,celltheory, Cellshapes, Cellstructure, Cellcycle.Chromosomes. Prokaryotic andeukaryoticCell.PlantCell,AnimalCell,PlanttissuesandAnimaltissues,Brief introductiontofivekingdomsofclassification.

Learning Outcomes: Aftercompletingthisunit, thestudentwillbeableto

- Summarizethebasisoflife.(L1)
- Understandthedifferencebetweenlowerorganisms(prokaryotes)fromhigherorganisms (eukaryotes).(L2)
- Understandhoworganismsareclassified.(L3)

Unit II: IntroductiontoBiomolecules
Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Learning Outcomes: Aftercompletingthisunit, thestudentwillbeableto

- Understandwhatarebiomolecules?theirroleinlivingcells,theirstructure,functionand howtheyareproduced.(L1)
- Interpretthe relationshipbetweenthestructureandfunctionofnucleic acids.(L2)
- Summarizetheapplicationsofenzymesinindustry.(L3)
- Understandwhatisfermentationandits applicationsoffermentationinindustry.(L4)

Unit III: HumanPhysiology
Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

Learning Outcomes: Aftercompletingthisunit,thestudentwillbeableto

- Understandwhatnutrientsare(L1)
- Understandthemechanismandprocessofimportanthumanfunctions(L2&L3)

Unit IV: IntroductiontoMolecularBiologyandrecombinantDNATechnology
Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and

Translation. rDNA technology. Introduction to gene cloning.

Learning Outcomes: Aftercompletingthisunit,thestudentwillbeableto

- Understand and explain about gene structure and replication in prokaryotesand Eukaryotes (L1)
- How genetic material is replicated and also understands how RNA and proteins are synthesized. (L2)
- Understand about recombinant DNA technology and its application in differentfields. (L3)
- Explain what is cloning. (L4)

Unit V: ApplicationofBiology

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

Learning Outcomes: AftercompletingthisunitthestudentwillbeabletoUnderstand.

- Howbiologyis appliedforproductionofusefulproductsformankind. (L1)
- Whatarebiosensors,biochipsetc.(L2)
- Understandtransgenicplantsandanimalsandtheirproduction(L3)

TEXT BOOKS:

1. P.K.Gupta,CellandMolecularBiology,5th Edition,RastogiPublications–
2. U.Satyanarayana.Biotechnology,Books&AlliedLtd2017

REFERENCE BOOKS:

1. N.A.Campbell,J.B.Reece,L.Urry,M.L.CainandS.A.Wasserman,“Biology:A GlobalApproach”,PearsonEducation Ltd,2018.
2. TJohnson,BiologyforEngineers,CRCpress,2011
3. J.M.WalkerandE.B.Gingold,MolecularBiologyandBiotechnology2nd ed..PanimaP ublications.PP434.
4. DavidHames,InstantNotesin Biochemistry–2016
5. PhilTunner,A.Mctennan,A. Bates &M.White,InstantNotes–MolecularBiology–2014

COURSE OUTCOMES: After successful completion of the course, the students will be able to:

1. Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
2. Explain about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.
3. Briefly about human physiology.
4. Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
5. Know about application of biological Principles in different technologies for the production of medicines and pharmaceutical molecules through transgenic microbes, plants and animals.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to IV Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AES0505T	3	0	0	3	CIA	30 M
Course Title	:	PYTHON PROGRAMMING FOR ENGINEERS LAB					SEE	70 M

COURSE OBJECTIVES: -

- To train the students in solving computational problems
- To elucidate solving mathematical problems using Python programming language
- To understand the fundamentals of Python programming concepts and its applications.

LIST OF TOPICS:

1. Write a program to demonstrate a) Different numeric data types and b) To perform different Arithmetic Operations on numbers in Python.
2. Write a program to create, append, and remove lists in Python.
3. Write a program to demonstrate working with tuples in Python.
4. Write a program to demonstrate working with dictionaries in Python.
5. Write a program to demonstrate a) arrays b) array indexing such as slicing, integer array indexing and Boolean array indexing along with their basic operations in NumPy.
6. Write a program that accepts a string from the user and display the same string after removing vowels from it.
7. Write a program to strip a set of characters from a string.
8. Write a function that prompts the user for the average temperature for each day of the week and returns a dictionary containing the required information.
9. Write a program that has the dictionary of your friends' names as keys and phone numbers as its values. Print the dictionary in a sorted order. Prompt the user to enter the name and check if it is present in the dictionary. If the name is not present, then enter the details in the dictionary.
10. Write a program to store the latitude and longitude of your house as a tuple and display it.
11. Write a program to do the following operations on files
    a) count the occurrence of each letter b) read the last n lines
    c) remove new line characters from the file d) read random line from a file
    e) read and write the contents from one csv file to another.
12. Write a program to add two polynomials using classes.
13. Create a class called library with data attributes accno, publisher, title and author. The methods of the class should include
    a) read () accno, title, author b) compute () – to accept the number of days late, calculate a display the fine charged at the rate of Rs. 10 per day.
    c) Display the data.
14. Create a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.
15. Programs on Python packages NumPy, Pandas, Matplotlib

TEXT BOOKS:

1. Francois Chollet, Deep Learning with Python, 1/e, Manning Publications Company, 2017
2. Manohar Swaminathan, "Mastering Machine learning with Python in Six steps", A press.

3. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python 3", 3rd edition, Available at http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
4. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016
5. DainelY.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Illustrate the use of various data structures. (L3)
2. Analyze and manipulate Data using Pandas (L4)
3. Design solutions to real-world problems using Python (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(IV Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0409P	0	0	3	1.5	CIA	30 M
Course Title	:	ELECTRONIC CIRCUITS – ANALYSIS AND DESIGN LAB					SEE	70 M

COURSE OBJECTIVES: -

- To provide a practical exposure for design & analysis of electronic circuits for generation and amplification input signal.
- To learn the frequency response and finding gain, input & output impedance of multistage amplifiers
- To Design negative feedback amplifier circuits and verify the effect of negative feedback on amplifier parameters.
- To understand the application of positive feedback circuits & generation of signals.
- To understand the concept of design and analysis of Power amplifiers and tuned amplifiers

Note: Design & simulate any 12 experiments with Multisim / PSPICE or equivalent software and verify the results in hardware lab with discrete components.

<u>List of experiments:</u>

1. MOSFET Amplifier
   a. Design and simulate MOSFET (Depletion mode) amplifier using PSPICE /Multisim and study the Gain and Bandwidth of amplifier
   b. Design common source MOSFET (Enhance mode) amplifier with discrete components and calculate the bandwidth of amplifier from its frequency response
2. JFET Amplifier
   a. Design and simulate common source FET amplifier using PSPICE /Multisim and study the Gain and Bandwidth of amplifier
   b. Design common source FET amplifier with discrete components and calculate the bandwidth of amplifier from its frequency response
3. Common Emitter Amplifier (Self bias Amplifier)
   a. Design and simulate a self- bias (Emitter bias)Common Emitter amplifier using PSPICE /Multisim and study the Gain and Bandwidth of amplifier
   b. Design voltage divider based Common Emitter amplifier with discrete components and calculate the bandwidth of amplifier from its frequency response.
4. Design and simulate two stage RC coupled amplifier for given specifications. Determine Gain and Bandwidth from its frequency response curve.
5. Design and simulate Darlington amplifier. Determine Gain and Bandwidth from its frequency response curve.
6. Design and Simulate CE – CB Cascade amplifier. Determine Gain and Bandwidth from its frequency response curve.

7. Design and simulate voltage series feedback amplifier for the given specifications. Determine the effect of feedback on the frequency response of a voltage series feedback amplifier.
8. Design and simulate current shunt feedback for the given specifications. Determine the effect of feedback on the frequency response of a current shunt feedback amplifier.
9. Design and simulate RC Phase shift oscillator and Wien bridge oscillator for the given specification. Determine the frequency of oscillation.
10. Design and simulate Hartley and Colpitts oscillators for the given specifications. Determine the frequency of oscillation.
11. Design and simulate class A power amplifier and find out the efficiency. Plot the output waveforms.
12. Design and simulate class B push-pull amplifier and find out the efficiency. Plot the output waveforms.
13. Design and simulate single tuned amplifier. Determine the resonant frequency and bandwidth of a tuned amplifier.
14. Design and simulate double tuned amplifier. Determine the resonant frequency and bandwidth of a tuned amplifier.

COURSE OUTCOMES: After successful completion of the course, the students will be able to

CO1: Understand Characteristics and frequency response of various amplifiers, basic equipment requirements for conducting the experiments.
CO2: Conduct various Experiments (both software and hardware related) to realize the concepts in coordination with fellow students in the batch.
CO3: Analyze negative feedback amplifier circuits, oscillators, Power amplifiers, tuned amplifiers and determine the efficiencies of power amplifiers.
CO4: Design RC and LC oscillators, Feedback amplifier for specified gain and multistage amplifiers for Low, Mid and high frequencies.
CO5: Simulate all the circuits and compare the performance.

B. TECH – V SEMESTER

DETAILED SYLLABUS

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Electronics and Communication Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0410T	3	1	0	4	CIA	30 M
Course Title	:	INTEGRATED CIRCUITS AND APPLICATIONS					SEE	70 M

COURSE OBJECTIVES:

1. To introduce basic building blocks of Op-Amps & specialized ICs.
2. To explain DC and AC performance characteristics of Op-Amps.
3. To impart knowledge on linear and non-linear applications of Op-Amps.
4. To describe operation & characteristics of data converters.
5. To design various circuits using Op-Amps and 555 timers.
6. To familiarize specialized ICs such as VCO, PLL, voltage regulators.

COURSE OUTCOMES:

After the completion of this course, the students will be able to:

1. Understand DC and AC characteristics of operational amplifiers & Op amp parameters and functionality of specialized ICs such as 555 TIMER, VCO, PLL & Voltage regulators.
2. Solve problems related to the linear ICs based circuits to make the foundation strong
3. Analyze Op-Amp based Amplifiers, Waveform generators, Active filters, Converters.
4. Design of Op amp-based Amplifiers, Waveform Generators, Active filters, Converters, design various multi-vibrator circuits using IC 555 timer.

Unit I

Operational Amplifier: Introduction, Block diagram, Characteristics and Equivalent circuits of an ideal op-amp, Various types of Operational Amplifiers and their applications, Inverting and non-inverting amplifier configurations. The Practical op-amp: Introduction, input offset voltage, offset current, Thermal drift, Effect of variation in power supply voltage, common-mode rejection ratio, Slew rate and its Effect, PSRR and Gain – bandwidth product.

Unit II

Applications of Operational Amplifier: Amplifiers: Adder, Integrator, Differentiator, Difference amplifier and Instrumentation amplifier, Converters: Current to voltage and voltage to current converters, Active Filters: First order filters, second order active finite and infinite gain low pass, high pass, band pass and band reject filters, Sine Wave Oscillators: RC phase shift oscillator, Wien bridge oscillator.

Unit III

Non-Linear Applications of Operational Amplifier: Comparators: Inverting comparator, non-inverting comparator, Schmitt Trigger.
Waveform Generators: Square wave and triangular wave generator with duty cycle modulation, Half and full wave precision rectifiers, log and antilog amplifiers, voltage to frequency converter, frequency to voltage converter.

Unit IV

Data Converters: Introduction, Basic DAC techniques, Different types of DACs-Weighted resistor DAC, R-2R ladder DAC, Different Types of ADCs - Parallel Comparator Type ADC, Counter Type ADC, Successive Approximation ADC. Dual Slope ADC, DAC and ADC Specifications.

Unit V

Special Purpose Integrated Circuits: Functional block diagram, working, design and applications of Timer 555 (Monostable & Astable), Functional block diagram, working and applications of VCO 566, PLL 565, voltage regulators.

Textbooks:

1. Ramakanth A. Gayakwad, “Op-Amps and Linear Integrated Circuits”, 4thEdition, Pearson, 2017.
2. D. Roy Choudhury,“Linear Integrated Circuits”, 2nd Edition, New Age International (p) Ltd., 2003.

Reference Books:

1. Sergio Franco, “Design with Operational Amplifiers &Analog Integrated Circuits”, 3rd edition, McGraw Hill, 1988.
2. Jacob Millman, Christos C. Halkias, “Integrated Electronics - Analog and Digital circuits system”, Tata McGraw Hill, 2003.
3. Gray and Meyer, Analysis and Design of Analog Integrated Circuits”, 5thedition Wiley International, 2009.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Electronics and Communication Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0411	3	1	0	4	CIA	30 M
Course Title	:	ANTENNAS AND WAVE PROPAGATION					SEE	70 M

COURSE OBJECTIVES:

7. To introduce radiation mechanisms and basic characteristics of antennas.
8. To derive mathematical expressions and their application for complete design of antennas.
9. To demonstrate various modes of EM wave propagation.
10. To explain measurement of antenna parameters
11. To introduce design concepts of various types of antennas including micro strip antenna.

COURSE OUTCOMES:

After the completion of this course, the students will be able to:

5. Understand concepts of various antenna fundamentals, principle of operation of various antennas viz. wired, aperture, micro strip antennas and wave propagation methods.
6. Get the problem-solving capability based on the concepts acquired on Antennas and wave propagation.
7. Analyze mathematical aspects of wave propagation, derive expressions related to radiation mechanisms for antennas.
8. Design various antennas namely array, micro strip, horn, lens and aperture antennas, etc., for a given application.

Unit I

Antenna Characteristics: Radiation mechanism and current distribution, radiation pattern, directivity, gain, Input impedance, polarization, bandwidth, HPBW. Reciprocity, equivalence of radiation and receive patterns, equivalence of impedances, effective aperture, vector effective length, antenna temperature, Friis transmission formula, problem solving.

Unit II

Wire and Antenna Arrays: Wire and antenna arrays: Radiation resistance and directivity and other characteristics of short dipole, monopole, half-wave dipole, small loop antenna.
Linear array and pattern multiplication, two-element array, uniform array, binomial array, broadside and end-fire arrays.
Rhombic antennas, Yagi-Uda array, Turnstile Antenna, Helical antenna - axial and normal modes, log-periodic Array, spiral antenna.

Unit III

Aperture Antennas and Lens Antennas: Aperture Antennas and Lens Antennas: Slot antenna, pyramidal and conical horn antennas, reflector Antenna: flat plate, corner and parabolic reflectors - common curved reflector shapes, Feed mechanisms.
Lens Antennas - Introduction, Geometry of Non-metallic Dielectric Lenses, Zoning, Tolerances, Applications.

Unit IV

Micro-Strip Antennas and Antenna Measurements: Micro-strip Antennas and Antenna Measurements: Basic characteristics, feeding methods, methods of analysis - Design of Rectangular and Circular Patch Antennas, Introduction to Smart Antennas - Concept of adaptive beam forming, Measurement of Antenna Parameters, basic setup, radiation pattern measurement, gain, directivity.

Unit V

Wave Propagation - I: Introduction, Definitions, Categorizations and General Classifications, Different Modes of Wave Propagation, Ray/Mode Concepts, Ground Wave Propagation (Quantitative Treatment) - Introduction, Plane Earth Reflections, Space and Surface Waves, Wave Tilt, Curved Earth Reflections, Space Wave Propagation - Introduction, Field Strength Variation with Distance and Height, Effect of Earth's Curvature, Absorption, Super retraction, M- Curves and Duct Propagation, Scattering Phenomena, Tropospheric Propagation.

Wave Propagation - II: Sky Wave Propagation - Introduction, Structure of Ionosphere, Refraction and Reflection of Sky Waves by Ionosphere, Ray Path, Critical Frequency, MUF, LUF, OF, Virtual Height and Skip Distance, Relation between MUF and skip Distance, Multi-hop Propagation, illustrative problems.

Text Books:

1. John D. Kraus, Ronald J. Marhefka, Ahmad S. Khan, "Antennas and Wave Propagation", 4thEdition, TMH, 2010.
2. Jordan, E.C. and Balmain. K. G., "Electromagnetic Waves and Radiating Systems", Prentice Hall Publications.

Reference Books:

1. Constantine A. Balanis, "Antenna Theory-Analysis and Design", Wiley Publication, 2016.
2. K.D. Prasad, "Antenna & Wave Propagation", Satya Prakash Publications, 2009.
3. Matthew N.O.Sadiku, "Principle of Electromagnetics", 4th edition, Oxford (International), 2012.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VSemester Electronics and Communication Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0412T	3	1	0	4	CIA	30 M
Course Title	:	COMMUNICATION SYSTEMS					SEE	70 M

COURSE OBJECTIVES:

1. To understand the key modules of both analog and digital communication systems.
2. To prepare mathematical background for communication signal analysis.
3. To analyze error performance of analog and digital communication systems in presence of noise and other interferences.
4. To get introduced to the concept and basics of information theory and the basics of source and channel coding/decoding.

COURSE OUTCOMES:

After the completion of this course, the students will be able to:

1. Understand the elements of both analog and digital communication systems, basics of information theory and error correcting codes.
2. Apply the knowledge of analog and digital communication system concepts to evaluate the performance of digital communication systems.
3. Analyze different analog modulation schemes, digital modulation techniques, and error control coding methods
4. Derive the expressions for optimum SNR and probability of error

Unit I

AMPLITUDE MODULATION: Block diagram of Electrical Communication System, Types of Communications, need for Modulation, Types of Amplitude Modulation: AM, DSBSC, SSBSC, Power and BW requirements, generation of AM, DSBSC, SSBSC, Demodulation of AM: Diode detector, Product demodulation for DSBSC & SSBSC, AM Transmitter and Superheterodyne Receiver.

Unit II

ANGLE MODULATION: Frequency & Phase Modulations, Advantages of FM over AM, Bandwidth consideration, Narrowband and Wideband FM, generation and demodulation of FM, Comparison of FM & PM. FM Transmitter and Superheterodyne Receiver.

Unit III

PULSE MODULATION: Elements & Advantages of Digital communication systems, PAM, Regeneration of Base-band Signal, PWM and PPM, Time Division Multiplexing, Frequency Division Multiplexing, Asynchronous Multiplexing.

Unit IV

DIGITAL MODULATION: Pulse Code Modulation: Advantages, Block diagram of PCM, Quantization, effect of Quantization, Quantization error, DM, ADM and Comparison,Raised Cosine Filter, Matched Filter, M-ary PSK, M-ary FSK, and M-ary PAM, Digital Modulation schemes: ASK, FSK, PSK, QPSK, DPSK, Modulation and Demodulation - Coherent and Non-coherent techniques.

Unit V

INFORMATION THEORY AND CODING: Concept of Information, Entropy and Rate of Information, Coding efficiency, Shannon-Fano and Huffman Coding, Error Control Coding, Error Detection and Correction Codes, Block Codes, Convolutional Codes.

Text Books:

1. Simon Haykin, "Communication Systems", Wiley India Edition, 4th Edition, 2011.
2. B.P. Lathi, &Zhi Ding, "Modern Digital &Analog Communication Systems", 4thedition, Oxford University Press, International 2010.

Reference Books:

1. Sam Shanmugam, "Digital and Analog Communication Systems", 3rd Edition, John Wiley, 2005.
2. Bruce Carlson, and Paul B. Crilly, "Communication Systems – An Introduction to Signals & Noise in Electrical Communication", 5th Edition, McGraw-Hill International Edition, 2010.
3. Bernard Sklar, "Digital Communications", 2nd edition, Prentice-Hall PTR, 2001.
4. Herbert Taub and Donald L Schilling, "Principles of Communication Systems", 3rdEdition, Tata McGraw-Hill, 2009.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VSemester Electronics and Communication Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0413T	3	1	0	4	CIA	30 M
Course Title	:	DIGITAL SYSTEM DESIGN THROUGH VHDL					SEE	70 M

COURSE OBJECTIVES:
1. Learn and understand the architectures of Field-programmable Gate Arrays.
2. Translate a software application into hardware logic for FPGA architectures.
3. Design synthesizable systems based on industry-standard coding methods.
4. Build testbenches and create data models to verify bit-true accurate designs.
5. Acquire the knowledge about Design and modelling of Parowan CPU, vending machine, washing machine, etc.

COURSE OUTCOMES:
After the completion of this course, the students will be able to:
1. Understand the architecture of FPGAs, tools used in modelling of digital design and modelling styles in VHDL.
2. Learn the IEEE Standard 1076 Hardware Description Language (VHDL).
3. Analyze basic digital circuits with combinatorial and sequential logic circuits using VHDL and also case studies.
4. Design complex digital CPU, vending machine and washing machines etc.
5. Model complex digital systems at several levels such as abstractions, behavioral& structural.

Unit I
Introduction and Field-Programmable Gate Arrays: Hardware Description Languages, FPGA Boards and Software Tools, Transistor as a Switch, Logic Gates from Switches, FPGA Building Blocks, Layout of the Xilinx Artix-7 XC7A35T FPGA, Resources of FPGA, Clock Management, The XADC Block, High-Speed Serial I/O Transceivers, Peripheral Component Interconnect Express Interface, FPGA-Based Digital System Design Philosophy, Advantages and Disadvantages of FPGAs, Usage Areas of FPGAs, Introduction to VHDL, VHDL Fundamentals, Entity and Architecture Representations, Dataflow Modeling, Behavioral Modeling, Timing and Delays in Modeling, Hierarchical Structural Representation, Test bench Formation in VHDL, Structure of a VHDL Testbench File, Displaying Test Results.

Unit II
VHDL Data Types and Operators: Data Types in VHDL, Signal and Variable Data Types, Data Values, naming a Signal or Variable, Defining Constants, Defining Arrays, Operators in VHDL, Application on Data Types and Operators, FPGA Building Blocks Used in Data Types and Operators, Implementation Details of Vector and Arithmetic Operations.

Unit III

Combinational Circuits: Logic Gates, Combinational Circuit Analysis, Logic Function Formation between Input and Output, Boolean Algebra, Gate-Level Minimization, Combinational Circuit Implementation, Truth Table-Based Implementation, Implementing Combinational Circuits, Combinational Circuit Design,

Combinational Circuit Blocks: Adders in VHDL, Comparators in VHDL, Decoders in VHDL, Encoders in VHDL, Multiplexers in VHDL, Parity Generators and Checkers in VHDL, Applications on Combinational Circuit Blocks, Sample Designs, Home Alarm System, Digital Safe System, Car Park Occupied Slot Counting System, Applications on Combinational Circuits, Implementing the Home Alarm System, Implementing the Digital Safe System, Implementing the Car Park Occupied Slot Counting System, FPGA Building Blocks Used in Combinational Circuits.

Data Storage Elements: Latches in VHDL, Flip-Flops in VHDL, Register, Memory, Read-Only Memory, ROM in VHDL, ROM Formation Using IP Blocks, Random Access Memory, Application on Data Storage Elements, FPGA Building Blocks Used in Data Storage Elements.

Unit IV

Sequential Circuits: Sequential Circuit Analysis, State Table, State Diagram, State Representation in VHDL, Timing in Sequential Circuits, Synchronous Operation, Asynchronous Operation, Shift Register as a Sequential Circuit, Shift Registers in VHDL, Multiplication and Division Using Shift Registers, Counter as a Sequential Circuit, Synchronous Counter, Asynchronous Counter, Counters in VHDL, Frequency Division Using Counters, Sequential Circuit Design, Applications on Sequential Circuits.

Unit V

CPU Modeling and Design: Defining a Comprehensive Example, ParwanCPU Memory Organization of Parwan, Instruction Set, Instruction Format, Programming in Parwan Assembly, Behavioral Description of Parwan, Timing and Clocking, Packages, Interface Description of Parwan,Parwan Behavioral Architecture, Parwan Bussing Structure, Interconnection of Components, Global View of Parwan Components, Instruction Execution

Advanced Applications: Vending Machine, Digital Clock, Moving Wave via LEDs, Translator, Air Freshener Dispenser, Obstacle-Avoiding Tank, Intelligent Washing Machine, Non-Touch Paper Towel Dispenser, Car Parking Sensor System, Digital Table Tennis Game.

Text Books:

1. CemUnsalan, Bora Tar “Digital System Design with FPGA Implementation Using Verilog and VHDL” McGraw-Hill Education, 2017.
2. ZainalabedinNavabi “VHDL: Analysis and Modeling of Digital Systems”, Z. Navabi, McGraw Hill International Ed. 1998.

Reference Books:

1. J. Bhaskar “A VHDL Primer”, Pearson Education India, 3rd edition, 2015.
2. Stephen Brown and ZvonkoVranesic “Fundamentals of digital logic design with VHDL”Tata McGraw Hill, 2nd edition, 2009.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Electronics and Communication Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0402	3	1	0	4	CIA	30 M
Course Title	:	INTRODUCTION TO INTERNET OF THINGS (IoT)					SEE	70 M

COURSE OBJECTIVES:
1. To present interconnection and integration of the physical world and the cyber space.
2. To demonstrate applications of Internet of Things.
3. To educate building blocks and characteristics of Internet of Things.
4. To introduce communication protocols used in Internet of Things.
5. To impart knowledge on design & develop IoT devices

COURSE OUTCOMES:
After the completion of this course, the students will be able to:
1. Illustrate revolution of Internet in Mobile Devices, Cloud & Sensor Networks, Examine the application areas of IoT.
2. Apply the concepts of IoT to solve day to day problems.
3. Analyze the communication protocols of IoT.
4. Design the IoT applications using Raspberry Pi
5. Make use of python programming to implement Internet of Things

Unit I
Introduction & Concepts: Introduction to Internet of Things, physical design of IoT, logical design of IoT, IoT enabling Technologies, IoT levels.

Unit II
Domain Specific IOTs: Home Automation, Cities, Environment, Energy, Retail, Logistics, Agriculture, Industry, Health & Life Style.

Unit III
M2M & System Management with NETCONF-YANG: M2M, Difference between IOT andM2M, SDN and NFV for IOT, Software defined Networking, Network Function Virtualization, Need for IOT Systems Management, Simple Network Management Protocol, Limitations of SNMP, Network Operator Requirements, NETCONF, YANG, IOT Systems management with NETCONF-YANG.

Unit IV
Internet of Things Systems - Logical Design using Python: Introduction, Motivation for using Python, Installing Python, Python Data Types & Data Structures, Control Flow, Functions, Modules, Packages, File Handling, Date/ Time Operations, Classes, Python Packages of Interest for IoT.

Unit V
IOT Physical Devices & Endpoints: What is an IOT Device, Exemplary Device, Board, Linux on Raspberry Pi, Interfaces, and Programming with Python; Python web application framework – Django, Designing a Restful web API.

Text Books:

1. Adrian McEwen, “Designing the Internet of Things”, Wiley Publishers, 2013
2. Vijay Madisetti, ArshdeepBahga, “Internet of Things a Hands-On- Approach”,2014.

Reference Books:

1. Matt Richardson & Shane Wallace, “Getting Started with Raspberry Pi”, O’Reilly (SPD), 2014.
2. Daniel Kellmereit, “The Silent Intelligence: The Internet of Things”, 2013

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Electronics and Communication Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AOE0402	3	1	0	4	CIA	30 M
Course Title	:	BASIC ELECTRONIC SYSTEMS					SEE	70 M

COURSE OBJECTIVES:

1. To understand the characteristics of various types of electronic devices and circuits.
2. To apply various principles of electronic devices and circuits to solve complex Engineering problems.
3. To analyze the functions of various types of electronic devices and circuits.
4. To evaluate the functions of various types of electronic devices and circuits in real time applications.
5. To design various types of electronic circuits for use in real time applications.

COURSE OUTCOMES:

After the completion of this course, the students will be able to:

1. Understand the characteristics of various types of electronic devices and circuits.
2. Apply various principles of electronic devices and circuits to solve problems on electronic circuits.
3. Analyze the functions of various types of electronic devices and circuits, Evaluate the functions of various types of electronic devices and circuits in real time applications.
4. Design various types of electronic circuits for use in real time applications.

Unit I

Diodes and Applications: Characteristics of PN junction diode and Zener diode, Applications of PN diode as a switch, rectifier and Zener diode as voltage regulator, Special purpose diodes: photodiode and LED.

Unit II

BJT and its Applications: Construction, Operation, and Characteristics in CE, CB and CC configurations; Fixed-Bias and Voltage Divider-Bias, Applications as switch and amplifier.

Unit III

JFETs: Construction, Operation, and Characteristics in CS configurations, Fixed-Bias and Voltage Divider –Bias, Applications as switch and amplifier.

MOSFETs: Construction, Operation, and Characteristics of Enhancement and Depletion modes in CS configurations, Biasing in Enhancement and Depletion modes, Applications as switch.

Unit IV

Feedback Amplifiers: Concept of feedback, General characteristics of negative feedback amplifiers, Voltage-series, Current-series, Voltage-shunt, and Current-shunt feedback amplifiers.

Oscillators: Conditions for oscillations, Hartley and Colpitts oscillators, RC phase-shift and Wien-bridge oscillators.

Unit V

Wave Shaping: Introduction, Waveform Shaping Circuits –RC and RL Circuits, Clippers, Comparator and Clampers.

Linear Integrated Circuits: Operational Amplifier: Characteristics, Block diagram, Applications – Inverting, Non-inverting, Summing amplifier, Subtractor, Voltage Follower.

Text Books:

1. S. Salivahanan and N. Suresh Kumar, "Electronic Devices and Circuits", 4th Edition, McGraw Hill Education (India) Pvt Ltd., 2017.
2. Ramakant A. Gaikwad, "Op-Amps & Linear ICs", 4^{th}Edition, Pearson, 2017

Reference Books:

1. J. Milliman, Christos C Halkias, and Satyabrata Jit, "Electronics Devices and Circuits", 4^{th} Edition, McGraw Hill Education (India) Pvt Ltd., 2015.
2. David A. Bell, "Electronics Devices and Circuits", 5^{th} Edition, Oxford University Press, 2008.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester CSE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19AMC9905	3	0	0	0	CIA	30 M
Course Title	:	ESSENCE OF INDIAN KNOWLEDGE TRADITION					SEE	--

Course Objectives:
To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system

- The course aim of the importing basic principle of third process reasoning and inference sustainability is at the course of Indian traditional knowledge system
- To understand the legal framework and traditional knowledge and biological diversity act 2002 and geographical indication act 2003
- The courses focus on traditional knowledge and intellectual property mechanism of traditional knowledge and protection
- To know the student traditional knowledge in different sector

UNITI
Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

Learning Outcomes:
At the end of the unit, the student will able to:

- Understand the traditional knowledge.
- Contrast and compare characteristics importance kinds of traditional knowledge.
- Analyze physical and social contexts of traditional knowledge.
- Evaluate social change on traditional knowledge.

UNIT II
Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

Learning Outcomes:
At the end of the unit, the student will able to:

- Know the need of protecting traditional knowledge.
- Apply significance of tk protection.
- Analyze the value of tk in global economy.
- Evaluate role of government

UNIT III
Legal framework and TK: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmers Rights Act,2001 (PPVFR Act);B:The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indications act 2003.

Learning Outcomes:

At the end of the unit the student will able to:

- Understand legal framework of TK.
- Contrast and compare the ST and other traditional forest dwellers
- Analyze plant variant protections
- Evaluate farmers right act

UNIT IV

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

Learning Outcomes:

At the end of the unit, the student will able to:

- Understand TK and IPR
- Apply systems of TK protection.
- Analyze legal concepts for the protection of TK.
- Evaluate strategies to increase the protection of TK.

UNIT V

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it fortheir food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Learning Outcomes:

At the end of the unit, the student will able to:

- Know TK in different sectors.
- Apply TK in engineering.
- Analyze TK in various sectors.
- Evaluate food security and protection of TK in the country.

Reference Books:

1) Traditional Knowledge System in India, by Amit Jha, 2009.
2) Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, Pratibha Prakashan 2012.
3) Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
4) "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino

e-Resources:

1) https://www.youtube.com/watch?v=LZP1StpYEPM
2) http://nptel.ac.in/courses/121106003/

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Electronics and Communication Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0410P	0	0	3	1.5	CIA	30 M
Course Title	:	**INTEGRATED CIRCUITS AND APPLICATIONS LAB**					SEE	70 M

LIST OF EXPERIMENTS

Course Objectives:

- To familiarize different Analog ICs.
- To implement linear and nonlinear application circuits by Op amp.
- To realize active filters using Op amp.
- To design of various multi-vibrator circuits using 555 timer application
- To design and understand the working of mixed signal circuits like Analog to Digital Convertors, Digital to analog Convertors and Phase Locked Loop.
- To understand the working of a few applications' specific analog ICs and to design circuits based on these ICs.

Conduct any 8 experiments from the following list.
Note: All the Hardware experiments may be performed using ICs 741, TL082, 555,565

Interpretation of data sheets (741/TL082, 555, 565)

1. Applications of Op-amp
   Design and test the performance of the following circuits using Op-amp IC741/TL082
   a. Inverting amplifier
   b. Non-inverting amplifier
   c. Voltage follower
   d. Summer
2. Design and test the performance of practical differentiator and integrator circuits for various time constants. Plot the graphs.
3. Comparator circuits
   To study Schmitt trigger using Op-Amp.
4. Active filters using Op-amp
   Design and test the performance of any order Butterworth LPF, HPF.
5. Construct and verify the performance of
   a. Logarithmic and antilog amplifiers b. Instrumentation amplifier
6. Precision rectifiers
   Conduct experiments on half wave and full wave precision rectifiers and draw the output waveforms.
7. Design the mono stable multivibrator circuit and verify their performance practically using IC 555.
8. Design the astable multivibrator circuit and verify their performance practically using IC 555.

9. Data converters
   Construct and study performance of
   a. DAC circuits – R-2R and ladder type.
   b. Successive approximation type ADC.
10. To study performance of PLL IC565
11. Design a DC power supply using 78XX/79XX and LM723, verify the same practically.

Equipment required:

1. Regulated Power supplies
2. Analog/Digital Storage Oscilloscopes
3. Analog/Digital Function Generators
4. Digital Multimeters
5. Decade Resistance Boxes/Rheostats
6. Decade Capacitance Boxes
7. Ammeters (Analog or Digital)
8. Voltmeters (Analog or Digital)
9. Active & Passive Electronic Components
10. Bread Boards
11. Connecting Wires
12. CRO Probes

Course Outcomes:

- Understand the working of Op amp ICs & Application specific analog ICs.
- Analyze operational amplifier-based circuits for linear and non-linear applications.
- Design Operational amplifiers for linear and nonlinear application, Multivibrator circuits using 555 & application specific ICs.
- Simulate all linear and nonlinear application-based Op-Amp Circuits and circuits based on application specific ICs.
- Compare theoretical, practical & simulated results in integrated circuits.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Electronics and Communication Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0412P	0	0	3	1.5	CIA	30 M
Course Title	:	**COMMUNICATION SYSTEMS LAB**					SEE	70 M

LIST OF EXPERIMENTS

Part-A: Hardware Experiments

Design the circuits and conduct experiments on the following by taking minimum of three from each section.

Section-A

1. AM Modulation and Demodulation
2. FM Modulation and Demodulation
3. Radio receiver measurements
4. PAM Modulation and Demodulation
5. PWM Modulation and Demodulation
6. PPM Modulation and Demodulation

Section-B

7. Sampling Theorem.
8. Time Division Multiplexing
9. Delta Modulation and Demodulation
10. PCM Modulation and Demodulation
11. BFSK Modulation and Demodulation
12. QPSK Modulation and Demodulation
13. DPSK Modulation and Demodulation
14. Implementation of Linear Block Codes with error detection & Correction
15. Implementation of Convolutional Codes with Viterbi Algorithm

Part-B: Software Experiments

Simulate and verify the above experiments in MATLAB taking minimum of three from each section.

Course Outcomes:

CO1: Understand the elements of both analog and digital communication systems, basics of information theory and error correcting codes.

CO2: Apply the knowledge of analog and digital communication system concepts to evaluate the performance of digital communication systems.

CO3: Analyze different analog modulation schemes, digital modulation techniques, and error control coding methods

CO4: Derive the expressions for optimum SNR and probability of error

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Electronics and Communication Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	19APC0413P	0	0	3	1.5	CIA	30 M
Course Title	:	**DIGITAL SYSTEM DESIGN THROUGH VHDL LAB**					SEE	70 M

Conduct all the experiments. There is no choice. Use appropriate tools.
Course Objectives:
1 To familiarize with CAD tools
2 To familiarize with design, simulation and synthesis of combinational and sequential circuits using CAD tools.

1. Write structural and dataflow VHDL models for
    a) 4-bit ripple carry adder.
    b) 4-bit carry look ahead adder
    c) 8-bit comparator
2. Write a VHDL program in structural model for
    a) 16:1 mux realization
    b) 3:8 decoder realization through 2:4 decoder
3. Write a VHDL program in behavioral model for
    a) 16:1 mux
    b) 3:8 decoder
    c) 8:3 encoder
    d) 8-bit parity generator and checker
4. Write a VHDL program in structural and behavioral models for
    a) 8 bit asynchronous up-down counter
    b) 8 bit synchronous up-down counter
5. Write a VHDL program for 4-bit sequence detector through Mealy and Moore state machines.
6. Write a VHDL program for traffic light controller realization through state machine.
7. Write a VHDL program in behavioral model for 8-bit shift and add multiplier.
8. Write a VHDL program in structural model for 8-bit Universal Shift Register.

Course Outcomes

CO1: Understand and use CAD tools for simulation and synthesis of digital systems
CO2: Simulate different combinational and sequential circuits.
CO3: Design/Synthesize and implement complex digital systems using CAD tools
CO4: Implement and test simple digital circuits on FPGA
CO5: Usage of appropriate tools

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
Course Structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20 onwards)

DEPARTMENT OF MECHANICAL ENGINEERING

INDUCTION PROGRAM (3 weeks duration)

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

B. Tech – I Semester (Theory – 4, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9901	Mathematics – I	3	1	0	4	30	70	100
2	BS	19ABS9902	Engineering Physics	3	0	0	3	30	70	100
3	ES	19AES0201	Basic Electrical and Electronics Engineering	3	0	0	3	30	70	100
4	MC	19AMC9902	Environmental Sciences	3	0	0	0	30	-	30
PRACTICAL										
5	ES	19AES0301	Engineering Drawing Lab	1	0	4	3	30	70	100
6	BS	19ABS9903	Engineering Physics Lab	0	0	3	1.5	30	70	100
7	LC	19ALC0301	Engineering & IT Workshop Lab	0	0	3	1.5	30	70	100
8	ES	19AES0202	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5	30	70	100
TOTAL:				**13**	**01**	**13**	**17.5**	**240**	**490**	**730**

B. Tech – II Semester (Theory – 5, Lab – 3)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9906	Mathematics – II	3	1	0	4	30	70	100
2	BS	19ABS9904	Engineering Chemistry	3	0	0	3	30	70	100
3	ES	19AES0501	C Programming	3	1	0	4	30	70	100
4	HS	19AHS9901	Communicative English	2	0	0	2	30	70	100
5	MC	19AMC9901	Human Values & Professional Ethics	3	0	0	0	30	-	30
PRACTICAL										
6	BS	19ABS9905	Engineering Chemistry Lab	0	0	3	1.5	30	70	100
7	ES	19AES0502	C Programming Lab	0	0	3	1.5	30	70	100
8	HS	19AHS9902	Communicative English Lab	0	0	3	1.5	30	70	100
TOTAL:				**14**	**02**	**09**	**17.5**	**240**	**490**	**730**

B. Tech – III Semester (Theory – 7, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9907	Complex Variables and Transforms	2	1	0	3	30	70	100
2	ES	19AES0503T	Data Structures	3	0	0	3	30	70	100
3	ES	19AES0505T	Python Programming for Engineers	2	1	0	3	30	70	100
4	PC	19APC0301	Engineering Mechanics	3	0	0	3	30	70	100
5	PC	19APC0302T	Manufacturing Processes	3	0	0	3	30	70	100
6	PC	19APC0303T	Material Science and Engineering	3	0	0	3	30	70	100
7	MC	19AMC9903	Biology for Engineers	3	0	0	0	30	00	30
PRACTICAL										
8	ES	19AES0503P	Data Structures Lab	0	0	3	1.5	30	70	100
9	PC	19APC0302P	Manufacturing Processes Lab	0	0	3	1.5	30	70	100
10	PC	19APC0303P	Material Science and Engineering Lab	0	0	3	1.5	30	70	100
11	LC	19ALC0302	Mechanical Engineering Workshop	0	0	3	1.5	30	70	100
TOTAL:				**19**	**02**	**12**	**24**	**330**	**700**	**1030**

B. Tech – IV Semester (Theory – 7, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9908	Numerical Methods and Probability Theory	2	1	0	3	30	70	100
2	ES	19AES0506T	Internet of Things	2	0	0	2	30	70	100
3	HS	19AHS9904	Design Thinking and Product Innovation	2	0	0	2	30	70	100
4	PC	19APC0304	Thermodynamics	2	1	0	3	30	70	100
5	PC	19APC0305T	Mechanics of Materials	2	1	0	3	30	70	100
6	PC	19APC0306T	Fluid Mechanics and Hydraulic Machinery	2	1	0	3	30	70	100
7	PC	19APC0307	Kinematics of Machinery	2	1	0	3	30	70	100
PRACTICAL										
8	ES	19AES0506P	Internet of Things Lab	0	0	3	1.5	30	70	100
9	PC	19APC0305P	Mechanics of Materials Lab	0	0	3	1.5	30	70	100
10	PC	19APC0306P	Fluid Mechanics and Hydraulic Machinery Lab	0	0	3	1.5	30	70	100
11	PC	19APC0308	Computer Aided Machine Drawing	0	0	3	1.5	30	70	100
TOTAL:				**14**	**05**	**12**	**25**	**330**	**770**	**1100**

B. Tech – V Semester (Theory – 7, Lab – 3)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC	19APC0309T	Applied Thermodynamics	2	1	0	3	30	70	100
2	PC	19APC0311T	Manufacturing Technology	3	0	0	3	30	70	100
3	PC	19APC0310	Dynamics of Machinery	2	1	0	3	30	70	100
4	HS	19AHS9905	Managerial Economics And Financial Analysis	3	0	0	3	30	70	100
			Professional Elective 1							
		19APE0301	Automobile Engineering							
		19APE0304	Manufacturing Methods in Precision Engineering							
		19APE0302	Design of Machine Elements							
		19APE0305	Power Plant Engineering							
5	PE	19APE0303	Ergonomics and Human Factors in Engineering	3	0	0	3	30	70	100
			Open Elective-I							
		19AOE0102	Experimental stress analysis.							
		19AOE0101	Building Technology							
		19AOE0201	Electrical Engineering Materials							
		19AOE0301	Introduction to Hybrid and Electric Vehicles							
		19AOE0302	Rapid Prototyping							
		19AOE0401	Analog Electronics							
		19AOE0403	Digital Electronics							
		19AOE0503	Computer Graphics and Multimedia Animation							
		19AOE0504	Free and Open Sources Systems							
		19AOE0502	Computer Applications in Food Technology							
		19AOE0303	Optimization Techniques							
6	OE	19AOE9901	Technical Communication and Presentation skills	3	0	0	3	30	70	100
7	MC	19AMC9904	Indian Constitution and Society	3	0	0	0	30	--	30
PRACTICAL										
8	PC	19APC0309P	Applied Thermodynamics Lab	0	0	3	1.5	30	70	100
9	PC	19APC0311P	Manufacturing Technology Lab	0	0	3	1.5	30	70	100
10	PR	19APR0101	Socially Relevant Project (15 Hrs/Sem)	0	0	1	0.5	50	--	50
TOTAL:				**19**	**02**	**07**	**21.5**	**320**	**560**	**880**

B. Tech – VI Semester (Theory – 7, Lab – 3)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC	19APC0312	Design of Transmission Elements	2	1	0	3	30	70	100
2	PC	19APC0313T	Heat Transfer	2	1	0	3	30	70	100
3	PC	19APC0314	Operations Research	2	1	0	3	30	70	100
4	PE		**Professional Elective-II**	3	0	0	3	30	70	100
		19APE0306	Alternative Fuels and Emission Control							
		19APE0310	Simulation and Modeling of Manufacturing Systems							
		19APE0307	Mechanical Behavior of Materials							
		19APE0309	Refrigeration & Air Conditioning							
		19APE0308	Product Marketing							
5	OE		**Open Elective-II**	3	0	0	3	30	70	100
		19AOE0104	Industrial waste and waste water management.							
		19AOE0103	Building Services & Maintenance							
		19AOE0304	Industrial Automation							
		19AOE0202	System Reliability Concepts							
		19AOE0305	Introduction to Mechatronics							
		19AOE0407	Optimization techniques through MATLAB							
		19AOE0405	Basics of VLSI							
		19AOE0404	Principles of Communications							
		19AOE0506	Fundamentals of VR/AR/MR							
		19AOE0505	Data Science Using Python							
		19AOE0408	Wavelet Transforms & its applications							
		19AOE9902	Soft Skills							
6	HS	19AHS9907	Entrepreneurship & Incubation	3	0	0	3	30	70	100
7	MC	19AMC9905	Essence of Indian Knowledge Tradition	3	0	0	0	30	--	30
PRACTICAL										
8	PC	19APC0313P	Heat Transfer Lab	0	0	2	1.0	30	70	100
9	HS	19AHS9906	Advanced English Language Communication Skills Lab (AECS Lab)	0	0	3	1.5	30	70	100
10	PR	19APR0102	Socially Relevant Projects (15 Hrs/Sem)	0	0	1	0.5	50	--	50
TOTAL:				**18**	**04**	**06**	**21.0**	**320**	**560**	**880**
Mandatory Industrial Training / Skill Development/Research Project for 4 weeks duration during Summer Vacation										

B. Tech – VII Semester (Theory – 6, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC	19APC0315T	Introduction to CAD/CAM	3	0	0	3	30	70	100
2	PC	19APC0316T	Metrology & Measurements	3	0	0	3	30	70	100
3	PE		**Professional Elective-III**	3	0	0	3	30	70	100
		19APE0312	Automotive Transmission Systems							
		19APE0311	Additive Manufacturing							
		19APE0313	Mechanics of Composite Materials							
		19APE0315	Solar and Wind Energy							
		19APE0314	Production and Operations Management							
4	OE		**Open Elective – III**	3	0	0	3	30	70	100
		19AOE0105	Air Pollution and Control.							
		19AOE0106	Basics of Civil Engineering							
		19AOE0204	Renewable Energy Systems							
		19AOE0203	Electric Vehicle Engineering							
		19AOE0306	Finite Element Methods							
		19AOE0307	Product Marketing							
		19AOE0409	Introduction to Microcontrollers & Applications							
		19AOE0411	Principles of Digital Signal Processing							
		19AOE0509	Fundamentals of Game Development							
		19AOE0508	Cyber Security							
5	HS	19AHS9908	Management Science	2	0	0	2	30	70	100
6	MC	19AMC9906	Research Methodology	3	0	0	0	30	--	30
PRACTICAL										
7	PC	19APC0316P	Metrology & Measurements Lab	0	0	3	1.5	30	70	100
8	PC	19APC0315P	CAD / CAM Lab	0	0	3	1.5	30	70	100
9	PR	19APR0103	Project Stage - I	0	0	4	2	50	--	50
10	PR	19APR0104	Industrial Training / Skill Development / Research Project	0	0	-	1.5	50	--	50
TOTAL:				**17**	**00**	**10**	**20.5**	**340**	**490**	**830**

B. Tech – VIII Semester (Theory – 2, Project – 1)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PE		**Professional Elective-IV**	3	0	0	3	30	70	100
		19APE0316	Autotronics							
		19APE0319	Robotics and Applications in Manufacturing							
		19APE0318	Mechanical Vibrations							
		19APE0317	Computational Fluid Dynamics							
		19APE0320	Total Quality Management (TQM)							
2	OE		**Open Elective-IV**	3	0	0	3	30	70	100
		19AOE0107	Disaster Management.							
		19AOE0108	Global Warming and Climate Changes							
		19AOE0308	Energy Conservation and Management							
		19AOE0309	Non Destructive Testing							
		19AOE0414	Introduction to Image Processing							
		19AOE0416	Principles of Cellular and Mobile Communications							
		19AOE0406	Industrial Electronics							
		19AOE0412	Electronic Instrumentation							
		19AOE0512	Block Chain Technology and Applications							
		19AOE0514	MEAN Stack Technology							
		19AOE0515	Mathematical Modeling & Simulation							
3	PR	19APR0105	Project Stage-II	-	-	-	07	60	140	200
TOTAL:				**06**	**00**	**00**	**13**	**120**	**280**	**400**

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE, ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9901	3	1	0	4	CIA	30 M
Course Title	:	MATHEMATICS – I					SEE	70 M

COURSE OBJECTIVES:

1. To enlighten the learners in the concept of differential equations, matrices and multivariable calculus.
2. To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

COURSE OUTCOMES:

After the completion of this course, the students will be able to:

1. Understand the effective mathematical tools for the solutions of differential equations that model physical processes.
2. Identify the essential characteristics of linear differential equations with constant coefficients and solve the linear differential equations with constant coefficients by appropriate method.
3. Solving systems of linear equations, using technology to facilitate row reduction determine the rank, Eigen values and Eigen vectors, diagonal form and different factorizations of a matrix.
4. Translate the given function as series of Taylor's and McLaren's with remainders and analyze the behavior of functions by using mean value theorems.
5. Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies and acquire the Knowledge maxima and minima of functions of several variables.

Unit I

Ordinary Differential Equations of First Order: Formation of the ordinary differential equations (ODEs) – Solution of an ordinary differential equation – Equations of the First Order and First Degree – Linear Differential Equation – Bernoulli's Equation – Exact Differential Equations – Equations Reducible to exact equations-Orthogonal Trajectories.

Ordinary Differential Equations of First Order but not First Degree: Equations solvable for p – Equations solvable for x – Equations solvable for y – Equations do not contain x(or y) – Clairaut's Equations.

Unit II

Ordinary Differential Equations of Higher Orders: Solutions of Linear Ordinary Differential Equations

With Constant Coefficients – Rules for finding the Complimentary Functions – Rules for finding the particular integral – Method of variation of parameters – Cauchy's linear equation – Legendre's Linear Equation.

Unit III

Matrices: Inverse and rank of a matrix - System of linear equations; Symmetric, skew-symmetric and orthogonal matrices - Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Unit IV

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), indeterminate forms and L'Hospital's rule; Maxima and minima.

Unit V

Multivariable Calculus: Limit, continuity and partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd.
2. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
3. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9902	3	0	0	3	CIA	30 M
Course Title	:	ENGINEERING PHYSICS					SEE	70 M

COURSE OBJECTIVES:

1. To disseminate knowledge in basic concepts of mechanics and to understand the basic ideas of damping and resonance.
2. To interpret the significant concepts of magnetic materials which leads to potential applications and basics of electromagnetic waves.
3. To identify the importance of the optical phenomenon i.e. interference, diffraction andpolarization related to its Engineering applications.
4. To teach the concepts related to laser, fiberoptics and superconductivity which lead to their fascinating applications.
5. To familiarize the concept of Quantum mechanics and semiconductors relevant to engineering branches.

UNIT I

MECHANICS AND OSCILLATIONS:

Basic laws of vectors and scalars-rotational frames – conservative forces; F = – grad V, torque andangular momentum - Newton's laws in inertial and linear accelerating non-inertial frames ofreference.

Simple Harmonic motion –Characteristics of SHM; Damped harmonic motion – over-damped, critically damped and lightly damped oscillators; Forced oscillations and resonance.

UNIT II

ELECTROMAGNETISM AND MAGNETIC PROPERTIES OF MATERIALS:

Divergence of Electric and Magnetic Fields – Gauss theorem for divergence – Curl of Electric and Magnetic Fields – Stokes theorem for curl – Maxwell's Equations – Electromagnetic wave propagation (conducting and non-conducting media) – Poynting's Theorem.

Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Classification of Magnetic materials – Domain Concepts of ferromagnetism – Hysteresis – soft and hard magnetic materials – Magnetic device applications.

UNIT III

WAVE OPTICS: Interference:

Principle of superposition – Young's Experiment – Coherence – Interference in thin films, Wedge shaped film, Newton's Rings – Determination of wavelength.

Diffraction: Diffraction, differences between interference and diffraction, Fraunhofer diffraction due to Single slit

Polarization: Polarization by double refraction – Plane polarized light by Nicol's Prism – Half wave and Quarter wave plate – Engineering applications of Polarization.

UNIT IV

LASERS AND FIBER OPTICS:
Introduction, spontaneous and stimulated emissions, population inversions, pumping, Ruby laser, Gas laser (He-Ne Laser), Semiconductor laser, Applications of lasers.
Optical Fibre and Total Internal Reflection, Acceptance Angle and cone of a fibre, Numerical aperture, Fibre optics in communications, Types of Optical Fibres, Applications of optical fibers.
SUPERCONDUCTIVITY: Super conductivity, Meissner Effect, Basics of BSC theory, Types of Superconductors and Applications of Superconductors.

UNIT V

QUANTUM MECHANICS
: Introduction, Photoelectric Effect, de-Broglie's hypothesis, Wave-particle duality Heisenberg's Uncertainty principle, Schrodinger's time independent wave equation, Particle in one dimensional box.
SEMICONDUCTOR PHYSICS: Energy bands in solids, Types of electronic materials: metals, semiconductors, and insulators**.** Intrinsic and Extrinsic semiconductors, Direct and Indirect band gap semiconductors Hall effect – Applications of Hall effect – Drift and Diffusion currents – Continuity equation– Applications of Semiconductors.

COURSE OUTCOMES:

After the completion of this course, the student will be able to:

1. ExtendNewton's second law for inertial and non-inertial frame of reference and analyze the concept of resonance.
2. Applythe Gauss' theorem for divergence and Stokes' theorem for curl andClassifythe magnetic materials based on susceptibility
3. Interpret the differences between interference and diffraction, illustrate the concept of polarization of light and its applications and classify ordinary polarized light and extraordinary polarized light.
4. Applyelectromagnetic wave propagation in different Optical Fibers, the lasers concepts in various applicationsand explainMeissner's effect, BCS theory.

5. interpret the direct and indirect band gap in semiconductors and identify the type of semiconductor using Hall effect.
   Analyze the behavior of particles at very microscopic level by using wave nature of particles.

TEXT BOOKS:

1. Gaur R.K. and Gupta S.L., "Engineering Physics"-Dhanpat Rai publishers, 2012

2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Krshisagar - S. Chand publications, 11th Edition 2019.
3. Fundamentals of Physics by David Halliday and Robert Resnick – Part I and Part II - Wiley.
4. H.K. Malik & A.K. Singh “Engineering Physics” - McGraw Hill Publishing Company Ltd.
5. “Engineering Physics”, K.Thyagarajan - McGraw Hill Publishing Company Ltd., 2015.
6. D.Kleppner and Robert Kolenkow “An introduction to Mechanics”- II - Cambridge University Press, 2015

REFERENCE TEXT BOOKS:

1. M K Varma “Introduction to Mechanics”-Universities Press-2015.
2. I. G. Main, “Vibrations and waves in physics”, 3rd Edn., Cambridge University Press
3. D.K. Bhattacharya and A. Bhaskaran, “Engineering Physics”- Oxford Publications-2015
4. David J. Griffiths, “Introduction to Electrodynamics”- 4/e, Pearson Education, 2014
5. P.K. Palaniswamy, “Engineering Physics” Scitech Publications
6. Shatendra Sharma, Jyotsna Sharma, “Engineering Physics” Pearson Education, 2018
7. D.Kleppner and Robert Kolenkow “An introduction to Mechanics” – II – Cambridge University Press, 2015.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, ME and ECE & II Semester CSE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0201	3	0	0	3	CIA	30 M
Course Title	:	BASIC ELECTRICAL AND ELECTRONICS ENGG.					SEE	70 M

COURSE OBJECTIVES:-

1. To introduce basics of simple electric circuits.
2. To impart knowledge on measuring devices for voltages and currents.
3. To provide comprehensive idea about working principle, operation and applications of PN junction diode & knowledge about semiconductors
4. To teach applications of electronic principles which are used in Engineering
5. To give knowledge about Special purpose diodes and applications

COURSE OUTCOMES:-

1. Able to recall Simple electrical connections.
2. Knowledge about the Measuring Instruments
3. Learning operation and properties of semiconductors
4. Useful knowledge on PN diode and simple applications.
5. Working and construction of Analog Electronic devices.

UNIT I

ELECTRICAL CIRCUITS: Basic Electrical Circuit elements – (R-L-C) – Ohms Law – Kirchoffs Law – Introduction to AC Circuits – and DC Circuits – Series connection – parallel connections, Analysis of single – phase ac circuits consisting of RL – RC – RLC series circuits – Nodal Analysis-Mesh Analysis.

UNIT II

MEASURING INSTRUMENTS: Moving coil and moving iron instruments (Ammeter and voltmeter) – Cathode ray oscilloscope – cathode ray tube - Regulated power supply – Digital Multi Meter (DMM) – Megger instrument-Introduction to Electric and magnetic fields – Thermistor – Linear Mode power supply.

UNIT III

SEMICONDUCTORS: Classification of semiconductors – Intrinsic semiconductors – Extrinsic semiconductors – conductivity of Intrinsic and Extrinsic semiconductors – P-type semiconductor – N-type semiconductor – Qualitative theory of P-N junction – V-I characteristics of PN junction diode – and simple applications – Ligiht Emitting Diode(LED).

UNIT IV

RECTIFIERS AND FILTERS: Introduction to Rectifiers – Half Wave Rectifiers – Full Wave Rectifiers – Bridge rectifier – Advantages of Bridge rectifier – Comparision of Rectifiers – Harmonic components in a Rectifier circuit – Introduction to Filters – Inductor Filter – capacitor Filter – LC or L-section Filter – Types of Voltage regulators – series voltage regulator – shunt voltage regulator – Clippers and Clampers.

UNIT V

ANALOG ELECTRONICS: Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, Breakdown mechanism – Avalanche zener Breakdown – special purpose diodes: Schottky diode, tunnel diode, varactor diode, photodiode, phototransistor ,Introduction to Bipolar Juntion Transistor – BJT construction, operation, configurations – CB, CE, CC. – Introduction to Basic Logic Gates.

Text Books:-

1. D.P. Kothari, I.J.Nagrath, Basic Electrical and Electronics Engineering, 2^{nd} Edition, McGraw Hill Education (India) Private Limited.
2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2nd edition, Pearson India Private Limited.

Reference Books:-

1. Principles of Electrical Engineering and Electronics, V.K. Mehta & Rohit Mehta, S.Chand publications.
2. Electronic Devices and Circuit Theory by Robert L.Boylestad and Louis Nashelsky., pearson.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9902	3	0	0	0	CIA	30 M
Course Title	:	ENVIRONMENTAL SCIENCES					SEE	--

COURSE OBJECTIVES:-

1. Creating basic awareness on environment
2. Understanding the importance of ecological balance for sustainable development.
3. Creating awareness on biodiversity and its conservation
4. Understanding the impacts of developmental activities and mitigation measures.
5. Understanding the environmental policies and regulations.

COURSE OUTCOMES:

Based on this course, the Engineering graduate will understand / evaluate / develop technologies on the basis of ecological principles and environmental regulations which in-turn helps in sustainable development.

UNIT I

Ecosystems: Definition, Scope and Importance ecosystem. Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Energy flow in the ecosystem, Biogeochemical cycles, Bioaccumulation, ecosystem value, derives and carrying capacity, Field visits.

UNIT II

Natural Resources: Classification of Resources: Living and Non - Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problem, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable energy source, case studies.

UNIT III

Biodiversity and its Conservation: Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels - India as a mega diversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Conservation of biodiversity: In-situ and Ex-situ conservation. National Biodiversity Act.

UNIT IV

Environmental Pollution and Control Technologies: Environmental Pollution & Control: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and industrial pollution, Ambient air

quality standards. Water pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid Waste management composition and characteristics of e - Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, Secondary Tertiary.
Overview of air pollution control technology, Concept of bioremediation. Global Environmental Problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montreal Protocol.

UNIT V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio - economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP).
Towards Sustainable Future: Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl Human Health, Environmental Ethics, Concept of Green Building, Ecological foot print, Life Cycle Assessment(LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCES:

1. Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.
2. Enviromental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela . 2008 PHI Learning Pvt Ltd.
4. Environmental Science by Daniel B. Botkin & Edwards A. Keller, Wiley INDIA edition.
5. Enviromental Studies by Anubha Kaushik, 4th Edition, New age international publishers.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0301	1	0	4	3	CIA	30 M
Course Title	:	ENGINEERING DRAWING LAB					SEE	70 M

COURSE OBJECTIVES:

1. To gain and understanding of the basics of geometrical constructions of various planes and solids, understanding system of graphical representation of various objects and various views to draft and read the products to be designed and eventually for manufacturing applications.

2. To learn about various projections, to understand complete dimensions and details of object.
3. Ultimately student must get imaginary skill to put an idea of object, circuit, assembly of parts in black & white, to design a product and to understand the composition, which can be understood universally.

COURSE OUTCOMES:

1. Drawing 2D and 3D diagrams of various objects.

2. Learning conventions of Drawing, which is an Universal Language of Engineers.
3. Drafting projections of points, planes and solids.

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance – Conventions in Drawing – Lettering – BIS Conventions.
Curves used in Engineering Practice: (a) Conic Sections including the Rectangular Hyperbola – General method only, (b) Cycloid, Epicycloid and Hypocycloid, (c) Involutes.

UNIT II

Scales: Plain, Diagonal and Vernier.
Projection of Points: Principles of orthographic projection – Convention – First angle projections, projections of points.

UNIT III

Projections of Lines: Lines inclined to one or both planes, Problems on projections, Finding True lengths.
Projections of Planes: Projections of regular plane surfaces- plane surfaces inclined to both planes.

UNIT IV

Projections of Solids: Projections of Regular Solids with axis inclined to both planes.
Developments of Solids: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid,

Cone.

UNIT V

Isometric and Orthographic Projections: Principles of isometric projection- Isometric Scale- Isometric Views- Conventions- Isometric Views of lines, Planes, Simple solids (cube, cylinder and cone). Isometric projections of spherical parts. Conversion of isometric Views to Orthographic Views.

Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai

References:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal /New age Publishers
4. Engineering Graphics, K.C. John, PHI,2013
5. Engineering Drawing, B.V.R. Guptha, J.K. Publishers

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9903	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING PHYSICS LAB					SEE	70 M

COURSE OBJECTIVES:

1. To understand the phenomenon of interference and diffraction using Travelling Microscope and spectrometer.
2. To analyze the interaction of electromagnetic fields.
3. To understand the concept of polarization and classify polarized and unpolarized lights.
4. To realize the laws of resistance by using Carey Foster's bridge.
5. To analyze the frequencies of electrically maintained tuning fork by Melde's apparatus.

COURSE OUTCOMES:

After completion of this course, the students will be able to:

1. Apply the knowledge of optics to calculate geometrical parameters of thickness of thin object and radius of curvature of a lens.
2. Plot the intensity of the magnetic field of circular coil carrying current with varying distance.
3. Evaluate the Planck's constant value practically and analyze the characteristics of photo electric cell and Cauchy's constants.
4. Determine coefficient of thermal Conductivity of a Bad Conductor.

LIST OF EXPERIMENTS:

1. Determination of Radius of Curvature of a given Convex Lens By forming Newton's Rings.
2. Determination of Wavelength of Spectral Lines in the Mercury Spectrum by Normal Incidence method.
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying Circular Coil.
4. Determination of Cauchy's Constants of a Given Material of the Prism using Spectrometer.
5. Determination of Refractive Index of Ordinary ray $\mu_0$and extraordinary$\mu_e$ray.
6. Determination of Thickness Given Paper Strip by Wedgeshape Method.
7. Calibration of LowRange Voltmeter.
8. Calibration of LowRange Ammeter.
9. Determination of Magnetic Moment and Horizontal Component of Earth's Magnetic Field.
10. Lees Method - Coefficient of thermal Conductivity of a Bad Conductor.
11. Carey Foster's Bridge – Verification of laws of Resistance and Determination of Specific Resistance.
12. Melde's Apparatus – Frequency of electrically maintained Tuning Fork.
13. Photoelectric cell-Characteristics.

14. Planks Constants.
15. Determination of Wavelength of Monochromaticsource using LASERdiffraction

Reference Books:

S.Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S.Chand Publishers, 2017.

1. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita Unive

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Laboratory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19ALC0301	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING & IT WORKSHOP LAB					SEE	70 M

ENGINEERING WORKSHOP LAB

COURSE OBJECTIVES:

4. The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labor involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

COURSE OUTCOMES:

1. Acquires basic knowledge of various tools and their uses in different sections of manufacturing.
2. Apply wood working skills in real world applications.
3. Design and model various basic prototypes in the trade of fitting.
4. Able to perform various basic House Wiring techniques.

TRADES FOR EXERCISES:

(a) Carpentry: Bench Work, tools used in carpentry.

Jobs for Class work: (i) Half lap joint (ii) Mortise and Tenon joint

(iii) Bridle joint (iv) Corner dovetail joint

(b) Fitting: Tools used in fitting work, Different files, chisels, hammers and bench vice.

Jobs for class work: (i) Vee Fit (ii) Square Fit

(iii) Dovetail Fit (iv) Half Round Fit

(c) House Wiring: Tools used in house wiring work.

Jobs for class work: (i) Series / Parallel Connection with three bulbs

(ii) Tube Light Connections (iii) Stair Case Connections

(iv) Measurement of Earth Resistance / Godown Wiring

Note: At least two exercises to be done from each trade.

TRADES FOR DEMONSTRATION:

a) Plumbing
b) Machine Shop

REFERENCE BOOKS:

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

IT WORKSHOP LAB

COURSE OBJECTIVES:

1) Understand the basic components and peripherals of a computer.
2) To become familiar in configuring a system.
3) Learn the usage of productivity tools.
4) Acquire knowledge about the netiquette and cyber hygiene.
5) Get hands on experience in trouble shooting a system

COURSE OUTCOMES:

At the end of the course the students can able to

1) Assemble and disassemble the systems
2) Use the Microsoft Office Tools
3) Install various software
4) Know about various search engines
5) Trouble shoots various Hardware and Software problems.

LIST OF EXERCISES

1. System Assembling, Disassembling and identification of Parts / Peripherals
2. Operating System Installation - Install Operating Systems like Windows, Linux along with necessary Device Drivers. The system should be configured as dual boot with both windows and Linux.
3. MS-Office / Open Office
   a) Word – All Toolbars, Page Setup, Page Background, Font, Para Graph, Page Borders, Headers & Footers, Mail Merge, Tables, Symbols, Equations, Saving, and Reviewing.
   b) Excel / Spread Sheet - All Toolbars, Cell Formatting, Grid Lines, Font, Page Setup, Organize data, Functions, Formulae, Headers & Footers, Tables, Graphs and Charts.
   c) Power Point Presentation – Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets, Numbering, Slide Show, Animations, Hyperlinks, Inserting – Images, Clip Art, Shapes, Objects, Tables and Charts, Audio, and Video files.
   d) Access - creation of database, validate data.
4. Network Configuration & Software Installation - Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.
5. Internet and World Wide Web Search Engines, Types of search engines, netiquette, cyber hygiene.

6. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

Reference Books:

1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.
2. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition By Gary B. Shelly, Misty E. Vermaat and Thomas J. Cashman (2007, Paperback).
3. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Rudra Prathap, Oxford University Press, 2002.
4. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
5. The Complete Computer upgrade and repair book, 3/e, Cheryl A Schmidt, Dreamtech.
6. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
6) Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0202	0	0	3	1.5	CIA	30 M
Course Title	:	BASIC ELECTRICAL & ELECTRONICS ENGG. LAB					SEE	70 M

COURSE OBJECTIVES:

1. Get exposure to common electronic components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand usage of common electrical measuring instruments.
4. Determine performance characteristics of PN Junction diodes and applications.
5. Understanding simple Network connections Like series circuits

COURSE OUTCOMES:

1. To learn about the simple Logic gates functions.
2. Understanding the simple configurations of the Transistor.
3. Useful for the simple applications of PN diode.
4. To give knowledge about PN diode characteristics.
5. Knowledge about simple Network Analysis

BASIC ELECTRICAL ENGINEERING LAB
List of Experiments:

1. Verification of Ohms Law
2. Verification of KCL and KVL Laws
3. MESH analysis
4. NODAL analysis
5. Verification of RC and RL Parallel Resonance
6. Verification of R-L-C Series Resonance

BASIC ELECTRONICS ENGINEERING LAB
List of Experiments:

1. V-I Characteristics of PN DIODE
2. Half Wave Rectifier
3. Full Wave Rectifier
4. BJT Configuration of CB, CE, CC
5. ZENER Diode Characteristics
6. Basic LOGIC gates

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to II Semester CSE, ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9906	3	1	0	4	CIA	30 M
Course Title	:	MATHEMATICS – II					SEE	70 M

COURSE OBJECTIVES:

1. To familiarize the prospective engineers with techniques in multivariate integration and partial differential equations.
2. To equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

COURSE OUTCOMES:

After the completion of this course, the students will be able to:

1. Understand beta and gamma functions and its relations and conclude the use of special function in evaluating definite integrals.
2. Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and apply double integration techniques in evaluating areas bounded by region.
3. Apply Del to Scalar and vector point functions and illustrate the physical interpretation of Gradient, Divergence and Curl.
4. Find the work done in moving a particle along the path over a force field and evaluate the rates of fluid flow along and across curves.
5. Apply a range of techniques to find solutions of standard PDEs and outline the basic properties of standard PDEs.

UNIT I
Sequences and Series: Convergence of sequence and series, tests for convergence;
Fourier series: Half range sine and cosine series, Parseval's theorem.

UNIT II
Special Functions: Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions, evaluation of improper integrals.

UNIT III

Multiple Integrals: Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves, Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates.

UNIT IV

Vector Calculus: Scalar and vector point functions, vector operator del, del applies to scalar point functions Gradient, del applied to vector point functions-Divergence and Curl, vector identities.
Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

UNIT V

Partial Differential Equations: First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

Text Books:

3. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers.
4. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons.

Reference Books:

4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd.
5. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
6. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9904	3	0	0	3	CIA	30 M
Course Title	:	ENGINEERING CHEMISTRY					SEE	70 M

COURSE OBJECTIVES:

COURSE OUTCOMES:

At the end of the course the students will be able to:

1. To impart the concept of soft and hard waters, softening methods of hard water.
2. Explain the importance of polymers in our daily life and mechanism of conduction in the conducting polymers.
3. To analyze the fuel and methods for preparation of synthetic fuels.
4. To understand the basics of electrochemistry, conductometry and batteries.
5. To familiarizes the Engineering materials.

UNIT I **(10 hrs)**

Water Technology:
Sources of Water, Impurities and their Influence on Living Systems, Soft Water and Hardness of Water, Estimation of Hardness by EDTA Method, Boiler Troubles **-** Scale and Sludge, Industrial Water Treatment Internal Treatment Methods(Phosphate Conditioning, Calgon Conditioning), Water softening Methods (Zeolite and Ion-Exchange Processes), Specifications for Drinking Water, Bureau of Indian Standards(BIS) and World Health Organization(WHO), Municipal Water Treatment, Desalination of Brackish Water, Reverse Osmosis (RO) and Electrodialysis.

UNIT II **(10 hrs)**

Polymer Chemistry: Introduction to Polymers, Types of Polymerisation (Addition & Condensation), Mechanism of Addition Polymerisation (Ionic and Radical).
Plastics: Thermoplastics and Thermosettings. Preparation, Properties and Applications of Bakelite, Nylon-66.
Elastomers: Buna-S, Buna-N–Preparation, Properties and Applications.

Conducting Polymers: Polyacetylene, Polyaniline, Mechanism of Conduction and Applications.

UNIT III **(10 hrs)**

Fuel Technology: Fuels – Classification of fuels.

Solid Fuels: Wood and Coal, Ranking of Coal-Analysis (Proximate and Ultimate), Coke Manufacture Otto Hoffman Process.

Liquid Fuels: Petroleum Origin, Extraction, and Refining. Motor Fuels Petrol, Diesel Oil, Knocking Octane Number and Cetane Number; Synthetic petrol-Fischer-Tropsch's & Bergius process.

Gaseous Fuels: Composition and Uses of Natural Gas, LPG, and CNG. Flue gas analysis and its significance.

UNIT IV **(10 hrs)**

Electrochemistry: Introduction to Electrochemistry (Conductors, Semi-Conductors, Insulators, Conductance). Electrodes, Reference Electrodes, Electrochemical Cell, Nernst Equation, Cell Potential and its Calculations, Numerical Problems. Principle and Applications of Potentiometry, Conductometry.

Batteries: Primary Batteries – Zinc-Air Battery.
Secondary Batteries- Lithium Ion Batteries- Working of the Batteries including Cell Reactions.
Fuel Cell- Hydrogen-Oxygen.

UNIT V **(10 hrs)**

Materials of Engineering Chemistry:

Building materials: Portland Cement, Constituents, Phases and Reactivity of Clinker, Setting and Hardening of Cement.

Refractories: Classification, Properties, Factors affecting the Refractory Materials and Applications.

Lubricants: Classification of Lubricants with examples. Definition and Significance of the following Characteristics of a Good Lubricating Oil- Viscosity, Viscosity Index, Flash & Fire Point, Acid Number, Saponifaction Value, Pour Point and Cloud Point.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Shashi Chawla, A Reading of Engineering Chemistry, 3rd Edition, Dhanpat Rai and Co., New Delhi, 2011,3rd edition.
3. Puri, Sharma and Pathania "Principles of Physical Chemistry". Vishal Publishing Co.,Jalandhar.1991, 31st edition
4. Gowariker *et al*., Polymer Science and Technology, Prentice Hall of India Pvt. Ltd., New Delhi, 2004, 10th reprint.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0501	3	1	0	4	CIA	30 M
Course Title	:	C PROGRAMMING					SEE	70 M

COURSE OBJECTIVES:

1. Introduce the internal parts of a computer, and peripherals.
2. Introduce the Concept of Algorithm and use it to solve computational problems
3. Identify the computational and non – computational problems
4. Teach the syntax and semantics of a C Programming language
5. Demonstrate the use of Control structures of C Programming language

COURSE OUTCOMES:

1. Illustrate the working of a computer and apply algorithmic approach for solving a problem.
2. Recognize the importance of programming language independent constructs
3. Select the control structure to solve computational problems
4. Design and implement programs to analyze the array applications.
5. Structure the individual data elements to simplify the solutions.

UNIT I

Introduction to Computer Programming Languages: Evolution of Computer Programming languages – Machine, Symbolic and high-level languages. Fundamentals of Algorithms (Pseudo Codes) and Flowcharts, Compiler, Interpreter, Loader, and Linker.
Creating and Running Programs: Writing, Editing, Compiling, Linking and Executing.
Program Control Structures: Sequence, Selection and Iteration. Software Development Method.

UNIT II

Introduction to C Language: Background, Basic Structure of a C Program – Steps to execute a C Program – Character Set of C Language – Basic I/O Statements – Basic Data Types and Sizes – C – Tokens: Identifiers, Keywords, Constants, and Variables. Sample Programs.
Input and output: standard input and output, formatted output – printf, formatted input – scanf.

UNIT III

Operators: Arithmetic, Relational, Logical, Increment and decrement, Conditional, Assignment, Bitwise – Operator Precedence – Expressions – Type Conversions, Conditional Expressions – Precedence and Order of Evaluation. Sample Programs.
Control Flow / Control Statements: Selection & Making Decisions – Logical Data and Operators – Two-way Selection, Multi-way selection – Standard Statements and blocks – Non-iterative Statements: (if, if-else, null else, nested if-else, if-else ladder, else-if, switch) – Repetitive / Iterative Statements: Concept of

loop – Pre-test and post-test loops – While loop, do-while loop, and for loops, initialization and updating, event and counter controlled loops. Branching: break, continue, and Goto. – Sample programs on applications.

UNIT IV

Arrays in C language: Concept – Definition – Declaration – Types of arrays – One Dimensional, two dimensional, multidimensional – initialization of arrays – Storing and assessing elements – Array applications.
Strings: Definition, Declaration, Initialization – Basic operations – String manipulations – String handling functions – Arrays using strings -

UNIT V

Pointers and arrays: Concept – Definition, Declaration, Initialization, pointer to pointer, functions and pointers, arrays and pointers, pointer as function arguments (call-by-reference), pointers and strings.
Functions: Concept – Definition, Declaration, Types of functions – parameter passing – passing arrays to functions, passing pointers to functions, Recursion – returning non-integers, external variables, scope variables, header variables, register variables, block structure. User defined functions – Standard Library Functions.
Structures: Definition – Declaration – Initialization - Accessing the structure elements – arrays of structures, Array with in structures, pointers to structures, Passing Structure to functions – nested structures, self-referential structures, unions, typedef.

Text Books:

1. Pradip Dey, and Manas Ghosh, "Programming in C", 2018, Oxford University Press.
2. R.G. Dromey, "How to Solve it by Computer". 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, "The C Programming Language", 2ndEdition, Pearson.

Reference Books:

1. RS Bichkar "Programming with C", 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, "Information Technology in Theory", 2017, Cengage Learning.
3. Byron Gottfried and Jitender Kumar Chhabra, "Programming with C", 4th Edition, 2019, McGraw Hill Education.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9901	2	0	0	2	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH					SEE	70 M

COURSE OBJECTIVES:

Reading Skills

- Addressing explicit and implicit meanings of a text on current topics.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

Writing Skills

- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, emails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

Interactive Skills

- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

Life Skills

- Examining self-attributes and identifying areas that require improvement: self-diagnosis and self-motivation.
- Adapting to a given situation and developing a functional approach to finding solutions: adaptability and problem solving.
- Understanding the importance of helping others: community services and enthusiasm.

COURSE OUTCOMES:

1. The student will acquire basic proficiency in English using all LSRW skills.
2. Read and explore for enrichment of works from various genres (Poems, essays etc.)
3. Make correct usage of grammar and Vocabulary in writing and speaking.
4. To make them develop Linguistic competence.
5. To make them understand the concept of redundancies in writing skills.

UNIT I

Reading	:	*On the conduct of life:* William Hazlitt
Grammar	:	Prepositions
Vocabulary	:	Word Formation I: Introduction to Word Formation
Writing	:	Clauses and Sentences

Life skills	:	**Values and Ethics** *If:* Rudyard Kipling

UNIT II

Reading	:	*The Brook:* Alfred Tennyson
Grammar	:	Articles
Vocabulary	:	Word Formation II: Root Words from other Languages
Writing	:	Punctuation
Life skills	:	**Self-Improvement** *How I Became a Public Speaker*: George Bernard Shaw

UNIT III

Reading	:	*The Death Trap*: Saki
Grammar	:	Noun-Pronoun Agreement Subject- Verb Agreement
Vocabulary	:	Word Formation III: Prefixes and Suffixes
Writing	:	Principles of Good Writing
Life skills	:	**Time Management** *On saving Time*: Seneca

UNIT IV

Reading	:	*Chindu Yellama*
Grammar	:	Misplaced Modifiers
Vocabulary	:	Synonyms; Antonyms
Writing	:	Essay Writing
Life skills	:	**Innovation** *Muhammad Yunus*

UNIT V

Reading	:	*Politics and the English Language*: George Orwell
Grammar	:	Clichés; Redundancies
Vocabulary	:	Common Abbreviations
Writing	:	Writing a Summary
Life skills	:	**Motivation** *The Dancer with a White Parasol*: Ranjana Dave

Prescribed Textbook: *Language and Life: A Skills Approach* Board of Editors, Orient Black Swan Publishers, India. 2018.

Suggested Readings

- Practical English Usage. Michael Swan. OUP. 1995.
- Remedial English Grammar. F.T. Wood. Macmillan.2007
- On Writing Well. William Zinsser. Harper Resource Book. 2001
- Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
- Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
- Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9901	3	0	0	0	CIA	30 M
Course Title	:	HUMAN VALUES AND PROFESSIONAL ETHICS					SEE	--

COURSE OBJECTIVES:- This introductory course input is intended.

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

UNIT I

Course Introduction – Need, basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self Exploration – what is it? – its content and process; 'Natural Acceptance' and Experiential Validation – as the mechanism for self exploration. Continuous Happiness and Prosperity – A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities – the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly – A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT II

Understanding Harmony in the Human Being – Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' – Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT III

Understanding Harmony in the Family and Society – Harmony in Human – Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human – human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti;
Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship.

Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society – Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) – from family to world family!

UNIT IV

Understanding Harmony in the nature and Existence – Whole existence as Co- existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature – recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astiva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order,
b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order.

a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b. At the level of society: as mutually enriching institutions and organizations.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

REFERENCE BOOKS:

1. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.

8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9905	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING CHEMISTRY LAB					SEE	70 M

COURSE OBJECTIVES:

COURSE OUTCOMES: At the end of the course, the students will be able to

1. **Prepare** of various Solutions
2. **Determine** the hardness of water
3. **Analysis** of water
4. **Calculate** the cell constant and conductance of solutions
5. **Determine** the physical properties like viscosity, acid number, saponification number
6. **Estimate** the Iron and Calcium in cement

LIST OF EXPERIMENTS:

1. Preparation of Primary Standard (sodium carbonate) Solution.
2. Estimation of Hardness of Water by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method.
4. Estimation of Available Chlorine in Bleaching Powder.
5. Estimation of Ferrous ion in the given Mohr Salt by using KMnO4 Solution
6. Determination of Strength of an Acid in Pb-Acid Battery.
7. Preparation of Polymer (Bakelite).
8. Determination of Cell Constant and Conductance of Solutions
9. Determination of Strength of Acid by Conductometric Titrations.
10. Estimation of Calcium in Port land Cement.
11. Determination of Iron in Cement Sample by Colorimeter.
12. Determination of Viscosity of Lubricating Oil using Ostwald Viscometer.
13. Determination of Average Molecular Mass of given Polymer (Polyvinyl Alcohol) by Using Ostwald Viscometer.
14. Determination of acid number of given lubricating oil.
15. Determination of Saponification number of given lubricating oil.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0502	0	0	3	1.5	CIA	30 M
Course Title	:	C PROGRAMMING LAB					SEE	70 M

COURSE OBJECTIVES:

1. To learn about the computer systems, computing environments, developing a computer program and structure of C.
2. To gain Knowledge of the operators, control statements in C.
3. To learn about the design concepts of arrays, strings and their usage.
4. To assimilate about pointers and dynamic memory allocation.

COURSE OUTCOMES:

1. Acquire skills to write, compile and debug programs in c language.
2. Be able to use different operators, data types and write programs
3. Acquire knowledge to select the best loop construct for a given problem.
4. Design and implement programs to analyze the array applications.
5. Design and implement C programs with Functions.

Exercise: 1

a) Write a C program to print a given statement.
b) Write a C program for exchanging (interchanging) values of two variables.
c) Write a C program to find the reverses of a given Number.

Exercise: 2

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program to find the second maximum number among the given list of numbers.
c) Write a C program to find the k^{th} smallest number among the given list of numbers.

Exercise: 3

a) Write a C program to demonstrate various operators (Arithmetic operator, increment & decrement operator, Relational operator, and Assignment operator).
b) Write a C Program, to counts number of positive and negative numbers separately and also compute the sum of them.

Exercise: 4

a) Write a C program to generate the first 'n' terms in the sequence of Fibonacci series.

Exercise: 5

a) Write a C program to generate all the prime numbers between 1 and n, where 'n' is the value given by the user.
b) Write a program which Prints the following patterns.

```
ABCDEFGFEDCBA
ABCDEF FEDCBA
ABCDE   EDCBA
ABCD     DCBA
ABC       CBA
AB         BA
A           A
```

```
    0
   111
  22222
 3333333
444444444
```

c) Write a C program to generate Pascal's triangle.
d) Write a C program to construct a pyramid of numbers.

Exercise: 6

a) Write a C program, for the arithmetic operators using switch case (which takes two integer operands and one operator from the user, performs the specified operation and then prints the result. (Consider the operators +,- ,*, /, % and use Switch Statement)
b) Write a program to find G.C.D (Greatest Common Divisor) of two numbers using recursion and non-recursion.
c) Write a program to find factorial of a number using recursion and non-recursion.

Exercise: 7

a) Write a C program to calculate distance between two points.
b) Write a program to find Roots of quadratic equation.

Exercise: 8

a) Write a C program to perform Matrix Addition
b) Write a C program to perform Matrix Multiplication
c) Write a C program to perform inverse of a Matrix.
d) Write a C program to find the transpose of a given matrix.

Exercise: 9

a) Write a C program for any numerical method.
b) Write a C program to make a simple calculator.

Exercise: 10

a) Write a C program to solve Towers of Hanoi problem by using recursive function.
b) Write a C program to know if the given string is a palindrome or non-palindrome.
c) Write a C program to find whether the given year is a leap year or not.

Exercise: 11

a) Write a C program to insert a sub-string in to the given main string.
b) Write a C program to demonstrate the parameter passing mechanism using: call-by-value, call-by-reference.

Exercise: 12

a) Implement the sorting algorithm: Insertion sort and Selection sort.
b) Write a C program to access elements of an array using pointers
c) Write a C program to find the sum of numbers with arrays and pointers.

Exercise: 13

a) Implementation of string using operations.
   i) Copy
   ii) Concatenate
   iii) Length
   iv) Compare

Exercise: 14

a) Write a C program to find the position of a substring.
b) Write a C program to represent complex numbers using structure.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9902	0	0	3	1.5	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH LAB					SEE	70 M

COURSE OBJECTIVES:

1. Students will be exposed to a variety of self instructional, learner friendly modes of language learning
2. Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
3. Students will learn better pronunciation through stress, intonation and rhythm
4. Students will be trained to use language effectively to face interviews, group discussions, public speaking
5. Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

COURSE OUTCOMES:

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
2. Apply communication skills through various language learning activities.
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional settings.
5. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

UNIT I

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

Learning Outcomes: At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

UNIT II

1. JAM
2. Small talks on general topics
3. Debates

Learning Outcomes: At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

UNIT III

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

Learning Outcomes: At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

UNIT IV

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

Learning Outcomes: At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

UNIT V

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

Learning Outcomes: At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester CE, ECE & ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9907	2	1	0	3	CIA	30 M
Course Title	:	COMPLEX VARIABLES AND TRANSFORMS					SEE	70 M

COURSE OBJECTIVES:-

- This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables. The student develops the idea of using continuous/discrete transforms.

UNIT I

Complex Variable – Differentiation

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations, analytic functions (exponential, trigonometric, logarithm), harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method-Conformal mappings-standard and special transformations (sin z, e^z, cos z, z^2) Mobius transformations (bilinear) and their properties.

Learning Outcomes: Students will be able to:

- Understand functions of Complex variable and its properties.
- Find derivatives of complex functions.
- Understand the analyticity of complex functions.
- Understand the conformal mappings of complex functions.

UNIT II

Complex Variable – Integration

Line integral-Contour integration, Cauchy's integral theorem, Cauchy Integral formula, Liouville's theorem (without proof) and Maximum-Modulus theorem (without proof);power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi circle with f(z) not having poles on real axis).

Learning Outcomes: Students will be able to

- Understand the integration of complex functions.
- Apply Cauchy's integral theorem and Cauchy's integral formula.
- Understand singularities of complex functions.
- Evaluate improper integrals of complex functions using Residue theorem.

UNIT III

Laplace Transforms

Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

Learning Outcomes: Students will be able to

- Understand the concept of Laplace transforms and find the Laplace transforms of elementary functions.
- Find the Laplace transforms of general functions using its properties.
- understand Laplace transforms of special functions(Unit step function, Unit Impulse & Periodic).
- Apply Laplace transforms to solve Differential Equations.

UNIT IV

Fourier series

Determination of Fourier coefficients (Euler's) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity-Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions- typical wave forms - Parseval's formula- Complex form of Fourier series.

Learning Outcomes: Students will be able to

- Understand finding Fourier series expression of the given function.
- Determine Fourier coefficients (Euler's) and identify existence of fourier series of the given function.
- Expand the given function in Fourier series given in Half range interval.
- Apply Fourier series to establish Identities among Euler coefficients.
- Find Fourier series of wave forms.

UNIT V

Fourier transforms& Z Transforms:

Fourier integral theorem (without proof) – Fourier sine and cosine integrals-complex form of Fourier integral. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem .

Z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

Learning Outcomes: Students will be able to

- Find Fourier Sine and cosine integrals.
- Understand Fourier transforms.
- Apply properties of Fourier transforms.
- Understand Z transforms.
- Apply properties of Z transforms.
- Apply Z transforms to solve difference equations.

TEXT BOOKS:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Advanced Engineering Mathematics, by R.K.Jain and S.R.K.Iyengar, Alpha Science International Ltd. Pangboume England.

REFERENCE BOOKS:

1. Higher Engineering Mathematics, by B.V.Ramana, McGraw Hill publishers.
2. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

COURSE OUTCOMES:

After the completion of course, students will be able to

1. Understand the analyticity of complex functions and conformal mappings.
2. Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
3. Understand the usage of Laplace Transforms, Fourier Transforms and Z transforms.
4. Evaluate the Fourier series expansion of periodic functions.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester CE, CSE & ME)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0503T	3	0	0	3	CIA	30 M
Course Title	:	DATA STRUCTURES					SEE	70 M

COURSE OBJECTIVES:-

- To teach the representation of solution to the problem using algorithm
- To explain the approach to algorithm analysis
- To introduce different data structures for solving the problems
- To demonstrate modeling of the given problem as a graph
- To elucidate the existing hashing techniques

UNIT I: Introduction

Algorithm Specification, Performance analysis, Performance Measurement. Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions. Sorting: Motivation, Insertion sort, Quick sort, How fast can we sort, Merge sort, Heap sort.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Analyze the given algorithm to find the time and space complexities.(L4)
- Select appropriate sorting algorithm (L4)
- Design a sorting algorithm (L6)

UNIT II: Stack, Queue and Linked lists

Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Evaluate expressions (L5)
- Develop the applications using stacks and queues (L3)
- Construct the linked lists for various applications (L6)

UNIT III: Trees

Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, Counting Binary Trees, Optimal Binary search Trees, AVL Trees. B-Trees: B-Trees, B + Trees.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain the concept of a tree (L2)
- Compare different tree structures (L4)
- Apply trees for indexing (L3)

UNIT IV: Graphs and Hashing

The Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure.
Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Recognize the importance of Graphs in solving real world problems (L2)
- Apply various graph traversal methods to applications (L3)
- Design a minimum cost solution for a problem using spanning trees (L6)
- Select the appropriate hashing technique for a given application (L5)
- Design a hashing technique (L6)

UNIT V: Files and Advanced sorting

File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization.

Advanced sorting: Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.

Learning Outcomes: Students will be able to

- Organize files (L3)
- Design the algorithms which sort the elements which doesn't fit in main memory (L6)

TEXT BOOKS:

3. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures in C", 2nd Edition, Galgotia Book Source, Pvt. Ltd., 2004.
4. ALAN L.THARP, "File Organization and Processing", Wiley and Sons, 1988.

REFERENCE BOOKS:

1) D. Samanta, “Classic Data Structures”, 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
2) Peter Bras, “Advanced Data Structures”, Cambridge University Press, 2016
3) Richard F.Gilberg, Behrouz A.Forouzan,”Data Structures A Pseudo code Approach with C”, Second Edition, Cengage Learning 2005.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1) Select Appropriate Data Structure for solving a real world problem. (L4)
2) Select appropriate file organization technique depending on the processing to be done. (L4)
3) Construct Indexes for Databases. (L6)
4) Analyse the Algorithms.(L4).
5) Develop Algorithm for Sorting large files of data.(L3).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to III Semester ME & IV Semester CE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0505T	3	0	0	3	CIA	30 M
Course Title	:	PYTHON PROGRAMMING FOR ENGINEERS					SEE	70 M

COURSE OBJECTIVES:-
- To teach the fundamentals of Python
- To elucidate problem-solving using a Python programming language
- To introduce a function-oriented programming paradigm through python
- To develop the skill of designing Graphical user Interfaces in Python
- To learn how to use lists, tuples, and dictionaries in Python programs.

UNIT I:

Introduction: What is a program, running python, Arithmetic operators, Value and Types?
Variables, Assignments and Statements: Assignment statements, Script mode, Order of operations, string operations, comments.
Functions: Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.
Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.

Learning Outcomes: After successful completion of this unit, the students will be able to
- List the basic constructs of Python (L1)
- Solve the problems by applying modularity principle (L3)

UNIT II:

Conditionals and Recursion: Floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.
Fruitful Functions: Return values, Incremental development, Composition, Boolean functions, More recursion, Leap of Faith, Checking types
Iteration: Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms.

Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Apply the conditional execution of the program (L3)
- Apply the principle of recursion to solve the problems (L3)

UNIT III:

Case Study: Reading word lists, Search, Looping with indices.
Lists: List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.
Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.

Tuples: Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Use the data structures Lists, Dictionaries, and Tuples (L3)
- Design programs for manipulating strings (L6)

UNIT IV:

Files: Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.
Classes and Objects: Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.
Classes and Functions: Time, Pure functions, Modifiers, Prototyping versus Planning
Classes and Methods: Object oriented features, Printing objects, The init method, The __str__method, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation

Inheritance: Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Apply object orientation concepts (L3)
- Organize data in the form of files (L6)

UNIT V:
Overview of Packages for Scientific and Data Processing

Introduction to Machine Learning-History and Evolution, Artificial intelligence Evolution, Different Forms, Machine learning categories, Machine learning Python packages, Data Analysis packages, Machine learning core libraries.

Learning Outcomes: Students will be able to

- Understand Machine learning fundamentals (L2)
- Apply python packages for solving machine learning and data analysis problems (L3)

TEXT BOOKS:

5. Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.
6. Manohar Swamynathan, "Mastering Machine learning with Python in Six steps", Apress.

REFERENCE BOOKS:

4) Martin C.Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
5) Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.
6) R. Nageswara Rao, "Core Python Programming", 2nd edition, Dreamtech Press, 2019

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

6) Explain the features of Python language (L2)
7) Select appropriate data structure of Python for solving a problem (L4)
8) Design object oriented programs for solving real-world problems (L6)
9) Use Python packages (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0301	3	0	0	3	CIA	30 M
Course Title	:	ENGINEERING MECHANICS					SEE	70 M

COURSE OBJECTIVES:-

- Explain the effect of force and moment in different engineering applications.
- Teach centre of gravity and moment of inertia of solids and surfaces.
- Familiarize frictional forces in mechanical applications.
- Analysis of rigid bodies under dynamic conditions.

UNIT I: **12 hours**

Introduction to Engineering Mechanics: Composition and resolution of forces, parallelogram law, principle of transmissibility, types of force systems - concurrent and concurrent coplanar forces, resultant of coplanar force systems couple, moment of a force Varignon's theorem, concept of free body diagrams, concept of equilibrium of coplanar force systems.

Friction: Laws of friction, types of friction, equilibrium of force systems involving frictional forces, wedge friction. Free body diagrams involving frictional forces.

Learning Outcomes: After completing this unit, the student will be able to:

- Resolve the forces in mechanical systems (L2)
- Identify the moments and forces (L3)
- Draw free body diagram (L3)

UNIT II: **10 hours**

Analysis of Structures**:** Introduction to plane trusses, analysis of plane trusses by method of joints and method of sections.

Virtual Work: Equilibrium of ideal systems, work done by a force, work done by a couple, principle of virtual work.

Learning Outcomes: After completing this unit, the student will be able to:

- Identify different types of trusses. (l2)
- Analyze the plane trusses by method of joints and the method of sections. (l4)
- Demonstrate equilibrium of ideal system. (l2)
- Estimate the work done by a force and work done by a couple. (l3)

UNIT III: **10 hours**

Properties of Surfaces and Volumes: Centroid and center of gravity, derivation of centroids from first moment of area, centroids of composite sections, center of gravity of common volumes - cylinder, cone, sphere, theorem of Pappus-guidinus.

Moment of Inertia: Area moment of inertia of plane and composite shapes, parallel axis theorem, perpendicular axis theorem, polar moment of inertia, mass moment of inertia of common volumes -thin plates, thin rod, cylinder, cone, sphere, rectangular prism, radius of gyration.

Learning Outcomes: After completing this unit, the student will be able to:

- Identify the centre of gravity of composite sections. (L3)
- Determine the centre of gravity of common solids. (L3)
- Determine moment of inertia for composite volumes. (L3)

UNIT IV: **10 hours**

Kinematics**:** Equations of motion for rigid bodies, constant and variable acceleration, rectilinear and curvilinear motion, motion under gravity -projectile motion, use of rectangular coordinates, tangential and normal coordinates, radius of curvature, rotation of a rigid body about a fixed axis, introduction to plane motion.

Learning Outcomes: After completing this unit, the student will be able to:

- Write equations of motion for rigid bodies. (L3)
- Find velocity and acceleration in rectilinear and curvilinear motions (L4)
- Trace the path of projectile. (L3)

UNIT V: **10 hours**

Kinetics**:** Principles of dynamics - Newton's Laws of motion, D'Alembert's principle in rectilinear translation, principle of work and energy.
Ideal Systems: Principle of conservation of energy, concept of power, conservation of linear and angular momentum, principle of momentum and impulse, impact - types of impact.

Learning Outcomes: After completing this unit, the student will be able to:

- Apply D'Alembert's principle in rectilinear translation. (L3)
- Relate principle of work and energy in dynamic systems. (L3)
- Make use of principle of momentum and impulse to dynamic bodies. (L4)

TEXT BOOKS:

4. S S Bhavikatti, “Engineering Mechanics”, 4th edition, New Age International, 2008.
5. S Timoshenko, DH Young, JV Rao, Sukumar Pati, “Engineering Mechanics (in SI units)”, 5th edition, McGraw Hill, 2013.

REFERENCE BOOKS:

1. Basudeb Bhattacharya., “Engineering Mechanics”, 2nd edition, Oxford University Press (India), 2015.
2. Irving Shames, G K M Rao, “Engineering Mechanics: Statics and Dynam-ics”, 4th edition, Pearson, 2009.
3. K L Kumar, Veenu Kumar, “Engineering Mechanics”, 4th edition, Tata McGraw Hill,

COURSE OUTCOMES:

After successful completion of the course, the students will be able to

5. Resolve forces and couples in mechanical systems. (L3)
6. Identify the frictional forces and its influence on equilibrium. (L3)
7. Find the centre of gravity and moment of inertia for various geometric shapes (L3)
8. Develop equations for different motions. (L4)
9. Determine the displacement, velocity and acceleration relations in dynamic systems (L4)
10. Relate the impulse and momentum (L4)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0302T	3	0	0	3	CIA	30 M
Course Title	:	MANUFACTURING PROCESSES					SEE	70 M

COURSE OBJECTIVES:-

- Working principle of different metal casting processes and gating system.
- Nature of plastic deformation, cold and hot working process, working of a rolling mill and types, extrusion processes.
- Principles of forging, tools and dies, working of forging processes.
- Classification of the welding processes, working of different types of welding processes and welding defects
- Classification, applications and manufacturing methods of plastics, ceramics and powder metallurgy.
- Learning Characteristics of Unconventional Machining Processes

UNIT I: **08 hours**

Introduction : Importance and selection of manufacturing processes.

Casting Processes: Introduction to casting process, process steps; pattern: types, materials and allowance; Cores: Types of cores, core prints, principles and design of gating system; Solidification of casting: Concept, solidification of pure metal and alloy; Special casting processes: Shell casting, investment casting, die casting, centrifugal casting, casting defects and remedies.

Learning Outcomes: After completing this unit, the student will be able to:

- Selection of suitable manufacturing process for a given product. (L3)
- Understand the steps involved in metal casting, pattern making. (L2)
- Apply the knowledge of designing gating systems, risers. (L3)
- Compare the working of various metal casting processes. (L4)
- Identify the various casting defects. (L3)

UNIT II: **08 hours**

Metal Forming: Introduction, nature of plastic deformation, hot and cold working of metals, mechanics of metal forming; Rolling: Principle, types of rolling mill and products, roll passes, forces in rolling and power requirements; Extrusion: Basic extrusion process and its characteristics, hot extrusion and cold extrusion, wire drawing, tube drawing.

Forging: Principles of forging, tools and dies. Types: Smith forging, drop forging, forging hammers, rotary forging and forging defects. Sheet metal forming: Mechanics of sheet metal working, blanking, piercing, bending, stamping.

Learning Outcomes: After completing this unit, the student will be able to:

- Compare cold working and hot working processes. (L4)
- Explain the working of rolling mills. (L2)
- Evaluate the forces and power in rolling and extrusion processes. (L5)
- Summarize the working of various extrusion processes. (L2)
- Identify the principles of forging, tools and dies. (L3)
- Summarize the various operations of Sheet metal forming. (L2)

UNIT III: **08 hours**

Metal Joining Processes: Classification of welding processes, types of welds and welded joints and V-I characteristics, arc welding, weld bead geometry, submerged arc welding, gas tungsten arc welding, gas metal arc welding. applications, advantages and disadvantages of the above processes, other fabrication processes. Heat affected zones in welding; soldering and brazing: Types and their applications, Welding defects: causes and remedies.

Learning Outcomes: After completing this unit, the student will be able to:

- Classify the working of various welding processes. (L2)
- Compare V-I characteristics of different welding processes. (L4)
- Summarize the applications, advantages of various welding processes. (L2)
- Identify the defects in welding. (L3)

UNIT IV:

Plastic Processing, Ceramics and Powder Metallurgy **08 hours**

Plastics: Types, properties and their applications, processing of plastics, extrusion of plastics, transfer molding and compression molding, injection molding, thermoforming, rotational molding and blow molding

Ceramics: Classification of ceramic materials, properties and their application, ceramic powder preparation; Processing of ceramic parts: Pressing, casting, sintering; Secondary processing of ceramics: Coatings, finishing.

Powder Metallurgy: Principle, manufacture of powders, steps involved.

Learning Outcomes: After completing this unit, the student will be able to:

- Learn the methods of manufacturing plastics parts. (L2)
- Explain the steps in making ceramics parts. (L2)
- Explain the steps in manufacturing of powder metallurgy parts. (L2)
- Demonstrate the application of plastic, ceramics and power metallurgy. (L2)

UNIT V: **10 hours**

Unconventional Machining Processes: Electrical discharge machining (EDM), principle and processes parameters, electro-chemical machining (ECM) Laser beam machining (LBM), plasma arc machining (PAM) and electron beam machining

Principles and process parameters of Abrasive jet machining (AJM), water jet machining, ultrasonic machining

Learning Outcomes: After completing this unit, the student will be able to:

- Identify different unconventional machining processes. (L3)
- Evaluate process parameters of EDM, ECM, LBM, PAM and AJM.(L5)
- Apply various unconventional machining processes. (L3)

TEXT BOOKS:

1 Rao P.N., "Manufacturing Technology – Volume I", 5th edition, McGraw-Hill Education, 2018.

2. Kalpakjain S and Schmid S.R., "Manufacturing Engineering and Technology", 7th edition, Pearson, 2018.

REFERENCE BOOKS:

1. Millek P. Groover, "Fundamentals of Modern Manufacturing": "Materials, Processes and Systems", 4th edition, John Wiley and Sons Inc, 2010.

2. Sharma P.C., "A Text book of Production Technology", 8th edition, S Chand Publishing, 2014.

COURSE OUTCOMES:

After successful completion of the course, the students will be able to

1. Demonstrate different metal casting processes and gating systems. (L2)
2. Classify working of various welding processes. (L2)
3. Evaluate the forces and power requirements in rolling process. (L5)
4. Apply the principles of various forging operations. (L3)
5. Outline the manufacturing methods of plastics, ceramics and powder metallurgy. (L1)
6. Identify different unconventional processes and their applications. (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0303T	3	0	0	3	CIA	30 M
Course Title	:	MATERIAL SCIENCE AND ENGINEERING					SEE	70 M

COURSE OBJECTIVES:-

- To teach the principles of physical metallurgy, i.e. crystallography of metals, constitution of alloys, phase diagrams.
- Expose commercially important metals and alloys (both ferrous and non ferrous) with engineering constraints.
- Explain the methods to change the properties of materials through heat treatment processes
- Familiarize properties and applications of ceramics, polymers and composite materials.
- Demonstrate the fundamental properties of nano-materials and their applications.

UNIT I: **10 hours**

Structure of Metals: Crystal Structures: Unit cells, Metallic crystal structures, Imperfection in solids: Point, Line, interstitial and volume defects; dislocation strengthening mechanisms and slip systems, critically resolved shear stress.

Constitution of Alloys: Necessity of Alloying, substitutional and interstitial solid solutions- Phase diagrams: Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions. Iron-Iron-carbide diagram and microstructural aspects of ferrite, cementite, austenite, ledeburite, and cast iron.

Learning Outcomes: After completing this unit, the student will be able to:

- Explain the importance of material science in engineering.(L2)
- Recall the definitions and terminology of crystallography. (L1)
- Distinguish metals and alloys. (L4)
- Make use of the principles of construction of binary phase diagrams. (L3)
- Identify various invariant reactions in binary phase diagrams. (L3)
- Explain the concept of metallography in studying the microstructures of metals and alloys. (L2)

Unit II: Steels and Cast Irons **08 hours**

Steels: Plain carbon steels, use and limitations of plain carbon steels. AISI & BIS classification of steels. Classification of alloys steels. Micro structure, properties and applications of alloy steels-stainless steels and tool steels.

Cast irons: Micro structure, properties and applications of white cast iron, malleable cast iron, grey cast iron, nodular cast iron and alloy cast irons.

Learning Outcomes: After completing this unit, the student will be able to:

- Classify various types of steels, their properties and applications. (l2)
- Identify various types of cast irons, their properties and applications. (l3)
- Compare steels and cast irons and their limitations in applications. (l3)

Unit III: **08 hours**

Heat Treatment of Steels: Annealing, tempering, normalizing and Spheroidizing, isothermal transformation diagrams for Fe-Fe_3C alloys and microstructure development. Continious cooling curves and interpretation of final microstructures and properties- Austempering, Martempering, Case Hardening, Carburizing, Nitriding, Cyaniding, Carbo-Nitriding, Flame and Induction hardening, and Vacuum and Plasma Hardening.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand the importance of steel and iron - iron carbide phase diagram. (L2)
- Explain the influence of heat treatment in modification of properties of steels. (L2)
- Develop a heat treatment cycle based on properties required. (L3)
- Explain the principles of surface hardening methods. (L2)

Unit IV: **08 hours**

Non-ferrous Metals and Alloys: Micro structure, properties and applications of copper and its alloys, aluminium and its alloys. Study of Al-Cu phase diagram, precipitation hardening. Micro structure, properties and applications of titanium and its alloys.

Learning Outcomes: After completing this unit, the student will be able to:

- Explain the importance of non-ferrous metals and alloys in engineering applications. (L2)
- Demonstrate various properties and applications of non-ferrous alloys. (L4)
- Differentiate between hardening of ferrous and non-ferrous alloys. (L4)

Unit V: **08 hours**

Ceramics, Polymers and Composites: Structure, properties and applications of ceramics, polymers and composites. Introduction to super alloys and nanomaterials.

Learning Outcomes: After completing this unit, the student will be able to:

- Explain the properties of ceramics and their applications. (L2)
- Summarize the properties of polymers and composites and their use. (L2)
- Interpret the properties of nano materials and their applications. (L2)
- Identify the difference between the micro and nano scale materials and their uses. (L3)

TEXT BOOKS:

11. V.Raghavan, “Material Science and Engineering”, 5th edition, Prentice Hall of India, 2004.

12. R.Balasubramaniam, Callister's "Material Science and Engineering:, 2nd edition, Wiley India, 2014.

REFERENCE BOOKS:

3. Y. Lakhtin, "Engineering Physical Metallurgy", University Press of the Pacific, 2000.
4. S.H.Avner, "Introduction to Physical Metallurgy", 2nd edition, Tata McGraw- Hill, 1997.
5. L.H.Van Vlack, "Elements of Material Science and Engineering", 6th edition, Pearson Education, 2008.
6. George E.Dieter, "Mechanical Metallurgy", 3rd edition, McGraw-Hill, 2013.

COURSE OUTCOMES:
After successful completion of the course, the students will be able to

13. Explain the principles of binary phases. (L2)
14. Select steels and cast irons for a given application. (L3)
15. Apply heat treatment to different applications. (L3)
16. Utilize nonferrous metals and alloys in engineering. (L3)
17. Choose composites for various applications. (L3)
18. Assess the properties of nano-scale materials and their applications. (L2)

(Common to III Semester CE & ME and IV Semester CSE & ECE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9903	3	0	0	0	CIA	30 M
Course Title	:	BIOLOGY FOR ENGINEERS					SEE	--

COURSE OBJECTIVES:-

- To provide basic understanding about life and life Process. Animal an plant systems. To understand what bimolecules, are, their structures are functions. Application of certain bimolecules in Industry.
- Brief introduction about human physiology and bioengineering.
- To understand hereditary units, i.e. DNA (genes) and RNA and their synthesis in living organism.
- How biology Principles can be applied in our daily life using different technologies.
- Brief introduction to the production of transgenic microbes, Plants and animals.

Unit I: Introduction to Basic Biology

Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification.

Learning Outcomes: After completing this unit, the student will be able to

- Summarize the basis of life. (L1)
- Understand the difference between lower organisms (prokaryotes) from higher organisms (eukaryotes). (L2)
- Understand how organisms are classified. (L3)

Unit II: Introduction to Biomolecules

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Learning Outcomes: After completing this unit, the student will be able to

- Understand what are biomolecules? their role in living cells, their structure, function and how they are produced. (L1)
- Interpret the relationship between the structure and function of nucleic acids. (L2)
- Summarize the applications of enzymes in industry. (L3)
- Understand what is fermentation and its applications of fermentation in industry. (L4)

Unit III: Human Physiology

Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

Learning Outcomes: After completing this unit, the student will be able to

- Understand what nutrients are (L1)
- Understand the mechanism and process of important human functions (L2 & L3)

Unit IV: Introduction to Molecular Biology and recombinant DNA Technology

Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. rDNA technology. Introduction to gene cloning.

Learning Outcomes: After completing this unit, the student will be able to

- Understand and explain about gene structure and replication in prokaryotes and Eukaryotes (L1)
- How genetic material is replicated and also understands how RNA and proteins are synthesized. (L2)
- Understand about recombinant DNA technology and its application in different fields.(L3)
- Explain what is cloning. (L4)

Unit V: Application of Biology

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

Learning Outcomes: After completing this unit, the student will be able to Understand.

- How biology is applied for production of useful products for mankind.(L1)
- What are biosensors, biochips etc. (L2)
- Understand transgenic plants and animals and their production (L3)

TEXT BOOKS:

7. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications –
8. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

REFERENCE BOOKS:

7) N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, “Biology: A Global Approach”, Pearson Education Ltd, 2018.
8) T Johnson, Biology for Engineers, CRC press, 2011
9) J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. Panima Publications. PP 434.
10) David Hames, Instant Notes in Biochemistry –2016
11) Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology – 2014

COURSE OUTCOMES: After successful completion of the course, the students will be able to:

10) Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
11) Explain about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.
12) Briefly about human physiology.
13) Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
14) Know about application of biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes, plants and animals.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester CE, CSE & ME)

(For III Semester ECE weekly 02 hrs with 01 Credits only)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0503P	0	0	3	1.5	CIA	30 M
Course Title	:	DATA STRUCTURES LAB					SEE	70 M

COURSE OBJECTIVES:-

- To introduce to the different data structures
- To elucidate how the data structure selection influences the algorithm complexity
- To explain the different operations that can be performed on different data structures
- To introduce the different search and sorting algorithms.

LIST OF EXPERIMENTS:

1. String operations using array of pointers
2. Searching Algorithms (With the Number of Key Comparisons) Sequential, Binary and Fibonacci Search Algorithms.
3. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort. Using the system clock, compute the time taken for sorting of elements. The time for other operations like I/O etc should not be considered while computing time.
4. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List
5. Stack implementation using arrays
6. Stack implementation using linked lists
7. Queue implementation using arrays. Implement different forms of queue. While implementing you should be able to store elements equal to the size of the queue. No positions should be left blank.
8. Queue implementation using linked lists
9. Creation of binary search tree, performing operations insertion, deletion, and traversal.
10. Breadth first search
11. Depth first search
12. Travelling sales man problem
13. File operations
14. Indexing of a file

OPTIONAL:

15. Reversing the links (not just displaying) of a linked list.
16. Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using 'Ladies first' principle. You may create new linked lists if necessary.
17. An expression can be represented in three ways: infix, prefix and postfix. All the forms are necessary in different contexts. Write modules to convert from one form to another form.

18. A table can be defined as a collection of rows and columns. Each row and column may have a label. Different values are stored in the cells of the table. The values can be of different data types. Numerical operations like summation, average etc can be performed on rows/columns which contain numerical data. Such operations are to be prevented on data which is not numeric. User may like to insert row/columns in the already existing table. User may like to remove row/column. Create table data type and support different operations on it.

COURSE OUTCOMES: After successful completion of this Lab, the students will be able to:

15) Select the data structure appropriate for solving the problem (L5)
16) Implement searching and sorting algorithms (L3)
17) Design new data types (L6)
18) Illustrate the working of stack and queue (L4)
19) Organize the data in the form of files (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0302P	0	0	3	1.5	CIA	30 M
Course Title	:	MANUFACTURING PROCESSES LAB					SEE	70 M

COURSE OBJECTIVES:-

- Acquire practical knowledge on Metal Casting, Welding, Press Working and unconventional machining Processes.

LIST OF EXPERIMENTS:

1. **METAL CASTING**
   - Gating Design and pouring time and solidification time calculations.
   - Sand Properties Testing – Exercise for Strength and Permeability.
   - Molding, Melting and Casting for ferrous/ non ferrous materials.
2. **WELDING**
   - TIG Welding.
   - MIG Welding.
   - Friction stir welding
   - Any other Special Welding Processes.
3. **MECHANICAL PRESS WORKING**
   - Press Tool: Blanking and Piercing operation with Simple, Compound and Combination dies.
   - Closed die forging, Deep Drawing and Extrusion operations.
4. **UN CONVENTIONAL MANUFACTURING PROCESSES**
   - Electro Discharge Machining(EDM)/ Wire cut EDM
   - Plasma arc cutting / Abrasive jet machining (AJM)
   - Additive manufacturing with reverse engineering

COURSE OUTCOMES: After successful completion of the lab, the student will be able to:

1) Fabricate different types of components using various manufacturing techniques. (L6)
2) Adapt unconventional manufacturing methods. (L6).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0303P	0	0	3	1.5	CIA	30 M
Course Title	:	MATERIAL SCIENCE AND ENGINEERING LAB					SEE	70 M

COURSE OBJECTIVES:-

- To understand microstructure and hardness of engineering materials.
- To explain grain boundaries and grain sizes of different engineering materials.

LIST OF EXPERIMENTS:

1. Study of microstructure of pure metals – Iron, copper and aluminum.
2. Study of microstructure of low carbon steel, mild steel and high carbon steel.
3. Study of microstructure of cast irons.
4. Study of microstructure of non-ferrous alloys – Aluminum, Copper, Titanium, Nickel and their alloys.
5. Study hardenability of steels by Jominy End Quench Test.
6. Study of microstructure of heat treated steels.
7. Find hardness of various untreated and treated steels.
8. Study of microstructure of ceramics, polymeric materials.
9. Study of microstructure of super alloy and nano-materials.
10. Find the hardness of ceramics, super alloys, nano-materials and polymeric materials (one sample on each)

COURSE OUTCOMES: After successful completion of the lab, the students will be able to

19. Identify various microstructures of ferrous and non-ferrous metals and alloys. (L3)
20. Visualize grains and grain boundaries. (L3)
21. Importance of hardening of steels. (L2)
22. Evaluate hardness of treated and untreated steels. (L4)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	Laboratory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19ALC0302	0	0	3	1.5	CIA	30 M
Course Title	:	MECHANICAL ENGINEERING WORKSHOP					SEE	70 M

COURSE OBJECTIVES:-

- Familiarize moulding and casting skills.
- Train on different types welding joints.
- Develop assemble or disassembly skills.

Make plastic components.

- Familiarize with use power tools.
- Demonstrate assembly of computer and installation of software

LIST OF EXPERIMENTS

1) Foundry Practice: (2 Sessions)

(i) (a) Determination of average grain size for sand sample using sieve shaker
(b) Preparation of a green sand mould using single piece pattern
(ii) Preparation of a green sand mould using split piece pattern with core and demonstration of casting.

2) Welding Practice: (2 Sessions)

(i) Lap joint, butt joint and T joint using arc welding.
(ii) (a) Lap joint using resistance spot welding
(b) Lap and butt joints using gas welding

3) Assembling/Disassembling Practice: (3 Sessions)

(i) Bicycle
(ii) Clutch and carburetor
(iii) Two wheeler engine parts
(iv) Desktop Computer and installation of Operating system Software

4) Manufacture of a Plastic Component (2 Sessions)

(i) Use of injection moulding machine
(ii) FRP composite using hand layup method
(iii) Joining of plastic components

5) Manufacturing any two domestic utility products with any material by above methods (2 Sessions)

6) Use of Power Tools (2 Sessions)

Drilling, Cutting, Planing, Finishing, Etc,. on wood or metals

Text Books:

1) K. Venkata Reddy Workshop Manual 6th Ed., B.S. Publishers, 2013.
2) B.L. Juneja Workshop practice 1st Ed., Cengage, 2015.

COURSE OUTCOMES: After successful completion of the lab, the students will be able to

23. Make moulds for sand casting. (L3)
24. Develop different weld joints. (L3)
25. Assemble or disassemble of machine components. (L3)
26. Make plastic components. (L3)
27. Use power tools for different applications. (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to IV Semester CE & ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9908	3	0	0	3	CIA	30 M
Course Title	:	NUMERICAL METHODS AND PROBABILITY THEORY					SEE	70 M

COURSE OBJECTIVES:-

This course aims at providing the student with the knowledge on

1. Various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations.
2. The theory of Probability and random variables.

Unit I: Solution of Algebraic & Transcendental Equations

Introduction-Bisection method-Iterative method-Regulafalsi method-Newton Raphson method
System of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

Learning Outcomes: After successful completion of this unit, the students will be able to:

1. Calculate the roots of equation using Bisection method and Iterative method.
2. Calculate the roots of equation using Regulafalsi method and Newton Raphson method.
3. Solve the system of algebraic equations using Gauss Jordan method and Gauss Siedal method.

Unit II: Interpolation

Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

Learning Outcomes: After successful completion of this unit, the students will be able to:

1. Understand the concept of interpolation.
2. Derive interpolating polynomial using Newton's forward and backward formulae.
3. Derive interpolating polynomial using Lagrange's formulae.
4. Derive interpolating polynomial using Gauss forward and backward formulae.

Unit III: Numerical Integration& Solution of Initial value problems to Ordinary differential equations

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule

Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.

Learning Outcomes: After successful completion of this unit, the students will be able to:

1. Solve integral equations using Simpson's 1/3 and Simpson's 3/8 rule.

2. Solve integral equations using Trapezoidal rule.
3. Solve initial value problems to ordinary differential equations using Taylor's method.
4. Solve initial value problems to ordinary differential equations using Euler's method and Runge Kutta methods.

Unit IV: Probability theory

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

Learning Outcomes: After successful completion of this unit, the students will be able to:

1. Understand the concept of Probability.
2. Solve problems on probability using addition law and multiplication law.
3. Understand Random variables and probability mass and density functions.
4. Understand statistical constants of random variables.

Unit V: Random variables & Distributions

Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties.

Learning Outcomes: After successful completion of this unit, the students will be able to:

1. Understand Probability distribution function.
2. Solve problems on Binomial distribution.
3. Solve problems on Poisson distribution.
4. Solve problems on Normal distribution.

TEXT BOOKS:

28. Higher Engineering Mathematics, B. S. Grewal, Khanna publishers.
29. Probability and Statistics for Engineers and Scientists, Ronald E. Walpole, PNIE.
30. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

REFERENCE BOOKS:

9. Higher Engineering Mathematics, by B. V. Ramana, McGraw Hill publishers.
10. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

COURSE OUTCOMES:

After the completion of course, students will be able to

31. Apply numerical methods to solve algebraic and transcendental equations
32. Derive interpolating polynomials using interpolation formulae
33. Solve differential and integral equations numerically
34. Apply Probability theory to find the chances of happening of events.
35. Understand various probability distributions and calculate their statistical constants.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester ME)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0506T	2	0	0	2	CIA	30 M
Course Title	:	INTERNET OF THINGS					SEE	70 M

COURSE OBJECTIVES:-

- Introduce the fundamental concepts of IoT and physical computing
- Expose the student to a variety of embedded boards and IoT Platforms
- Create a basic understanding of the communication protocols in IoT communications.
- Familiarize the student with application program interfaces for IoT.
- Enable students to create simple IoT applications.

Unit I: Overview of IoT

The Internet of Things: An Overview, The Flavor of the Internet of Things, The “Internet” of “Things”, The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things?
Design Principles for Connected Devices: Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances.
Prototyping: Sketching, Familiarity, Costs Vs Ease of Prototyping, Prototypes and Production, Open source Vs Close source, Tapping into the community.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain IoT architecture. [L2]
- Interpret the design principles that govern connected devices [L2]
- Summarize the roles of various organizations for IoT [L2]
- Understand the significance of Prototyping [L2]

Unit II: Embedded Devices
Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain the basics of microcontrollers [L2]
- Outline the architecture of Arduino [L2]
- Develop simple applications using Arduino [L3]
- Outline the architecture of Raspberry Pi [L2]
- Develop simple applications using Raspberry Pi [L3]

- Select a platform for a particular embedded computing application [L3]

Unit III:

Communication in the IoT: Internet Communications: An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols

Prototyping Online Components: Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols Protocol.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Interpret different protocols and compare them [L2]
- Select which protocol can be used for a specific application [L3]
- Utilize the Internet communication protocols for IoT applications [L3]
- Select IoT APIs for an application [L3]
- Design and develop a solution for a given application using APIs [L6]
- Test for errors in the application [L4]

Unit IV:

Introduction to the Industrial IoT: What is Industrial Internet, The Power of 1%, Key IIoT technologies, Why Industrial Internet and Why now, Catalysts and Precursors of the IIoT, Innovation and the IIoT, Intelligent devices, Key opportunities and benefits, The Why behind the Buy, Selling light-not light bulbs, The Digital and Human Workforce.

Industrial Internet Use-cases – Logistics and the Industrial Internet

Introducing Industry 4.0: Introduction, Defining Industry 4.0, Why Industry 4.0 and Why now, Four main characteristics of Industry 4.0, The Value Chain, Creating a Value chain, Differential Prospective, Benefits to Business, Industry 4.0 Design principles, Building blocks of Industry 4.0, Industry 4.0 reference architecture, Smart manufacturing.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Understand Industry 4.0 [L2]
- Compare IoT and Industrial IoT [L4]

Unit V:

Smart Factories: Introducing the smart factory, Smart factories in Action, Why smart manufacturing is important, Winners and Losers, Real-world Smart Factories, Industry 4.0-The way forward.

Getting from Here to there-A Road map

Learning Outcomes: After successful completion of this unit, the students will be able to

- Employ novel manufacturing techniques [L4]
- Understand Smart Factory [L2]

TEXT BOOKS:

11. Adrian McEwen, Hakim Cassimally, “Designing the Internet of Things”, Wiley Publications, 2012.
12. Alasdair Gilchrist, “Industry 4.0-The industrial Internet of Things”, APress.

REFERENCE BOOKS:

12) Arshdeep Bahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
13) The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.

REFERENCE SITES:

1) https://www.arduino.cc/
2) https://www.raspberrypi.org/

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

20) Choose the sensors and actuators for an IoT application (L1)
21) Select protocols for a specific IoT application (L2)
22) Utilize the cloud platform and APIs for IoT applications (L3)
23) Experiment with embedded boards for creating IoT prototypes (L3)
24) Design a solution for a given IoT application (L6)
25) Prepare for Industry 4.0 and Smart Factories [L6]

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester ME)

Course Category	:	Humanities Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9904	2	0	0	2	CIA	30 M
Course Title	:	DESIGN THINKING AND PRODUCT INNOVATION					SEE	70 M

Design is a realization of a concept or idea into a configuration, drawing or a product. Design thinking is cognitive and practical processes by which design concepts are developed by designers. Innovation is a new idea or a new concept. Product development is the creation of a new or different product that offers new benefits to the end user. This course introduces the design thinking in product innovation.

COURSE OBJECTIVES:-

- To bring awareness on innovative design and new product development.
- To explain the basics of design thinking.
- To familiarize the role of reverse engineering in product development.
- To train how to identify the needs of society and convert into demand.
- To introduce product planning and product development process.

Unit I:

Science to Engineering: Job of engineers, engineering units and measurement, elements of engineering analysis, forces and motion, energy, kinematics and motion, conversion of linear motion to rotary and vice versa, motion transmission.

Physics to Engineering: Application of Newton laws, Pascal's law, Bouncy, Bernoulli's theorem, Ohm's law, electrical induction in engineering products.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Relate the principles of science to engineering (L2)
- Explain simple mechanics motion and force transmission (L2)
- Identify the laws of physics applied to engineering products (L3)

Unit II:

Historical Development: Invention wheel, early mechanics in design, mechanical advantages, industrial revolution, steam and petrol for mobility. Innovations in Electrical and Electronics: Electrical energy generation, electrical bulb, electrical equipment, electronics and automation, computing for early days to present, innovations in communications.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Identify innovation in early mechanical designs (L2)
- Explain development of electrical equipment (L2)
- List out the developments in computing machines (L4)

- Summarize innovations in communication systems (L2)

Unit III:

Systematic approach to product development: Design Thinking, Innovation, Empathize Design Thinking as a systematic approach to Innovation, brainstorming, visual thinking, design challenges, innovation, art of Innovation, strategies for idea generation, creativity, teams for innovation. Solution finding methods: Conventional, intuitive, discursive, methods for combining solution, decision making for new design.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain the steps in the design process (L2)
- Apply systematic approach in design (L3)
- Develop strategies for new product development (L3)

Unit IV:

Reverse engineering in product development: Reversing engineering methods, identifying the bad features in a product, reduction in size and weight, usage of new materials, 3D printing, study of introducing electrical and electronic controls to the old products, importance of ergonomics in product development, environmental considerations in design, safety considerations in design.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Understand reverse engineering methods in product development (L2)
- Use new materials to improve the product (L2)
- Apply electronic controls to improve the product acceptability (L3)
- Summarize the safety and environmental factors in new product design (L2)
- Understand 3D printing in manufacturing (L2)

Unit V:

Study of Product Development- Agriculture, development of machines for separation of corn seeds, peeling of groundnut shells, husk removing from paddy. Electrical: Design of burglar alarm, speedometer, water level indicator, smart gates, smart lights. Design of electrical vehicles, unmanned vehicles, design principles in drones.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Identify the needs for new product development in agriculture (L3)
- Develop simple electrical gadgets (L3)

- Explain the principles in design electrical vehicles and drones (L2)

TEXT BOOKS:

13. Philip Kosky, Robert T. Balmer, William D. Keat, George Wise, “Exploring Engineering: An Introduction to Engineering and Design”, 4th edition, Elsevier, 2016.
14. David Ralzman, “History of Modern Design”, 2nd edition, Laurence King Publishing Ltd., 2010
15. An AVA Book, “Design Thinking”, AVA Publishing, 2010.

REFERENCE BOOKS:

14) G. Pahl, W.Beitz, J. Feldhusen, KH Grote, “Engineering Design: A Systematic Approach”, 3rd edition, Springer, 2007.
15) Tom Kelley, Jonathan Littman, “Ten Faces in Innovation”, Currency Books, 2006.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to:

26) Summarize the importance of basic sciences in product development (L2)
27) Explain the historical developments in mechanical, electrical, communications and computational engineering (L3)
28) Apply systematic approach to innovative designs (L3)
29) Identify new materials and manufacturing methods in design (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester Mechanical Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0304	2	1	0	3	CIA	30 M
Course Title	:	THERMODYNAMICS					SEE	70 M

COURSE OBJECTIVES:-

- Familiarize concepts of heat, work, energy and governing rules for conversion of one form to other.
- Explain relationships between properties of matter and basic laws of thermodynamics.
- Teach the concept of entropy for identifying the disorder and feasibility of a thermodynamic process.
- Introduce the concept of available energy for maximum work conversion.
- Familiarize steam properties to understand working of steam power plants.
- Provide fundamental concepts of air standard cycles used in steam power plants, IC engines and gas turbines

Unit I: **10 hours**

Introduction: Basic Concepts: Macroscopic and microscopic viewpoints, definitions of thermodynamic terms, quasi – static process, point and path function, forms of energy, ideal gas and real gas, Zeroth law of thermodynamics.

First law of Thermodynamics: Joule's experiment - first law of thermodynamics, corollaries-perpetual motion machines of first kind, first law applied to non-flow and flow process- limitations of first law of thermodynamics.

Learning Outcomes: After completing this unit, the student will be able to:

- Understand thermodynamic systems, properties and their importance in solving engineering problems. (L3)
- Make energy balance for closed systems and open systems. (L4)
- Solve simple thermodynamics problems. (L3)

Unit II: **08 hours**

Second Law of Thermodynamics: Kelvin - Planck statement and Clausius statement and their equivalence, corollaries - perpetual motion machines of second kind - reversibility and irreversibility, cause of irreversibility - Carnot cycle, heat engine, heat pump and refrigerator, Carnot theorem, Carnot efficiency.

Learning Outcomes: After completing this unit, the student will be able to:

- Apply second law of thermodynamics in design of heat engine, refrigerator and heat pump. (L3)
- Explain the efficiency of thermodynamic systems.(L2)
- Enumerate the causes for poor performance of thermodynamic systems. (L3)

Unit III: **08 hours**

Entropy: Clausius inequality - Concept of Entropy - entropy equation for different processes and systems

Availability and Irreversibility: Definition of exergy and anergy, expressions for availability and irreversibility. Availability in steady flow, non-flow processes and irreversibility.

Learning Outcomes: After completing this unit, the student will be able to:

- Apply entropy concepts to estimate the performance of systems. (L3)
- Evaluate entropy changes in a wide range of processes and determine the reversibility or irreversibility of a process. (L4)

Unit IV: **08 hours**

Properties of Steam and use of Steam Tables: Pure Substances, P-V-T surfaces, T-s and h-s diagram, Mollier chart, dryness fraction, property tables, analysis of steam undergoing various thermodynamic processes using Mollier chart– steam calorimetry.

Learning Outcomes: After completing this unit, the student will be able to:

- Apply properties of steam to design steam systems. (L3)
- Examine steam systems using conservation equations. (L4)
- Evaluate the dryness fraction and performance of steam systems. (L4)

Unit V: **08 hours**

Thermodynamic Relations: Maxwell relations, TdS equations, difference in heat capacities, ratio of heat capacities, Energy equation, Joule Thompson coefficient, Clausius-Clapeyron equation.
Air Standard Cycles: Otto, Diesel and dual cycles, P-V and T -S diagrams - description and efficiencies, mean effective pressures. Comparison of Otto, Diesel and dual cycles

Learning Outcomes: After completing this unit, the student will be able to:

- Explain the importance of T-ds equations. (L3)
- Relate specific heats, internal energy, enthalpy and Joule-Thomson coefficient in standard form. (L3)
- Examine the importance of compression ratio. (L4)
- Explain the cycles on which internal combustion engines work. (L3)

TEXT BOOKS:

36. P.K.Nag, “Engineering Thermodynamics:, 5th edition, Tata McGraw Hill, 2013.
37. Yunus A. Cengel, Michaela A. Boles, “Thermodynamics”, 7th edition, Tata McGraw Hill, 2011.

REFERENCE BOOKS:

7. J.B.Jones and G.A.Hawkins, “Introduction to Thermodynamics”, 2nd edition, John Wiley & Sons, 2012.
8. Moran, Michael J. and Howard N. Shapiro, “Fundamentals of Engineering Thermodynamics”, 3rd edition, Wiley, 2015
9. R.K. Rajput, S.Chand& Co., “Thermal Engineering”, 6th edition, Laxmi publications, 2010.

COURSE OUTCOMES:
After successful completion of the course, the students will be able to

Explain the importance of thermodynamic properties related to conversion of heat energy into work. (L3)
Apply the laws of thermodynamics to boilers, heat pumps, refrigerators, heat engines, compressors and nozzles. (L3)
Utilize steam properties to design steam based components. (L4)
Compare thermodynamic relations and air standard cycles. (L4)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester Mechanical Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0305P	0	0	3	1.5	CIA	30 M
Course Title	:	MECHANICS OF MATERIALS LAB					SEE	70 M

COURSE OBJECTIVES:-

- To conduct uni-axial tension test on Steel, Aluminium, Copper and Brass.
- To perform compression tests on spring and wood.
- To determine elastic constants of materials using flexural and torsion tests.
- To find hardness of given metals.

List of Experiments:

1. Study the stress – strain relations of (a) Mild Steel b) Cast iron and (c) Tor Steel by conducting tension/compression test on U.T.M.
2. Study the stress – strain relation of (a) Copper and (b) Aluminium (c) other materials by conducting tension /compression test.
3. Find the compressive and shear strength of wood and shear strength of GI sheet by conducting relevant tests.
4. Find the Brinnell's and Vicker's hardness numbers of:
   (a) Steel (b) Brass (c) Aluminium (d) Copper.
5. Determine the Modulus of rigidity (a) Solid shaft (b) Hollow shaft made of steel and aluminium.
6. Find the spring index and modulus of rigidity of the material of a spring by conducting compression and tensile tests.
7. Determine the Young's modulus of the material by conducting deflection test on a simply supported, propped cantilever and continuous beams.
8. Find impact strength of a given material by conducting a) Charpy test and b) Izod test
9. Determine buckling load in a compressive member made with steel and aluminium.
10. Dethermine the deflection in leaf spring with a single leaf and multiple leafs.

COURSE OUTCOMES: After successful completion of this lab course, the students will be able to

1) Understand the stress-strain behavior of different materials.
2) Identify the difference between compression and tension testing.
3) Evaluate the hardness of different materials.
4) Correlate the elastic constants of the materials.
5) Explain the relation between elastic constants and hardness of materials.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(IV Semester Mechanical Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0306P	0	0	3	1.5	CIA	30 M
Course Title	:	FLUID MECHANICS AND HYDRAULIC MACHINERY LAB					SEE	70 M

COURSE OBJECTIVES:-

- The object of the course to make the students understand the fluid flow concepts and get familiarity with flow measuring devices.

List of Experiments:

1. Calibration of Venturi meter
2. Calibration of Orifice meter
3. Determination of Coefficient of discharge for a small orifice by a constant head method.
4. Determination of Coefficient of discharge for an external mouth piece by variable head method.
5. Calibration of contracted Rectangular Notch and /or Triangular Notch.
6. Determination of Coefficient of loss of head in a sudden contraction and friction factor.
7. Verification of Bernoulli's equation.
8. Impact of jet on vanes.
9. Study of Hydraulic jump.
10. Performance test on Pelton wheel turbine.
11. Performance test on Francis turbine.
12. Efficiency test on centrifugal pump.

COURSE OUTCOMES: After successful completion of this lab course, the students will be able to

38. The various flow properties using various flow measuring devices
39. The performance of various turbines and pumps

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester Mechanical Engineering)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0308	0	0	3	1.5	CIA	30 M
Course Title	:	COMPUTER AIDED MACHINE DRAWING					SEE	70 M

COURSE OBJECTIVES:-

- Introduce conventional representations of material and machine components.
- Train to use software for 2D and 3D modeling.
- Familiarize with thread profiles, riveted, welded and key joints.
- Teach solid modeling of machine parts and their sections.
- Explain creation of 2D assembly drawings from 3D assemblies.
- Familiarize with limits, fits and tolerances in mating components.

The following contents are to be done by any 2D software package Conventional representation of materials and components:

Detachable joints: Drawing of thread profiles, hexagonal and square-headed bolts and nuts, bolted joint with washer and locknut, stud joint, screw joint and foundation bolts.
Riveted joints: Drawing of rivet, lap joint, butt joint with single strap, single riveted , double riveted double strap joints.
Welded joints: Lap joint and T joint with fillet, butt joint with conventions.
Keys: Taper key, sunk taper key, round key, saddle key, feather key, woodruff key.
Shaft coupling, bushed pin-type flange coupling, universal coupling, Oldhams' coupling.

The following contents to be done by any 3D software package
Sectional views Creating solid models of complex machine parts and create sectional views.
Assembly drawings: (Any four of the following using solid model software)
Lathe tool post, tool head of shaping machine, tail stock, machine vice, gate valve, carburettor, piston, connecting rod, excentric, screw jack, plumber block, axle bearing, pipe vice, clamping device, Geneva cam, universal coupling,
Manufacturing drawing:
Representation of limits, fits and tolerances for mating parts. Use any four parts of above assembly drawings and prepare manufacturing drawing with dimensional and geometric tolerances.

TEXT BOOKS:

40. K.L.Narayana, P.Kannaiah, "A text book on Engineering Drawing", SciTech Publications, 2014
41. "Software tools/packages", Auto CAD, Solid works or equalent.

REFERENCE BOOKS:

1. Cecil Jensen, Jay Helsel and Donald D.Voisinet, “Computer Aided Engineering Drawing”, Tata Mcgraw-Hill, NY, 2000.
2. James Barclay, Brain Griffiths, “Engineering Drawing for Manufacture”, Kogan Page Science, 2003.
3. N.D.Bhatt, “Machine Drawing”, Charotar, 50th edition, 2014.
4. K.L.Narayana, “Production Drawing”, NewAge International Publishers, 3rd edition, 2014

COURSE OUTCOMES: After successful completion of the course, the students will be able to

42. Demonstrate the conventional representations of materials and machine components.
43. Model riveted, welded and key joints using CAD system.
44. Create solid models and sectional views of machine components.
45. Generate solid models of machine parts and assemble them.
46. Translate 3D assemblies into 2D drawings.
47. Create manufacturing drawing with dimensional and geometric tolerances.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0309T	2	1	0	3	CIA	30 M
Course Title	:	**APPLIED THERMODYNAMICS**					SEE	70 M

Course Objectives

- To familiarize the Working Principles of IC engines.
- To teach combustion process in SI and CI engines.
- To introduce different types of compressors.
- To familiarize concepts of thermodynamic cycles used in steam power plants and gas turbines
- To impart knowledge on the working of nozzles, turbines, refrigeration and air conditioning.

UNIT I **10 hours**

IC Engines: Working and classification of IC engines, comparison of two stroke and four stroke engines, comparison of SI and CI Engines.

Testing and Performance of IC Engines: Methods of testing IC Engines, performance analysis of IC Engines.

Combustion in IC Engines: SI engine: stages of combustion, normal combustion, abnormal combustion, variables effecting delay period and knocking, pre-ignition. CI engine: stages of combustion, normal combustion, abnormal combustion, variables effecting delay period and knocking. Fuel requirements and fuel rating.

Learning Outcomes:

After completion of this unit, students will be able to

- Understand working of IC engines on the basis of thermodynamic cycles. (L2)
- Estimate engine performance. (L5)
- Identify the effects of abnormal combustion in IC engines. (L3)

UNIT II **8 hours**

Air compressors

Reciprocating Compressor: Single stage reciprocating compressors, work required, effect of clearance in compressors, volumetric efficiency, multi stage compressor, effect of inter cooling in multi stage compressors, compressor performance.

Rotary Compressor: Working principle of a rolling piston type compressor (fixed vane type), multi vane type compressors, characteristics of rotary vane type compressor, working principle of centrifugal compression and axial flow compressors, velocity triangles.

Learning Outcomes:

After completion of this unit, students will be able to

- Classify different types of air compressors. (L2)
- Compare the performance of different types of air compressors (L2)

UNIT III **8 hours**

Vapour Power Cycles: Vapour power cycle, simple Rankine cycle, mean temp of heat addition thermodynamic variables effecting efficiency and output of Rankine cycle
Gas power Cycle: Simple gas turbine plant, Brayton cycle, closed cycle and open cycle for gas turbines, condition for maximum pressure ratio and optimum pressure ratio, actual cycle. Methods to improve performance: regeneration, intercooling and reheating. Introduction to jet propulsion: working principle of ramjet, turbojet, turbofan, turboprop and pulse jet engines,

Learning Outcomes:

After completion of this unit, students will be able to

- Explain concepts of vapour power cycle used in steam power plant. (l2)
- Evaluate the cycles used in gas turbines. (l5)
- Outline the jet propulsion system (l2)

UNIT IV **8 hours**

Nozzles: Type of nozzles - air and steam nozzles. Compressible flow through nozzle- condition for maximum discharge - nozzle efficiency.
Steam Turbines: Classification of steam turbines -impulse turbine and reaction turbine - compounding in turbines - velocity diagrams in impulse and reaction turbines, efficiency, degree of reaction - governing of turbines

Learning Outcomes:

After completion of this unit, students will be able to

- Compare the performance of nozzles, used in turbines. (l2)
- Classify steam turbines and applications. (l4)

- Analyse the performance of steam turbines under different operating conditions. (l5)

UNIT V **8 hours**

Refrigeration: Bell-Coleman cycle - vapour compression cycle, effect of vapour condition on COP of VCR, -vapour absorption cycle, properties of common refrigerants

Principles of Psychrometry and Air Conditioning: Psychometric terms, psychometric processes and air conditioning systems.

Learning Outcomes:

After completion of this unit, students will be able to

- Outline the operation of refrigerators. (l2)
- Identify different refrigerants and applications.(l3)
- Use properties of moist air in calculations for air-conditioning system. (l3)

Course Outcomes

After completing this course, the students can

- Explain working of IC engines with combustion process. (L2)
- Select compressors for different applications. (L1)
- Use T-s diagram in vapour power and gas power cycles. (L3)
- Explain the basic principles of steam turbines. (L2)
- Select appropriate refrigerant for different applications. (L1)

Text Book(s)

1. Ganesan V, "Internal Combustion Engines", Tata McGraw Hill, 2017.
2. M.L.Mathur and F.S.Mehta, "Thermal Engineering", Jain brothers,2014

References:

1. Mahesh V Rathore, "Thermal Engineering", Tata McGraw Hill 2017
2. Yahya, S. M., Turbines, "Compressors and Fans", 4th edition, Tata McGraw Hill, 2010.
3. Nag P.K, "Engineering Thermodynamics", 4th edition, Tata McGraw-Hill, 2008.
4. Onkar Singh, "Thermal Turbomachines", 3rd edition, Wiley India, 2014.
5. P.L.Ballaney, "Thermal Engineering", 2nd edition, Khanna, 2005.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0311T	0	0	3	3	CIA	30 M
Course Title	:	**MANUFACTURING TECHNOLOGY**					SEE	70 M

Course Objectives:

- Explain parameters in the metal cutting operation.
- Relate tool wear and tool life and the variables that control them.
- Calculate machining times for different machining processes.
- Teach various metal cutting processes. (lathe, drilling, boring shaping, slotting, milling and grinding).
- Familiarise the principles of jigs and fixtures and types of clamping and work holding devices.

UNIT I:

Material Removal Processes: **8hrs**

Metal Cutting: Single and multi-point cutting, orthogonal cutting, various force components, chip formation, tool wear and tool life, surface finish and integrity, machinability, cutting tools and materials, cutting fluids, coatings.

Learning Outcomes:

At the end of the this unit, the student will be able to

- Describe cutting processes and variables. (l2)
- Classify various types of chips, cutting tool materials and cutting fluids. (l4)
- Calculate cutting force, speed and feed finding techniques during machining. (l5)

UNIT II:

Machining processes for round shapes: **12hrs**

Lathe and Lathe Operations: Principles of working, specifications, types of lathes, operations performed, work holders and tool holders. Taper turning, thread turning attachments for lathes. machining time calculations. Turret and capstan lathes - Principle of working, collect chucks, other work holders - tool holding devices.

Drilling and Drilling Machines: Principles of working, specifications, types, and operations performed - tool holding devices - nomenclature of twist drill.

Boring and Boring Machines- Principles of working, specifications, types, and operations performed - tool holding devices - nomenclature of boring tools

Reaming and Reamers: Principles of working, specifications, types, and operations performed - tool holding devices - nomenclature of reamers.

Taping and Taps: Principles of working, specifications, types, and operations performed - tool holding devices - nomenclature of taps.

Learning Outcomes:

At the end of this unit, the student will be able to

- List the specifications for various types of lathes. (l1)
- Determine cutting speeds for different machining operations. (l5)
- Identify parts of drilling, boring, reaming machines. (l3)

UNIT III:

Machine processes for other shapes: 8hrs

Milling operations and Milling machines - Principles of working, specifications, classifications of milling machines, machining operations, types and geometry of milling cutters, methods of indexing, and accessories to milling machines, machining time calculations.

Shaping, Slotting and planing machines - Principles of working - principal parts, specification, classification, operations performed, machining time calculations

Learning Outcomes:

At the end of this unit, the student will be able to

- Recognize the parts of milling, shaping, slotting and planing machine. (l3)
- Compare tool geometry for milling, shaping, slotting and planing operations. (l3)
- Calculate machining times. (l5)

UNIT IV:

Abrasive Machining: 6hrs

Grinding and grinding machines: Grinding process, types of grinding machines, grinding process parameters, honing, lapping, other finishing processes.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the basic principles of abrasive processes. (l2)
- Classify different types of grinding machines and their applications. (l4)

- Assess the grinding process and variables that effect the operation. (l5)
- Estimate the time and power required for the grinding operation. (l5)
- Explain various types of abrasive processes such as honing and lapping for final finishing operation. (l2)

UNIT V **8hrs**

Jigs and Fixtures Principles of design of Jigs and fixtures and uses, 3-2-1 principle of location and clamping, classification of Jigs & Fixtures, types of clamping and work holding devices, typical examples of jigs and fixtures.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify various types of jigs and fixtures. (l4)
- Identify various types of work and tool holding devices. (l3)
- Explain the design principles of jigs and fixtures. (l2)
- Design a jig and fixture for a given application. (l6)

Course Outcomes:

At the end of the course, the student will be able to

- Choose cutting processes and variables. (l3)
- Relate tool wear and tool life. (l1)
- Calculate the machining parameters for different machining processes. (l5)
- Identify methods to generate different types of surfaces. (l3)
- Explain work-holding requirements. (l2)
- Design jigs and fixtures. (l6)

Text books:

1. P.N. Rao, "Manufacturing Technology: Metal Cutting and Machine Tools", (Volume 2), 3rd edition, Tata McGraw-Hill Education, 2013
2. R.K. Jain and S.C. Gupta, "Production Technology", 17th edition, Khanna Publishers, 2012.

Reference books:

1. Kalpakzian S and Schmid SR, "Manufacturing Engineering and Technology", 7th edition, Pearson, 2018.
2. Milton C.Shaw , "Metal Cutting Principles", 2nd edition, Oxford, 2012
3. Hindustan Machine Tools, "Production Technology", TMH, 2001
4. V.K.Jain, Advanced Machining Process,12th edition, Allied Publications, 2010
5. AB. Chattopadhyay, "Machining and Machine Tools", 2nd edition, Wiley, 2017
6. Halmi A Yousuf & Hassan, "Machine Technology: Machine Tools and Operations", CRC Press Taylor and Francis Group, 2008

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0310	2	1	0	3	CIA	30 M
Course Title	:	**DYNAMICS OF MACHINERY**					SEE	70 M

Course Objectives:

The Objectives of this course are to

- Explain the importance of friction and apply for brakes and dynamometers
- Analyze the turning moment diagrams and discuss the applications of flywheel
- Familiarizes the concept of gyroscope and its applications for aero plane, motor cycle and motor cars
- Uses of governors and its applications
- Explain the need of balancing of rotating and reciprocating masses

UNIT I

FRICTION: Inclined plane, friction of screws and nuts, pivot and collar, uniform pressure, uniform wear. Friction circle and friction axis, lubricated surfaces, boundary friction, film lubrication.
CLUTCHES: Friction clutches- Single Disc or plate clutch, Multiple Disc Clutch, Cone Clutch, Centrifugal Clutch.
BRAKES AND DYNAMOMETERS: Simple block brakes, Band brake, internal expanding brake, braking of vehicle. Dynamometers – absorption and transmission types. General description and methods of operation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Know the applications and concepts of friction. (L3)
- Understand the significance of clutches. (L2)
- Know the applications of breaks and dynamometers. (L3)

UNIT II

PRECESSION: Gyroscopes, effect of precession motion on the stability of moving vehicles such as motor car, motor cycle, aeroplanes and ships. TURNING MOMENT DIAGRAMS AND **FLY WHEELS:** Turning moment diagrams for steam engine, IC Engine and multi cylinder engine. Crank effort - coefficient of Fluctuation of energy, coefficient of
Fluctuation of speed – Fly wheels and their design, Fly wheels for Punching machines.

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand the concept and applications of gyroscopic couple. (L3)
- To draw the turning moment diagram for energy storage . (L2)
- To study the applications of flywheels. (L3)

UNIT III

GOVERNORS: Watt, Porter and Proell governors. Spring loaded governors – Hartnell and Hartung governors with auxiliary springs. Sensitiveness, isochronism and hunting. Effort and power of a governor.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand different types of governors. (L3)
- Analyse the sensitiveness and isochronisms of governors. (L2)
- Estimate the effort and power of governors. (L3)

UNIT IV

BALANCING: Balancing of rotating masses - single and multiple – single and different planes.
BALANCING OF RECIPROCATING MASSES: Primary and Secondary balancing of reciprocating masses. Analytical and graphical methods. Unbalanced forces and couples -V- engine, multi cylinder inline and radial engines for primary and secondary balancing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the importance of balancing. (L3)
- Analyzing the balancing of reciprocating masses. (L2)
- Apply the balancing techniques. (L3)

UNIT V

VIBRATION: Free and forced vibration of single degree of freedom system, Role of damping, whirling of shafts and critical speeds. Simple problems on free, forced and damped vibrations.

Vibration Isolation & Transmissibility. Transverse vibrations of beams with concentrated and distributed loads. Dunkerly's method, Raleigh's method. Torsional vibrations - two and three rotor systems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Formulate the equations of motion and solve single degree of freedom system with damping. (L3)
- Estimate the natural frequency of vibrating systems. (L2)
- Explain the concept of vibration isolation of transmissibility. (L3)

Course Outcomes:

At the end of the course, the student will be able to

- Understand the effect of reactive gyroscopic couple on the stability of vehicles
- Understand the power lost and power transmitted due to friction
- Identify and correct the unbalances of rotating body
- Reduce the magnitude of vibration and isolate vibration of dynamic systems
- Determine dimensions of Governors for speed control.

TEXT BOOKS:

1. S.S. Rattan, "Theory of Machines", MGH Publishers,3rd Edition,2013.
2. R.L. Norton, "Kinematics and Dynamics of Machinery", Tata McGraw Hill.

REFERENCES:

1. Thomas bevan, "Theory of machines", Pearson, 3rd edition,2012.
2. J.E. Shiegley, "The theory of machine", Mcgraw hill .
3. Shigley et.al. "Theory of machines and mechanisms" of Oxford international student edition.
4. R.S Khurm, "Theory of machines", S.Chand publications

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to IV Semester CSE & ECE)

Course Category	:	Humanities Sciences Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9905	3	0	0	3	CIA	30 M
Course Title	:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS					SEE	70 M

COURSE OBJECTIVES:-

- To inculcate the basic knowledge of micro economics and financial accounting analysis
- To understand fundamentals of Production & Cost Concepts to take certain business decisions in the processes of optimum utilization of resources.
- To know various types of Market Structures & pricing methods and its strategies, and Trade Blocks.
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on Accounting and to explain the process of preparing Financial statements & analysis for effective business decisions.

Unit I: INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND

Managerial Economics – Definition – Nature & Scope - Contemporary importance of Managerial Economics - Demand Analysis **-** Concept of Demand **-** Demand Function - Law of Demand - Elasticity of Demand - Significance - Types of Elasticity - Measurement of Elasticity of Demand - Demand Forecasting - Factors governing Demand Forecasting - Methods of Demand Forecasting - Relationship of Managerial Economics with Financial Accounting and Management.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the nature and scope of Managerial Economics and its importance
- Understand the concept of demand and its determinants
- Analyze the Elasticity and degree of elasticity
- Evaluate Demand forecasting methods
- Design the process of demand estimation for different types of demand

Unit II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function – Least-cost combination - Short-run and Long-run Production Function - Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale – **Cost & Break Even Analysis** - Cost concepts and Cost behavior - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems) - Managerial significance and limitations of Break-Even Analysis.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the production function, Input-Output relationship and different cost concepts
- Apply the least-cost combination of inputs
- Analyze the behavior of various cost concepts
- Evaluate BEA for real time business decisions
- Develop profit appropriation for different levels of business activity

Unit III: INTRODUCTION MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly - Monopolistic Competition - Oligopoly - Price - Output Determination - Pricing Methods and Strategies

Forms of Business Organizations - Sole Proprietorship - Partnership – Joint Stock Companies - Public Sector Enterprises - New Economic Environment - Economic Liberalization - Privatization – Globalization - Trade Blocks (SAARC,EU,NAFTA,BRICS)-EXIM Policy-International Economic Environment.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the structure of markets, features of different markets and forms of business organizations
- Apply the price output relationship in different markets
- Analyze the optimum output levels to maximize profit in different markets
- Evaluate price-output relationship to optimize cost, revenue and profit
- Interpret Pricing Methods and Strategies

Unit IV: CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Significance **-** Types of Capital **-** Components of Working Capital - Sources of Short-term and Long-term Capital - Estimating Working capital requirements – Cash Budget - **Capital Budgeting** – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the concept of capital budgeting and its importance in business
- Contrast and compare different investment appraisal methods
- Analyze the process of selection of investment alternatives using different appraisal methods
- Evaluate methods of capital budgeting for investment decision making and for maximizing returns
- Design different investment appraisals and make wise investments

Unit V: INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Accounting Concepts and Conventions - Introduction to Double-Entry Book Keeping, Journal, Ledger, Trial Balance - Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios-Du Pont Chart.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the concept, convention and significance of accounting
- Apply the fundamental knowledge of accounting while posting the journal entries
- Analyze the process and preparation of final accounts and financial ratios
- Evaluate the financial performance of an enterprise by using financial statements

Data Books Required: Present Value Factors table

TEXT BOOKS:

1. Varshney & Maheswari: “Managerial Economics”, Sultan Chand, 2013.
2. Aryasri: “Business Economics and Financial Analysis”, 4th edition, MGH, 2019

REFERENCE BOOKS:

1. Ahuja Hl “Managerial economics” 3rd edition, Schand, ,2013
2. S.A. Siddiqui and A.S. Siddiqui: “Managerial Economics and Financial Analysis”, New Age International,. 2013.
3. Joseph G. Nellis and David Parker: “Principles of Business Economics”, 2nd edition, Pearson, New Delhi.
4. Domnick Salvatore: “Managerial Economics in a Global Economy”, Cengage, 2013.

COURSE OUTCOMES: After successful completion of the course, the students will be able to

1) Analyze the fundamentals of Economics viz., Demand, Elasticity, forecasting, Production, cost, revenue and markets (L4)
2) Apply concepts of production , cost and revenues for effective business decisions (L3)
3) Identify the influence of various markets, the forms of business organization and its International Economic Environment (L1)
4) Analyze how to invest adequate amount of capital in order to get maximum return from selected business activity (L4)
5) Prepare and analyze accounting statements like income & expenditure statement, balance sheet apart from the fundamental knowledge, to understand financial performance of the business and to initiate the appropriate decisions to run the business profitably (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0301	3	0	0	3	CIA	30 M
Course Title	:	**AUTOMOBILE ENGINEERING**					SEE	70 M

Course objectives:

- Impart the knowledge of vehicle structure and its components.
- Demonstrate various components of petrol engines and diesel engines.
- Trains various electrical system, circuits, and testing of automobiles.
- Explain the concepts of steering, suspension and braking system in automobile.

UNIT - I

Introduction to vehicle structure and engine components: Vehicle construction - Chassis and body - Specifications - Engine - Types - Construction - Location of engine - Cylinder arrangement - Construction details - Cylinder block - Cylinder head - Cylinder liners - Piston – piston rings - Piston pin - Connecting rod - Crankshaft - Valves. Lubrication system - Types - Oil pumps - Filters - Cooling system - Types - Water pumps - Radiators - Thermostats - Anti- freezing compounds.

Learning Outcomes:

At the end of the unit, the student will be able to

- Identify different parts of the automobile.(l3)
- Explain various parts of the engine.(l2)
- Describe the lubrication and cooling system in ic engines.(l2)

UNIT - II

Ignition, fuel supply and emission control system: Ignition system - Coil and Magneto - Spark plug - Distributor – Electronic ignition system - Fuel system - Carburetor - Fuel pumps - Fuel injection systems - Mono point and Multi point – UNIT Injector – Nozzle types - Electronic Fuel Injection system (EFI) – GDI, MPFI, DTSI-Automobile Emissions - Source of formation – Effects on human health and environment - Control techniques - Exhaust Gas Recirculation (EGR) - Catalytic converter - Emission tests and standards (Indian and Europe)

Learning Outcomes:
At the end of the unit, the student will be able to

- Explain the working principles of ignition, fuel supply and emission control systems.(l2)
- Compare the types of ignition systems and fuel systems.(l2)

- Interpret the about effects of automobile emissions on human health and environment.(l6)

UNIT - III

Transmission system: Clutches - Function - Types - Single plate, Multiple plate and Diaphragm Clutch – Fluid coupling - Gearbox - Manual - Sliding - Constant - Synchromesh - Overdrive – Automatic transmission - Torque converter - Epicylic and Hydromatic transmission – Continuously variable transmission - Universal joint - Propeller shaft - Hotchkiss drive – Final drive - Rear axle assembly - Types -Differential - Need - Construction – Non-slip differential – Differential locks – Front wheel and rear wheel drive-Four wheel drive.

Learning Outcomes:

At the end of the unit, the student will be able to

- Describe different transmission systems.(l2)
- Illustrate working principle of different gearbox transmission systems.(l2)
- Demonstrate various types of clutches and differentials.(l2)
- Explain the rear axle assembly.(l2)

UNIT - IV

Steering, suspension and braking system: Principle of steering - Steering Geometry and wheel alignment - Steering linkages – Steering gearboxes - Power steering - front axle - Suspension system - Independent and Solid axle – coil, leaf spring and air suspensions - torsion bar - shock absorbers – Wheels and Tyre - Construction - Type and specification - Tyre wear and causes - Brakes - Needs – Classification –Drum and Disc Mechanical - Hydraulic and pneumatic - Vacuum assist – Retarders – Anti-lock Braking System(ABS)

Learning Outcomes:

At the end of the unit, the student will be able to

- Describe the steering and the suspension systems.(l2)
- Classify the brakes in automobile.(l1)
- Explain power steering system in automobiles.(l2)
- Illustrate working principle of anti-lock breaking system.(l2)

UNIT - V

Automobile electrical systems, instrumentation and advances in automobile engineering: Battery-General electrical circuits-Dash board instrumentation - Passenger comfort – Safety and security - HVAC - Seat belts - Air bags - Automotive Electronics - Electronic Control Unit (ECU) - Variable Valve Timing (VVT) - Active Suspension System (ASS) - Electronic Brake

Distribution (EBD) – Electronic Stability Program(ESP) Traction Control System (TCS) - Global Positioning System (GPS) - X-by-wire - Electric - Hybrid vehicle.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the working principles of various automobile electrical systems. (l2)
- Identify the various electrical components in automobile.(l3)
- Explain about ecu, vvt, ass, esp, ebd, tcs and gps in automobile.(l2)
- Examine the recent developments of automobile engineering.(l4)

Course Outcomes:

After successful completion of this course, the student will be able to

- Identify different parts of automobile.(l3)
- Explain the working of various parts like engine, transmission, clutch, brakes.(l2)
- Describe the working of steering and the suspension systems. (l2)
- Summarize the environmental implications of automobile emissions.(l2)
- Outline the future developments in the automobile industry.(l2)

TEXTBOOKS:

1. Kirpal Singh, “Automobile Engineering”,Vol 1 & 2.
2. S.K. Gupta, “A text book of Automobile Engineering”, S. Chand Publications.

REFERENCES:

1. K.K. Ramalingam, “Automobile Engineering” , 2nd edition, 2014.
2. K. Newton and W. Steeds, “The motor vehicle”, 13th edition, Butterworth-Heinemann Publishing Ltd. (year).
3. Kirpal Singh, “Automobile Engineering”, Vol.1&2, Standard Publications year.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0304	3	0	0	3	CIA	30 M
Course Title	:	**MANUFACTURING METHODS IN PRECISION ENGINEERING**					SEE	70 M

Course Objectives:

- Familiarize with surface treatments and their industrial applications.
- Explain powder metal production sintering techniques for metal
- powders, glass, ceramics

  and plastics.

- Explain wafer preparation, optical lithography including current best practice and perceived limits and equipment required for micro-device packaging processes.
- Demonstrate plastics processing.
- Different liquefied, solidified and particulate methods for different MMC, CMC, Polymer matrix composites.

UNIT I

Surface treatment: Scope, Cleaners, Methods of cleaning, Surface coating types, and ceramic and organic methods of coating, economics of coating. Electro forming, Chemical vapour deposition, thermal spraying, Ion implantation, diffusion coating, Diamond coating and cladding.

Learning Outcomes:

After completion of this unit, students will be able to

- Identify the phenomenon related to different surface modification by physical and chemical treatments: (L2)
- Develop the basics of CVD (Chemical Vapour Deposition) and PVD (Physical Vapour Deposition) technologies for surface coating deposition, description of thermal spraying technology for surface coating applications. (L2)
- Explain properties and characteristics of different surface coatings and their applications.(L3)

UNIT II

Processing of Powder metals, Glass and Superconductors: Introduction, production of metal powders, compaction of metal powders, sintering, secondary and finishing operations, design considerations for powder metallurgy, Process capabilities, economics of powder metallurgy, forming and shaping of Glass, techniques for strengthening and treating Glass, design considerations for Glass, processing of superconductors.

Processing of ceramics: Applications, characteristics, classification .Processing of particulate ceramics, Powder preparations, consolidation, Drying, sintering, Hot compaction, Area of application , finishing of ceramics.

Learning Outcomes:

After completion of this unit, students will be able to

- Explain powder metallurgy and ceramics applications. (l2)
- Demonstrate processing of powders and sintering techniques. (l2)
- Outline mechanism of sintering properties and characteristics of powder metals, glass and superconductors. (l3)

UNIT III

Fabrication of Microelectronic devices: Crystal growth and wafer preparation, Film Deposition oxidation, lithography, bonding and packaging, reliability and yield, Printed Circuit boards, computer aided design in microelectronics, surface mount technology, Integrated circuit economics. E-Manufacturing, nanotechnology, and micro machining, High speed Machining.

Learning Outcomes:

After completion of this unit, students will be able to

- Illustrate wafer preparation, optical lithography. (l1)
- Explain the basic packaging and its levels, different ic chip mounting and interconnect methods. (l2)
- Summarize mechanisms like e-manufacturing, nanotechnology, and micromachining, high speed machining.(l3)

UNIT IV

Processing Of Plastics, injection and blow moulding, calendaring, thermo forming, compression moulding, transfer moulding, High energy rate forming methods Rapid manufacturing: - Introduction - concepts of rapid manufacturing, information flow for rapid prototyping, classification of rapid prototyping process, sterer holography fused deposition modeling, selective laser sintering, Applications of rapid prototyping process.

Learning Outcomes:

After completion of this unit, students will be able to

- Build basic knowledge of manufacturing of plastics. (l1)
- Explain the rapid prototyping methods in plastic processing. (l2)

UNIT V

Processing of Composites: Composite Layers, Particulate and fiber reinforced composites, Elastomers, Reinforced plastics, MMC, CMC, Polymer matrix composites.

Learning Outcomes:

After completion of this unit, students will be able to

- Use of fibre-reinforced composites in engineering applications. (l1)
- Summarize the use of composite materials, micromechanics of layered composites. (l2)
- Explain different liquefied, solidified and particulate methods for mmc, cmc, polymer matrix composites. (l3)

Course Outcomes:

After completing the course, the student will be able to

- Classify different surface treatment methods.(l2)
- Explain processing of powder metals, glass and super conductors. (l2)
- Develop fabrication of microelectronic devices.(l2)
- Process plastics and composites.(l2)

TEXT BOOKS:

1. Schmid and Kalpakjin, "Manufacturing Engineering and Technology", 7th edition, Pearson Education India, 2001.
2. Rafiq Noorani, "Rapid Prototyping Principles and Applications", Illustrated edition, Wiley, 2006.

REFERENCE BOOKS:

1. R.K. Jain, "Production Technology", 17th edition, Khanna Publishers, 2012.
2. Roy A. Lindberg, "Process and materials of manufacturing", 2nd edition, Allyn and Bacon, 1978.
3. Sreeramulu moinkumta Production technology Voi 1, Wiley Publishes,2018.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0302	3	0	0	3	CIA	30 M
Course Title	:	**DESIGN OF MACHINE ELEMENTS**					SEE	70 M

Course Objectives:

- Provide an introduction to design of machine elements.
- Familiarize with fundamental approaches to failure prevention for static and dynamic loading.
- Explain design procedures to different types of joints.
- Teach principles of clutches and brakes and design procedures.
- Instruct different types of bearings and design procedures.

UNIT I **12 hours**

Mechanical Engineering Design: Design process, design considerations, codes and standards of designation of materials, selection of materials.

Design for Static Loads: Modes of failure, design of components subjected to axial, bending, torsional and impact loads. Theories of failure for static loads.
Design for Dynamic Loads: Endurance limit, fatigue strength under axial, bending and torsion, stress concentration, notch sensitivity. Types of fluctuating loads, fatigue design for infinite life, Soderberg, Goodman and modified Goodman criterion for fatigue failure.

Learning Outcomes:

After completion of this unit, students will be able to

- Identify materials suitable for machine elements. (l1)
- Apply codes and standards in design. (l3)
- Contrast the difference between static and dynamic loads. (l2)

UNIT II **10 hours**

Design of Bolted Joints: Threaded fastiness, preload of bolts, various stresses induced in the bolts. Torque requirement for bolt tightening, eccentrically loaded bolted joints, gasketed joints.
Riveted Joints: Design of lap, butt and eccentrically loaded joints, failure and efficiency of riveted joints. Structural joints and Boilers joints
Welded Joints: Strength of lap and butt welds, eccentrically loaded welded joints. Joints subjected to bending and torsion.

Learning Outcomes:

After completion of this unit, students will be able to

- Identify different types of joints. (l1)
- Analyse stresses induced in joints subjected to different loads. (l4)
- Design different joints subjected to combined loading. (l6)

UNIT III **10 hours**

Keys & cotters: Function, types, design of sunk, saddle, Kennedy and Woodruff keys.
Power Transmission Shafts: Design of shafts subjected to bending, torsion and axial loading.
Couplings: Design of flange and bushed pin couplings, universal coupling.
Springs: Design of helical compression, tension, torsion and leaf springs.

Learning Outcomes:

After completion of this unit, students will be able to

- Explain the functions of different keys. (l2)
- Design shafts subjected to fluctuating loads. (l6)
- Select coupling for a given application and outline the design procedure. (l3)
- Explain construction and design procedure for helical and leaf springs. (l2)

UNIT IV **10 hours**

Friction Clutches: Torque transmitting capacity of disc and centrifugal clutches. Uniform wear theory and uniform pressure theory.
Brakes: Different types of brakes. Concept of self-energizing and self-locking of brake. Band and block brakes, disc brakes.

Learning Outcomes:

After completion of this unit , students will be able to

- Explain the difference between brake and clutch. (l2)
- Calculate the torque transmitting capacity in clutches. (l3)
- Compare different types of brakes and their applications. (l4)
- Explain the concepts of self-energizing and self-locking brakes. (l2)
- Discuss procedures to design different types of brakes. (l2)

UNIT V **12 hours**
Design of Sliding Contact Bearings: Lubrication modes, bearing modulus, McKee's equations, design of journal bearing. Bearing Failures.

Design of Rolling Contact Bearings: Static and dynamic load capacity, Stribeck's Equation, equivalent bearing load, load-life relationships, load factor, selection of bearings from manufacturer's catalogue.

Learning Outcomes:

After completion of this unit, students will be able to

- Contrast the difference between sliding and rolling contact bearings. (l2)
- Explain the mechanics of lubrication in sliding contact bearings. (l2)
- Identify failures in bearings. (l3)
- Evaluate static and dynamic load capacity of rolling contact bearings. (l5)
- Explain the procedure to select bearings from manufacturer's catalogue. (l3)

Course Outcomes:

At the end of the course the students will be able to

- Estimate safety factors of machine members subjected to static and dynamic loads. (l5)
- Design fasteners subjected to variety of loads. (l6)
- Select of standard machine elements such as keys, shafts, couplings, springs and bearings. (l1)
- Design clutches, brakes and spur gears. (l6)

Text Book(s)

1. J.E. Shigley, "Mechanical Engineering Design", 2nd edition, Tata McGraw Hill, 1986.
2. V.B.Bhandari, "Design of Machine Elements", 3rd edition, Tata McGraw Hill, 2010.

References

1. R.L. Norton, "Machine Design an Integrated approach", 2nd edition, Pearson Education, 2004.
2. R.K. Jain, "Machine Design:, Khanna Publications, 1978.
3. M.F.Spotts and T.E.Shoup, "Design of Machine Elements", 3rd edition, Prentice Hall (Pearson Education), 2013.

Note: PSG Design data book is permitted.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0305	3	0	0	3	CIA	30 M
Course Title	:	**POWER PLANT ENGINEERING**					SEE	70 M

Course Objective:

- Familiarize the sources of energy, power plant economics and environmental aspects.
- Outline the working components of different power plant.
- Explain renewable energy sources; characteristics, working principle, classify types, layouts, and plant operations.
- Impart types of nuclear power plants, and outline working principle and advantages and hazards.

UNIT I

Introduction to the Sources Of Energy - Resources and Development of Power in India. Convectional and non- conventional energy sources, Power Plant Economics and Environmental Considerations: Capital Cost, Investment of Fixed Charges, Operating Costs, General Arrangement of Power Distribution, Load Curves, Load Duration Curve. Definitions of Connected Load, Maximum Demand, Demand Factor, Average Load, Load Factor, Diversity Factor - Tariff - Related Exercises. Effluents from Power Plants and Impact on Environment - Pollutants and Pollution Standards - Methods of Pollution Control. Inspection And Safety Regulations.

Learning Outcomes

At the end of this unit, the student will be able to

- Outline sources of energy, compare and selection of types of power plants.(l2)
- Explain cost factors, load and power distribution factors. (l2)
- Select tariff based on load and demand factors. (l3)
- Summarize the impact of power plant on the environment, pollution mitigation and regulations. (l2)

UNIT II

Steam Power Plant : Introduction to Boilers- Modern High Pressure and Supercritical Boilers - Analysis of Power Plant Cycles - Modern Trends in Cycle Improvement - Waste Heat Recovery, Fluidized Bed Boilers., Fuel and Handling Equipments, Types of Coals, Coal Handling, Choice of Handling Equipment, Coal Storage, Ash Handling Systems.

Steam Power Plant : Combustion Process : Properties of Coal - Overfeed and Under Feed Fuel Beds, Travelling Grate Stokers, Spreader Stokers, Retort Stokers, Pulverized Fuel Burning System And Its Components, Combustion Needs and Draught System, Cyclone Furnace, Design and Construction, Dust

Collectors, Cooling Towers And Heat Rejection. Analysis of Pollution from Thermal Power Plants - Pollution Controls.CO2 Recorders

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate latest high pressure boilers, power plant cycles and their improvements. (l2)
- Explain various types of coals, coal handling operations and associated systems. (l2)
- Outline and compare types of feeders, stokers, combustion systems. (l2)
- Illustrate draught, dust collector, furnace, cooling tower and heat rejection systems. (l2)
- Evaluate pollution levels from power plants, pollution control methods, and application of pollution recorders. (l4)

UNIT III

Diesel Power Plant: Diesel Power Plant, Construction, Plant lay out with auxiliaries, fuel storage.
GAS TURBINE PLANT: Introduction - Classification - Construction - Layout with Auxiliaries

- Principles of Working Closed and Open Cycle Gas Turbines. Advantages And Disadvantages Combined Cycle Power Plants.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain working principle, and compare types of diesel power plant. (l2)
- Outline the diesel power plant layout with its supporting equipment. (l2)
- Illustrate the working principle of open cycle and closed cycle gas turbine. (l2)
- Demonstrate combined cycle power plants with benefits and shortcomings. (l2)

UNIT IV

Hydro Electric Power Plant: Water Power - Hydrological Cycle / Flow Measurement - Drainage Area Characteristics - Hydrographs - Storage and Pondage - Classification of Dams and Spill Ways.

Hydro Projects And Plant: Classification - Typical Layouts - Plant Auxiliaries - Plant Operation Pumped Storage Plants.

Learning Outcomes

At the end of this unit, the student will be able to

- Explain hydrological cycle, infer flow measurements from hydrographs. (l2)
- Summarize working principle of hydro electric power plant. (l2)
- Illustrate typical layout of hydro electric power plant, and its auxiliary equipments. (l2)

UNIT V

Power from Non-Conventional Sources: Utilization of Solar Collectors- Working Principle, Wind Energy - Types of Turbines - HAWT & VAWT-Tidal Energy. MHD power Generation.

Nuclear Power Station: Nuclear Fuel - Nuclear Fission, Chain Reaction, Breeding and Fertile Materials - Nuclear Reactor -Reactor Operation.

Types of Reactors: Pressurized Water Reactor, Boiling Water Reactor, Sodium-Graphite Reactor, Fast breeder Reactor, Homogeneous Reactor, Gas Cooled Reactor, Radiation Hazards and Shielding - Radioactive Waste Disposal.

Learning Outcomes

At the end of this unit, the student will be able to

- Familiarize the source of conventional and non conventional sources in India . (L2)
- Explain working principle of Nuclear power plants, nuclear fuels, and reactor operations. (L2)
- Outline the various types of nuclear reactors, their applications and limitations. (L2)
- Summarize the hazards of nuclear reactors and significance of nuclear waste disposal. (L2)

Course Outcomes:

At the end of this course, the student will be able to

- Outline sources of energy, power plant economics, and environmental aspects. (l2)
- Explain power plant economics and environmental considerations.(l2)
- Describe working components of a steam power plant.(l2)
- Illustrate the working mechanism of diesel and gas turbine power plants.(l2)
- Summarize types of renewable energy sources and their working principle.(l2)
- Demonstrate the working principle of nuclear power plants. (l4)

TEXT BOOKS:

1. P.K. Nag, "Power Plant Engineering", 3rd edition, TMH, 2013.
2. Wakil, "Power plant technology", M.M.EI TMH Publications.

REFERENCE BOOKS:

1. Rajput, "A Text Book of Power Plant Engineering:, 4th edition, Laxmi Publications, 2012.
2. Ramalingam, "Power plant Engineering", Scietech Publishers, 2013
3. P.C. Sharma, "Power Plant Engineering", S.K. Kataria Publications, 2012.
4. Arora and S.Domakundwar, "A course in Power Plant Engineering", Dhanpat Rai & Co

   (p) Ltd, 2014.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0303	3	0	0	3	CIA	30 M
Course Title	:	**ERGONOMICS AND HUMAN FACTORS IN ENGINEERING**					SEE	70 M

Course Objectives

- Familiarize the fundamentals of human factors in engineering.
- Explain principles Hours Anthropometry, Ergonomics and product design.
- Describe the Improvement of human work place through controls.
- Evaluate the sources of vibration and performance effect of vibration in machine tools.
- Know the Special purpose lighting for illumination and quality control.

UNIT I

Fundamentals of Human Factors Engineering: Human Biological, Ergonomic and psychological capabilities and limitations, Concepts of human factors engineering and ergonomics, Man-Machine system and Design philosophy.

Physical work and energy expenditure: Manual lifting, Work posture, Repetitive motion, Provision of energy for muscular work, Heat stress, Role of oxygen physical exertion, Measurement of energy expenditure, Respiration, Pulse rate and blood pressure during physical work, Physical work capacity and its evaluation.

Learning Outcomes:

At the end of this unit the student will be able to

- Define the fundamentals concepts of human factors in engineering.(l1)
- Discus the human biological, ergonomic and psychological capabilities in engineering.(l6)
- Evaluate physical work capacity and energy expenditure.(l4)
- Measure the energy expenditure, respiration, pulse rate and blood pressure during physical exertion. (l4)

UNIT-II

Hours Anthropometry: Physical dimensions of the human body as a working machine, Motion size relationships, Static and dynamic anthropometry, Anthropometric design principles, Using anthropometric measures for industrial design.

Ergonomics and product design: Ergonomics in automated systems, Expert systems for ergonomic design, Anthropometric data and its application in ergonomic design, Limitations of anthropometric data, Use of computerized database.

Learning Outcomes:

At the end of this unit the student will be able to

- Explain the concept of hours anthropometry. (l2)
- Illustrate the physical dimensions of the human body as a working machine. (l2)
- Discus anthropometric data and its application in ergonomic design. (l6)
- State the limitations of anthropometric data in ergonomic design. (l4)

UNIT -III

Machine controls: Improvement of human work place through controls, Displays and Controls, Shapes and sizes of various controls and displays, Multiple display and control situations, Design of major controls in automobiles and machine tools, Principles of hand tool design.

Work place and seating design: Design of office furniture, Redesign of instruments, Work process: Duration of rest periods, Design of visual displays, Design for shift work.

Learning Outcomes:

At the end of this unit the student will be able to

- Describe the concept of improvement of human work place through controls.(l2)
- Explain the principles of hand tool design. (l2)
- Illustrate the design of major controls in automobiles and machine tools. (l2)
- Design the work place and seating plane in machine controls.(l6)

UNIT-IV

Color and light: Color and the eye, Color consistency, Color terms, Reactions to color and color continuation, Color on engineering equipments.

Temperature-Humidity-Illumination and Contrast: Use of Photometers, Recommended illumination levels, The ageing eye, Use of indirect (Reflected) lighting, Cost efficiency of illumination, Special purpose lighting for illumination and quality control.

Unit Outcomes:

At the end of this unit the student will be able to

- Explain the terms color consistency, reactions to color and color continuation.(l2)
- Describe effects of color on engineering equipments.(l2)
- Indentify recommended illumination levels. (l3)
- Explain about special purpose lighting for illumination and quality control. (l2)

UNIT-V

Hours Measurement of sound: Noise exposure and hearing loss, Hearing protectors, Analysis and reduction of noise, Effects of noise, Performance annoyance of noise and interface with communication, Sources of vibration and performance effect of vibration, Vibrations in machine tools.

Learning Outcomes:

At the end of this unit the student will be able to

- Describe the sources of vibration and performance effect of vibrations inmachine tools.(l6)
- Illustrate the effects of noise on machine tool opreation. (l2)
- Explain the terms noise exposure, hearing loss and hearing protectors. (l2)
- Explain the terms analysis and reduction of noise in machine tools.(l2)

Course Outcomes

After completing the course, the student will be able to

- Describe the sources of vibration and performance effect of vibrations in machine tools.(l6)
- Indentify recommended illumination levels. (l3)
- Illustrate the design of major controls in automobiles and machine tools. (l2)
- State the limitations of anthropometric data in ergonomic design. (l4)
- Measure the energy expenditure, respiration, pulse rate and blood pressure during physical exertion. (l4)

TEXT BOOK(S)

1. M. S. Sanders and E. J. McCormick, “Human Factors in Engineering Design”, 7th edition, McGraw-Hill International, 1993.

REFERENCES

1. P. V. Karpovich and W. E. Sinning, “Physiology of Muscular Activity”, 7th edition, Saunders (W.B.) Co Ltd., 1971.
2. “Applied Ergonomics Handbook”, I.P.C. Science and Technology Press Limited, 1974.
3. M. Helander, “A Guide to the Ergonomics of Manufacturing”, 2nd edition, CRC Press, 1997.
4. K. H. E. Kroemer, H. B. Kroemer and K. E. Kroemer Elbert, “Ergonomics: How to design for ease and efficiency”, 2nd edition, Pearson Publications, 2001.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0102	3	0	0	3	CIA	30 M
Course Title	:	**EXPERIMENTAL STRESS ANALYSIS**					SEE	70 M

Course Objective:

To bring awareness on experimental method of finding the response of the structure to different types of load.

- Demonstrates principles of experimental approach.
- Teaches regarding the working principles of various strain gauges.
- Throws knowledge on strain rosettes and principles of non destructive testing of concrete.
- Gives an insight into the principles of photo elasticity.

UNIT-I

PRINCIPLES OF EXPERIMENTAL APPROACH: - Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods – Simplification of problems.

Learning outcomes:

At the end of the unit, students will be able to:

- Demonstrate the merits and principles of experimental approach
- Give an insight into the uses and advantages of experimental stress analysis

UNIT-II

STRAIN MEASUREMENT USING STRAIN GAUGES: - Definition of strain and its relation of experimental Determinations Properties of Strain Gauge Systems-Types of Strain Gauges – Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – various types –Gauge factor – Materials of adhesion base.

Learning outcomes:

At the end of the unit, students will be able to:

- Introduce various strain gauge systems and their properties
- Give information regarding the gauge factor and materials of adhesion bases

UNIT III

STRAIN ROSSETTES AND NON – DESTRUCTIVE TESTING OF CONCRETE:- Introduction – the three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge. Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.

Learning outcomes:

At the end of the unit, students will be able to:

- Introduces various strain rosettes and corrections for strain gauges
- Gives an insight into the destructive and non destructive testing of concrete

UNIT-IV

THEORY OF PHOTOELASTICITY: - Introduction –Temporary Double refraction – The stress Optic Law – Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster"s Stress Optic law.

Learning outcomes:

At the end of the unit, students will be able to:

- Introduces stress optic laws.
- Gives the arrangements and working principles of polariscope.

UNIT-V

TWO DIMENSIONAL PHOTOELASTICITY: - Introduction – Iso-chromatic Fringe patterns- Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

Learning outcomes:

At the end of the unit, students will be able to:

- Introduces the understanding of different fringe patterns.
- Introduces model analysis and properties of photo elastic materials.

Course Outcomes:

After completion of the course

- The student will be able to understand different methods of experimental stress analysis
- The student will be able to understand the use of strain gauges for measurement of strain
- The student will be exposed to different Non destructive methods of concrete
- The student will be able to understand the theory of photo elasticity and its applications in analysis of structures

TEXT BOOKS:-

1. J.W.Dally and W.F.Riley, “Experimental stress analysis College House Enterprises”
2. Dr.Sadhu Singh, “Experimental stress analysis”, khanna Publishers

REFERENCE BOOKS:

1. U.C.Jindal, “Experimental Stress analysis”, Pearson Publications.
2. L.S.Srinath, “Experimental Stress Analysis”, MC.Graw Hill Company Publishers.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0101	3	0	0	3	CIA	30 M
Course Title	:	**BUILDING TECHNOLOGY**					SEE	70 M

Course Objective:

- To impart to know different types of buildings, principles and planning of the buildings.
- To identify the termite control measure in buildings, and importance of grouping circulation, lighting and ventilation aspects in buildings.
- To know the different modes of vertical transportation in buildings.
- To know the utilization of prefabricated structural elements in buildings.
- To know the importance of acoustics in planning and designing of buildings.

UNIT-I

Overview of the course, basic definitions, buildings-types-components- economy and design- principles of planning of buildings and their importance. Definitions and importance of grouping and circulation-lighting and ventilation-consideration of the above aspects during planning of building.

Learning outcomes:

At the end of the unit, students will be able to:

- To be able to plan the building with economy and according to functional requirement**.**

UNIT-II

Termite proofing: Inspection-control measures and precautions- lighting protection of buildings- general principles of design of openings-various types of fire protection measures to be considered while panning a building.

Learning outcomes:

At the end of the unit, students will be able to:

- Able to know the termite proofing technique to the building and protection form lightening effects.
- To be able to know the fire protection measure that are to be adopted while planning a building.

UNIT-III

Vertical transportation in a building: Types of vertical transportation-stairs-different forms of stairs-planning of stairs- other modes of vertical transportation – lifts-ramps-escalators.

Learning outcomes:

At the end of the unit, students will be able to:

- To be able to know the different modes of vertical transportation and their suitability

UNIT-IV

Prefabrication systems in residential buildings- walls-openings-cupboards-shelves etc., planning and modules and sizes of components in prefabrication. Planning and designing of residential buildings against the earthquake forces, principles, seismic forces and their effect on buildings.

Learning outcomes:

At the end of the unit, students will be able to:

- Identify the adoption of prefabricated elements in the building.
- Know the effect of seismic forces on buildings

UNIT-V

Acoustics – effect of noise – properties of noise and its measurements, principles of acoustics of building. Sound insulation- importance and measures.

Learning outcomes:

At the end of the unit, students will be able to:

- To know the effect of noise, its measurement and its insulation in planning the buildings

Course Outcomes:

After completion of the course the student will be able to

- Understand the principles in planning and design the buildings.
- Know the different methods of termite proofing in buildings.
- Know the different methods of vertical transportation in buildings.
- Know the implementation of prefabricated units in buildings and effect of earthquake on buildings.
- Know the importance of acoustics in planning and designing of buildings.

TEXT BOOKS

1. Varghese, “Building construction”, PHI Learning Private Limited.
2. Punmia.B.C, “Building construction”, Jain.A.K and Jain.A.K Laxmi Publications.
3. S.P.Arora and S.P.Brndra “Building construction”, Dhanpat Rai and Sons Publications, New Delhi
4. “Building construction-Technical teachers training institute”, Madras, Tata McGraw Hill.

REFERENCE BOOKS:

National Building Code of India, Bureau of Indian Standards

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0201	3	0	0	3	CIA	30 M
Course Title	:	**ELECTRICAL ENGINEERING MATERIALS**					SEE	70 M

Course Objectives:

To make the students learn about

- Classification of materials.
- Properties of materials and its applications.
- Domestic wiring and earthing

UNIT-I Conducting Materials

Introduction – classification of materials – Metals and Non metals, physical, thermal, mechanical and electrical properties of materials – classification of electrical materials – concept of atom – electron configuration of atom, conductors, general properties of conductors, factors effecting resistivity of electrical materials –electrical/mechanical/thermal properties of copper, aluminum, iron, steel, lead, tin and their alloys – applications.

Learning outcomes:

At the end of the unit, students will be able to:

- Uunderstand the classification of conducting materials.
- Analyze the properties of different conducting materials
- Apply the materials where it is applicable
- Know about electron configuration of atom

UNIT-II Dielectric and High Resistivity Materials

Introduction – solid, liquid and gaseous dielectrics, leakage current, permittivity, dielectric constant, dielectric loss – loss angle – loss constant, Breakdown voltage and dielectric strength of

– solid, liquid and gaseous dielectrics, effect of break down– electrical and thermal effects, Polarization – electric, ionic and dipolar polarization. Effect of temperature and Frequency on dielectric constant of polar dielectrics. High Resistivity materials – electrical / thermal / mechanical properties of Manganin, Constantan, Nichrome, Tungsten, Carbon and Graphite and their applications in electrical equipment.

Learning outcomes:

At the end of the unit, students will be able to:

- Understand the classification of dielectric and high resistivity materials.
- Analyze the properties of dielectric and high resistivity materials

- Understand about concept of polarization and dipolar polarization
- Apply the materials where it is applicable

UNIT-III Solid Insulating Materials

Introduction – characteristics of a good electrical insulating materials – classification of insulating materials – electrical, thermal, chemical and mechanical properties of solid insulating materials - Asbestos, Bakelite, rubber, plastics, thermo plastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

Learning outcomes:

At the end of the unit, students will be able to:

- Understand about various characteristics of solid insulating materials
- Understand the classification of solid insulating materials.
- Analyze the properties of solid insulating materials
- Apply the materials where it is applicable

UNIT-IV Liquid & Gas Insulating Materials

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids – Electrical, thermal and chemical properties – transformer oil – properties – effect of moisture on insulation properties Gaseous insulators – classification based on dielectric strength – dielectric loss, chemical stability properties and their applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the classification of liquid insulating materials.
- Analyze the properties of liquid insulating materials
- Apply the materials where it is applicable
- Understand about properties and classification of gaseous insulators

UNIT-V Domestic Wiring

Wiring materials and accessories – Types of wiring – Types of Switches - Specification of Wiring – Stair case wiring - Fluorescent lamp wiring- Godown wiring – Basics of Earthing – single phase wiring layout for a residential building.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand about wiring materials and accessories
- Understand about earthing and wiring layout of domestic buildings
- Design and develop Residential wiring
- Know about godown wiring

Course Outcomes:

After completing the course, the student should be able to:

- Understand the classification of materials, domestic wiring materials and earthing.
- Analyze the properties of different electrical materials
- Apply where the materials are applicable based on properties of materials
- Design and develop Residential wiring, godown wiring and earthing.

Text Books:

1. G.K. Mithal, "Electrical Engineering Materials", Khanna publishers, 2nd edition, 1991.
2. R.K. Rajput, A course in "Electrical Engineering Materials", Laxmi publications, 2009.

Reference Books:

1. C.S. Indulkar and S. Thiruvengadam, "An Introduction to Electrical Engineering Materials" S Chand & Company, 2008.
2. Technical Teachers Training Institute, "Electrical engineering Materials", 1st Edition, Madras, McGraw Hill Education, 2004.
3. by S.P. Seth, "A course in Electrical Engineering Materials Physics Properties & Applications", Dhanapat Rai & Sons Publications, 2018.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0301	3	0	0	3	CIA	30 M
Course Title	:	**INTRODUCTION TO HYBRID AND ELECTRIC VEHICLES**					SEE	70 M

Course Objectives:

- Provide good foundation on hybrid and electrical vehicles.
- To address the underlying concepts and methods behind power transmission in hybrid and electrical vehicles.
- Familiarize energy storage systems for electrical and hybrid transportation.
- To design and develop basic schemes of electric vehicles and hybrid electric vehicles.

UNIT I: Electric Vehicle Propulsion and Energy Sources

Introduction to electric vehicles, vehicle mechanics - kinetics and dynamics, roadway fundamentals propulsion system design - force velocity characteristics, calculation of tractive power and energy required, electric vehicle power source - battery capacity, state of charge and discharge, specific energy, specific power, Ragone plot. battery modeling - run time battery model, first principle model, battery management system- soc measurement, battery cell balancing. Traction batteries - nickel metal hydride battery, Li-Ion, Lipolymer battery.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Summaries the concepts of electrical vehicle propulsion and energy sources. (l2)
- Identify the types of power sources for electrical vehicles.(l3)
- Demonstrate the design considerations for propulsion system. (l2)
- Solve the problems on tractive power and energy required. (l3)

UNIT II: Electric Vehicle Power Plant And Drives

Introduction electric vehicle power plants. Induction machines, permanent magnet machines, switch reluctance machines. Power electronic converters-DC/DC converters - buck boost converter, isolated DC/DC converter. Two quadrant chopper and switching modes. AC drives- PWM, current control method. Switch reluctance machine drives - voltage control, current control.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Choose a suitable drive scheme for developing an electric vehicles depending on resources.(l1)
- List the various power electronic converters. (l1)

- Describe the working principle dc/dc converters and buck boost convertor. (l2)
- Explain about ac drives. (l2)

UNIT III: Hybrid And Electric Drive Trains

Introduction hybrid electric vehicles, history and social importance, impact of modern drive trains in energy supplies. Hybrid traction and electric traction. Hybrid and electric drive train topologies. Power flow control and energy efficiency analysis, configuration and control of DC motor drives and induction motor drives, permanent magnet motor drives, switch reluctance motor drives, drive system efficiency.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Identify the social importance of hybrid vehicles. (l3)
- Discus impact of modern drive trains in energy supplies. (l6)
- Compare hybrid and electric drive trains.(l2)
- Analyze the power flow control and energy efficiency. (l6)

UNIT IV: Electric and Hybrid Vehicles - Case Studies

Parallel hybrid, series hybrid -charge sustaining, charge depleting. Hybrid vehicle case study – Toyota Prius, Honda Insight, Chevrolet Volt. 42 V system for traction applications. Lightly hybridized vehicles and low voltage systems. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid electric heavy duty vehicles, fuel cell heavy duty vehicles.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- List the various electric and hybrid vehicles in the present market. (l1)
- Discus lightly hybridized vehicle and low voltage systems.(l6)
- Explain about hybrid electric heavy duty vehicles and fuel cell heavy duty vehicles. (l2)

UNIT V: Electric And Hybrid Vehicle Design :

Introduction to hybrid vehicle design. Matching the electric machine and the internal combustion engine. Sizing of propulsion motor, power electronics, drive system. Selection of energy storage technology, communications, supporting subsystem. Energy management strategies in hybrid and electric vehicles - energy management strategies- classification, comparison, implementation.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Illustrate matching the electric machine and the internal combustion engine. (l2)

- Select the energy storage technology. (l3)
- Select the size of propulsion motor. (l3)
- Design and develop basic schemes of electric and hybrid electric vehicles. (l3)

Course outcomes:

After learning the course the students will be able to:

- Explain the working of hybrid and electric vehicles. (l2)
- Choose a suitable drive scheme for developing an hybrid and electric vehicles depending on resources. (l3)
- Develop the electric propulsion unit and its control for application of electric vehicles.(l3)
- Choose proper energy storage systems for vehicle applications. (l3)
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles.(l3)

Text Books :

1. Iqbal Hussein, "Electric and Hybrid Vehicles: Design Fundamentals", 2nd edition, CRC Press, 2003.
2. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, "Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach", illustrated edition, John Wiley & Sons, 2014.
3. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, "Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design", CRC Press, 2004.

References:

1. James Larminie, John Lowry, "Electric Vehicle Technology", Explained, Wiley, 2003.
2. John G. Hayes, G. Abas Goodarzi, "Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles", 1st edition, Wiley- Blackwell, 2018.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0302	3	0	0	3	CIA	30 M
Course Title	:	**RAPID PROTOTYPING**					SEE	70 M

Course Objectives:

- Familiarize techniques for processing of CAD models for rapid prototyping.
- Explain fundamentals of rapid prototyping techniques.
- Demonstrate appropriate tooling for rapid prototyping process.
- Focus Rapid prototyping techniques for reverse engineering.
- Train Various Pre – Processing, Processing and Post Processing errors in RP Processes.

UNIT – I **10 Hours**

Introduction: Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.

RP Software: Need for RP software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, SolidView, 3DView, etc., software, Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain prototyping process. (l2)
- Classify different rapid prototyping processes. (l2)
- Summarize rp software's and represent a 3d model in stl format, other rp data formats. (l2)

UNIT – II **8 Hours**

Solid and Liquid Based RP Systems: Stereolithography (SLA): Principle, Process, Materials, Advantages, Limitations and Applications. Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications.

Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications. **Laminated Object Manufacturing (LOM):** Principle, Process, Materials, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the principles, advantages, limitations and applications of Solid and Liquid based AM systems. (L2)
- Identify the materials for Solid and Liquid based AM systems. (L2)

UNIT – III **8 Hours**

Powder Based RP Systems: Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

Other RP Systems: Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballastic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the principles, advantages, limitations and applications of powder based AM systems. (L2)
- Understand the principles, advantages, limitations and applications of other Additive Manufacturing Systems such as 3D Printing, Ballistic Particle Manufacturing and Shape Deposition Modeling. (L2)

UNIT – IV **8 Hours**

Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods.

Reverse Engineering (RE): Meaning, Use, RE – The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Learning Outcomes:

At the end of the unit, the student will be able to

- Classify Rapid Tooling methods. (L2)
- Explain the concepts of reverse engineering and scanning tools. (L2)

UNIT – V **8 Hours**

Errors in RP Processes: Pre-processing, processing, post-processing errors, Part building errors in SLA, SLS, etc.

RP Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse

Engineering, Medical Applications of RP.

Learning Outcomes:

At the end of the unit, the student will be able to

- Identify various Pre – Processing, Processing and Post – Processing errors in RP processes. (L2)
- Apply of RP in engineering design analysis and medical applications. (L3)

Course Outcomes:

At the end of the course, the student will be able to

- Use techniques for processing of CAD models for rapid prototyping. (L3)
- Understand and apply fundamentals of rapid prototyping techniques. ((L3)
- Use appropriate tooling for rapid prototyping process. (L3)
- Use rapid prototyping techniques for reverse engineering. (L3)
- Identify Various Pre – Processing, Processing and Post Processing errors in RP processes. (L3)

Text Books:

1. Chua C.K., Leong K.F. and Lim C.S., “Rapid Prototyping: Principles and Applications”, 2nd edition, World Scientific Publishers, 2003.
2. Ian Gibson, David W. Rosen, Brent Stucker, “Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing”, 1st Edition, Springer, 2010.
3. Rafiq Noorani, “Rapid Prototyping: Principles and Applications in Manufacturing”, John Wiley & Sons, 2006.

Reference Books:

1. Liou W. Liou, Frank W., Liou, “Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development”, CRC Press, 2007.
2. Pham D.T. and Dimov S.S., “Rapid Manufacturing; The Technologies and Application of RPT and Rapid tooling”, Springer, London 2001.
3. Gebhardt A., “Rapid prototyping”, Hanser Gardener Publications, 2003.
4. Hilton P.D. and Jacobs P.F., “Rapid Tooling: Technologies and Industrial Applications”, CRC Press, 2005.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0401	3	0	0	3	CIA	30 M
Course Title	:	**ANALOG ELECTRONICS**					SEE	70 M

Course Objectives:( )

- To understand the characteristics of various types of electronic devices and circuits (L1).
- To apply various principles of electronic devices and circuits to solve complex Engineering problems (L2).
- To analyze the functions of various types of electronic devices and circuits (L3).
- To evaluate the functions of various types of electronic devices and circuits in real time applications (L3).
- To design various types of electronic circuits for use in real time applications (L4).

UNIT-I:

Diodesand Applications

Properties of intrinsic and extrinsic semiconductor materials. Characteristics of PN junction diode and Zener diode. Applications of PNdiode as a switch, rectifier and Zener diode as regulator. Special purpose diodes: Schottky diode, Tunnel diode, Varactor diode, photodiode and LED.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the characteristics of various types of diodes (L1).
- Apply the principles of diodes to solve complex Engineering problems (L2).
- Analyze the functions of diodes in forward and reverse bias conditions (L3).
- Evaluate the functions of diodes in real time applications (L3).
- Design rectifiers and switches using diodes (L4).

UNIT-II:

BJT and its Applications

Construction, Operation, and Characteristics in CE, CB and CC configurations. Fixed-Bias and Voltage Divider-Bias. Applications as switch and amplifier.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the characteristics and biasing of BJT (L1).
- Apply the principles of BJT to solve complex Engineering problems (L2).
- Analyse the functions of BJT in various configurations (L3).
- Evaluate the functions of BJT in real time applications (L3).
- Design amplifiers and switches using BJT (L4).

UNIT-III:

FETs and Applications

JFETs: Construction, Operation, and Characteristics in CS configurations. Fixed-Bias and Voltage Divider -Bias. Applications as switch and amplifier.
MOSFETs: Construction, Operation, and Characteristics of Enhancement and Depletion modes in CS configurations. Biasing in Enhancement and Depletion modes. Applications as switch.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the characteristics and biasing of FETs (L1).
- Apply the principles of FETsto solve complex Engineering problems (L2).
- Analyze the functions of FETs in CSconfiguration (L3).
- Evaluate the functions of FETs in real time applications (L3).
- Design amplifiers and switches using FETs (L4).

UNIT-IV:

Feedback Amplifiers and Oscillators

Feedback Amplifiers: Concept of feedback, General characteristics of negative feedback amplifiers, Voltage-series, Current-series, Voltage-shunt, and Current-shunt feedback amplifiers. **Oscillators:**Conditions for oscillations, Hartley and Colpitts oscillators, RC phase-shift and Wien-bridge oscillators.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of negative & positive feedback and characteristics feedback amplifiers (L1).
- Apply the principles of feedback amplifiers and oscillators to solve complex Engineering problems (L2).
- Analyze the functions of feedback amplifiers and oscillators (L3).
- Evaluate the functions of feedback amplifiers and oscillators in real time applications

(L3).

- Design feedback amplifiers and oscillators for specific applications (L4).

UNIT-V:

Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits

Wave-Shaping & Multivibrator Circuits: Introduction, Waveform Shaping Circuits –RC and RL Circuits. Clippers, Comparator and Clampers. Bistable, Schmitt Trigger, Monostable and Astable Multivibrators.

Linear Integrated Circuits: Operational Amplifier: Introduction, Block diagram, Basic applications – Inverting, Non-inverting, Summing amplifier, Subtractor, Voltage Follower. IC 555 Timer and IC 7805 Regulator.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the operation of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits (L1).
- Apply the principles of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits to complex Engineering solve problems (L2).
- Analyse the functions of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits (L3).
- Evaluate the functions of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits in real time applications (L3).
- Design Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits for specific applications (L4).

Note: In all the units, only qualitative treatment is required.

Course Outcomes:

At the end of the course, the student should be able to

- Understand the characteristics of various types of electronic devices and circuits
- Apply various principles of electronic devices and circuits to solve complex
- Engineering problems
- Analyse the functions of various types of electronic devices and circuits, Evaluate the functions of various types of electronic devices and circuits in real time applications
- Design various types of electronic circuits for use in real time applications.

TEXT BOOKS:

1. S. Salivahanan and N. Suresh Kumar, “Electronic Devices and Circuits”, 4th Edition, McGraw Hill Education (India) Pvt Ltd., 2017.

REFERENCES:

1. J. Milliman, Christos C Halkias, and Satyabrata Jit, “Electronics Devices and Circuits”, 4th Edition, McGraw Hill Education (India) Pvt Ltd., 2015.
2. David A. Bell “Electronics Devices and Circuits”, 5th Edition, Oxford University Press, 2008.

Blooms’ learning levels:

L1: Remembering and Understanding L2: Applying
L3: Analyzing/Derive
L4: Evaluating/Design L5: Creating

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0403	3	0	0	3	CIA	30 M
Course Title	:	**DIGITAL ELECTRONICS**					SEE	70 M

Course Objectives:

- To introduce different methods for simplifying Boolean expressions
- To analyze logic processes and implement logical operations using combinational logic circuits
- To understand characteristics of memory and their classification.
- To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines
- To understand concept of Programmable Devices

UNIT- I

Minimization Techniques and Logic Gates Minimization Techniques**:** Boolean postulates and laws – De-Morgan's Theorem - Principle of Duality - Boolean expression - Minimization of Boolean expressions –– Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS)

– Karnaugh map Minimization – Don't care conditions – Quine - McCluskey method of minimization. Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates, NAND– NOR implementations – Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics – Tristate gates.

Learning Outcomes:

At the end of the unit, the student should be able to:

- Learn Boolean algebra and logical operations in Boolean algebra. (L1)
- Apply different logic gates to functions and simplify them. (L2)
- Analyze the redundant terms and minimize the expression using Kmaps and tabulation methods (L3)

UNIT- II

Combinational Circuits -Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/ Demultiplexer – decoder -

encoder – parity checker – parity generators – code converters - Magnitude Comparator.

Learning Outcomes:

At the end of the unit, the student should be able to:

- Apply the logic gates and design of combinational circuits(L2)
- Design of different combinational logic circuits(L4)

UNIT -III

Sequential Circuits-Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Characteristic table and equation –Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor- Asynchronous Ripple or serial counter – Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters: state diagram- State table –State minimization –State assignment - Excitation table and maps-Circuit implementation - Modulo–n counter, Registers – shift registers - Universal shift registers – Shift register counters – Ring counter – Shift counters - Sequence generators.

Learning Outcomes:

At the end of the unit, the student should be able to:

- Understand the clock dependent circuits (L1)
- Identify the differences between clocked and clock less circuits, apply clock dependent circuits(L2)
- Design clock dependent circuits(L4)

UNIT -IV

Memory Devices Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM – EAPROM, RAM – RAM organization – Write operation – Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell- Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell –Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL

Learning Outcomes:

At the end of the unit, the student should be able to:

- Understand the principle of operation of basic memory devices, and programmable logic devices. (L1)
- Implement combinational logic circuits using memory and programmable logic devices (L2)

UNIT -V

Synchronous and Asynchronous Sequential Circuits Synchronous Sequential Circuits: General Model –

Classification – Design – Use of Algorithmic State Machine – Analysis of Synchronous Sequential Circuits Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits – Incompletely specified State Machines – Problems in Asynchronous Circuits – Design of Hazard Free Switching circuits.

Learning Outcomes:

At the end of the unit, the student should be able to:

- Understand how synchronous and asynchronous sequential circuit works (L1)
- Understand the FSM and its design principles. (L1)
- Analyze the procedure to reduce the internal states in sequential circuits (L3)
- Illustrate minimization of complete and incomplete state machines and to write a minimal cover table(L2)

Course Outcomes:

- Explain switching algebra theorems and apply them for logic functions, discuss about digital logic gates and their properties, Identify the importance of SOP and POS canonical forms in the minimization of digital circuits.
- Evaluate functions using various types of minimizing algorithms like Boolean algebra, Karnaugh map or tabulation method.
- Analyze the design procedures of Combinational & sequential logic circuits.
- Design of different combinational logic circuits, and compare different semiconductor memories.

Text Books:

1. M. Morris Mano, "Digital Design", 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. Zvi Kohavi, "Switching and Finite Automata Theory", 3rd Edition, South Asian Edition, 2010,

References:

1. John F.Wakerly, "Digital Design", Fourth Edition, Pearson/PHI, 2008
2. John.M Yarbrough, "Digital Logic Applications and Design", Thomson Learning, 2006.
3. Charles H.Roth. "Fundamentals of Logic Design", 6th Edition, Thomson Learning, 2013.
4. Donald P.Leach and Albert Paul Malvino, "Digital Principles and Applications", 6th Edition, TMH, 2006.
5. Thomas L. Floyd, "Digital Fundamentals", 10th Edition, Pearson Education Inc, 2011
6. Donald D.Givone, "Digital Principles and Design", TMH, 2003.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering Common to CSE & IT)

Course Category	:	OPEN ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0503	3	0	0	3	CIA	30 M
Course Title	:	COMPUTER GRAPHICS AND MULTIMEDIA ANIMATION					SEE	70 M

Course Objectives:

This course is designed to:

- Introduce the use of the components of a graphics system and become familiar with the building approach of graphics system components and related algorithms.
- Understand the basic principles of 3- 3-dimensional computer graphics.
- Provide insites on how to scan, convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
- Provide an understanding of mapping from world coordinates to device coordinates, clipping, and projections.
- Discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

UNIT I OVERVIEW OF COMPUTER GRAPHICS SYSTEM

OverView of Computer Graphics System – Video display devices – Raster Scan and random scan system – Input devices – Hard copy devices.

Learning outcomes:

At the end of the unit, students will be able to:

- Explain the overview of computer graphics with visualization. (L2)
- Classify the Input devices. (L2)
- Distinguish raster scan and random scan systems. (L4)

UNIT II OUTPUT PRIMITIVES AND ATTRIBUTES

Drawing line, circle and ellipse generating algorithms – Scan line algorithm – Character Generation – attributes of lines, curves and characters – Antialiasing.

Learning outcomes:

At the end of the unit, students will be able to:

- Analyse output primitives and attributes. (L4)
- Design algorithms based on output. (L6)

UNIT III TWO DIMENSIONAL GRAPHICS TRANSFORMATIONS AND VIEWING:

Two-dimensional Geometric Transformations – Windowing and Clipping – Clipping of lines and clipping of polygons.

Learning outcomes:

At the end of the unit, students will be able to:

- Create two-dimensional graphics. (L6)
- Examine the clipping of polygon. (L4)
- Compare different forms of variations. (L2)

UNIT IV THREE DIMENSIONAL GRAPHICS AND VIEWING

Three-dimensional concepts – Object representations- Polygon table, Quadric surfaces, Splines, Bezier curves and surfaces – Geometric and Modelling transformations – Viewing - Parallel and perspective projections.

Learning outcomes:

At the end of the unit, students will be able to:

- Create three-dimensional graphics. (L6)
- Explain the Quadric surfaces and polygon table. (L2)
- Define modelling transformations. (L1)

UNIT V REMOVAL OF HIDDEN SURFACES

Visible Surface Detection Methods – Computer Animation.

Learning outcomes:

At the end of the unit, students will be able to:

- List the different types of detection methods. (L1)
- Compare various computer animations. (L2)

Course outcomes:

Upon completion of the course, the students should be able to:

- Explain the basic concepts used in computer graphics. (L2)
- Inspect various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping. (L4)
- Assess the importance of viewing and projections. (L5)
- Define the fundamentals of animation, virtual reality and its related technologies. (L3)
- Analyze the typical graphics pipeline (L4)

TEXTBOOK

1. Hearn, D. and Pauline Baker,M., Computer Graphics (C-Version), 2nd Edition, Pearson Education, 2002.

REFERENCES

1. Neuman, W.M., and Sproull, R.F., Principles of Interactive Computer Graphics, Mc Graw Hill Book Co., 1979.
2. Roger, D.F., Procedural elements for Computer Graphics, Mc Graw Hill Book Co., 1985.
3. Asthana, R.G.S and Sinha, N.K., Computer Graphics, New Age Int. Pub. (P) Ltd., 1996.
4. Floey, J.D., Van Dam, A, Feiner, S.K. and Hughes, J.F, Computer Graphics, Pearson Education, 2001.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0504	3	0	0	3	CIA	30 M
Course Title	:	**FREE AND OPEN SOURCES SYSTEMS**					SEE	70 M

Course Objectives:

This course is designed to:

- Understand the context and operation of free and open source software (FOSS) communities and associated software projects.
- Motivate the students to contribute in FOSS projects
- Familiarize with programming languages like Python, Perl, Ruby
- Elucidate the important FOSS tools and techniques

UNIT I PHILOSOPHY

Notion of Community--Guidelines for effectively working with FOSS community--, Benefits of Community based Software Development --Requirements for being open, free software, open source software –Four degrees of freedom - FOSS Licensing Models - FOSS Licenses – GPL- AGPL-LGPL - FDL - Implications – FOSS examples.

Learning outcomes:

At the end of the unit, students will be able to:

- Analyze the benefits of Community based Software Development. (L4)
- Explain the degrees of Freedom. (L2)

UNIT II LINUX

Linux Installation and Hardware Configuration – Boot Process-The Linux Loader (LILO) - The Grand Unified Bootloader (GRUB) - Dual-Booting Linux and other Operating System - Boot- Time Kernel Options- X Windows System Configuration-System Administration – Backup and Restore Procedures- Strategies for keeping a Secure Server.

Learning outcomes:

At the end of the unit, students will be able to:

- Demonstrate Linux Installation and hardware configuration. (L2)
- Compare Linux and Windows System Configurations. (L4)

UNIT III

PROGRAMMING LANGUAGES

Programming using languages like Python, Perl, Ruby

Learning outcomes:

At the end of the unit, students will be able to:

- Explain the syntax of programming Languages Python, Perl and Ruby. (L2)
- Develop applications in the Open source programming Languages (L6)

UNIT IV

PROGRAMMING TOOLS AND TECHNIQUES

Usage of design Tools like Argo UML or equivalent, Version Control Systems like Git or equivalent, – Bug Tracking Systems- Package Management Systems

Learning outcomes:

At the end of the unit, students will be able to:

- List various programming tools and explain their uses (L1)
- Make use of the various tools while building applications (L3)

UNIT V

FOSS CASE STUDIES

Open Source Software Development - Case Study – Libre office -Samba

Learning outcomes:

At the end of the unit, students will be able to:

- Elaborate the open Source Software Development(L6)
- Compare Libre office with its proprietary equivalent (L5)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Demonstrate Installation and running of open-source operating systems.(L2)
- Justify the importance of Free and Open Source Software projects. (L5)
- Build and adapt one or more Free and Open Source Software packages. (L6)
- Utilize a version control system. (L3)

- Develop software to and interact with Free and Open Source Software development projects.(L3)

TEXT BOOK:

Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “Linux in a Nutshell”, Sixth Edition, OReilly Media, 2009.

REFERENCES:

2. Philosophy of GNU URL: http://www.gnu.org/philosophy/.
3. Linux Administration URL: http://www.tldp.org/LDP/lame/LAME/linux-admin-made-easy/.
4. The Python Tutorial available at http://docs.python.org/2/tutorial/.
5. Perl Programming book at http://www.perl.org/books/beginning-perl/.
6. Ruby programming book at http://ruby-doc.com/docs/ProgrammingRuby/.
7. Version control system URL: http://git-scm.com/.
8. Samba: URL : http://www.samba.org/.
9. Libre office: http://www.libreoffice.org/.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0502	3	0	0	3	CIA	30 M
Course Title	:	**COMPUTER APPLICATIONS IN FOOD INDUSTRY**					SEE	70 M

PREAMBLE

This course covers all facets of computerization and various software's used and their usage.

Course Objectives

- Able to know about "The necessity of Software & their applications in Food Industries"
- Able to Implement the Programs in 'C' to perform various operations that are related to Food Industries.

UNIT – I

Computerization, Importance of Computerization in food industry and IT applications in food industries. Computer operating environments and information system for various types of food industries. Introduction to Bar charts and Pie charts & the procedure to develop bar charts and pie charts on given Data.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Computerization, Importance of Computerization in food industry and IT applications in food industries.
- Computer operating environments and information system for various types of food industries.
- Introduction to Barcharts and Piecharts & the procedure to develop barcharts and piecharts on given Data.

UNIT – II

Introduction to Software & Programming Languages, Properties, Differences of an Algorithm and Flowcharts, Advantages and disadvantages of Flowcharts & Algorithms. Introduction, Fundamentals & advantages of 'C'. Steps in learning 'C' (Character set, Identifiers, Keywords) Steps in learning 'C' (Data types, Constants, Variables, Escape sequences).

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Introduction to Software & Programming Languages, Properties, Differences of an Algorithm and Flowcharts
- Advantages and disadvantages of Flowcharts & Algorithms. Introduction, Fundamentals & advantages of ‘C’.
- Steps in learning ‘C’ (Character set, Identifiers, Keywords)
- Steps in learning ‘C’ (Data types, Constants, Variables, Escape sequences).

UNIT – III

Steps in learning ’C’ (Operators, Statements) Steps in learning ‘C’ (Header Files, Input & Output functions: Formatted I/O functions, Unformatted I/O functions). Basic Structure of a simple ‘C’ program. Decision Making/Control Statements. Branching, Concept of Looping & Looping statements.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Steps in learning ’C’ (Operators, Statements)
- Steps in learning ‘C’ (Header Files, Input & Output functions: Formatted I/O functions, Unformatted I/O functions).
- Basic Structure of a simple ‘C’ program. Decision Making/Control Statements.
- Branching, Concept of Looping & Looping statements.

UNIT – IV

Concept of Functions (Defining a function & Function Prototypes, Types of functions: Library functions & User defined functions. Concept of various types of User Defined Functions (i.e., About 4 types). Concept of Arrays & Types of Arrays (Single, Double and Multi-Dimensional Arrays). Concept of a String Library Functions.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Concept of Functions (Defining a function & Function Prototypes, Types of functions: Library functions & User defined functions.
- Concept of various types of User Defined Functions (i.e., About 4 types).
- Concept of Arrays & Types of Arrays (Single, Double and Multi-Dimensional Arrays).
- Concept of a String Library Functions.

UNIT – V

Concept of Pointers, Structures & Unions. Introduction to Data Structures, Types of Data Structures (Primary & Secondary Data Structures) Concept of Linked Lists, Types of Linked
Lists & Basic operations on linked Lists. Concept of Stacks & Operations on Stacks (PUSH & POP Operations) Concept of Queues and types of Queues Operations on a Queue (ENQUEUE & DEQUEUE Operations)

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Concept of Pointers, Structures & Unions. Introduction to Data Structures, Types of Data Structures (Primary & Secondary Data Structures)
- Concept of Linked Lists, Types of Linked Lists & Basic operations on linked Lists.
- Concept of Stacks & Operations on Stacks (PUSH & POP Operations)
- Concept of Queues and types of Queues Operations on a Queue (ENQUEUE & Dequeue Operations)

Course Outcomes

By the end of the course, the students will be able to

- know about the various steps which are related to computer and Software and their application in Food Industries
- know about the various steps which are necessary to implement the programs in 'C'

TEXT BOOKS

1. Yeswanth Kanethkar, Let us 'C'
2. Balaguruswamy E., "Computer Programming in 'C'"
3. Mark Allen Waise , "Data Structures"

REFERENCES

1. M. S Excel 2000, Microsoft Corporation
2. M. S. Office – Microsoft Corporation
3. Verton M.V. "Computer concepts for Agri Business", AVI Pub. Corp., West Port, USA.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0303	3	0	0	3	CIA	30 M
Course Title	:	**OPTIMIZATION TECHNIQUES**					SEE	70 M

Course Objectives:

- how to formulate statement of optimization problem with or without constraints
- To know about classification of single and multivariable optimization problems
- To know about necessary and sufficient conditions in defining the optimization problems
- To understand how to formulate Kuhn-Tucker conditions and to solve numerical problems

UNIT – II Linear Programming

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm – Numerical examples.

Learning Outcomes:

The student will be able to learn:

- The basic concepts of Optimization
- The emphasis of this course is on different classical Optimization techniques linear programming and simplex algorithms.
- About optimality of balanced transportation Problems
- About Constrained and unconstrained nonlinear programming.
- About principle of optimality and dynamic programming

UNIT – I Introduction and Classical Optimization Techniques:

Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Classical Optimization Techniques: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions – Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To know At the end of unit, students will be able to understand the following
  - To know about formulation of LPP
  - To know about formulations of GPP
  - To understand various theorems in solving simultaneous equations
  - To understand about necessity of Simplex method and to solve numerical problems

UNIT – III Nonlinear Programming – One Dimensional Minimization methods

Introduction, Unimodal function, Elimination methods- Unrestricted Search, Exhaustive Search, Dichotomous Search, Fibonacci Method, Golden Section Method and their comparison; Interpolation methods - Quadratic Interpolation Method, Cubic Interpolation Method and Direct Root Methods – Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To know about NLP in one dimensional optimization problems
- To understand about various search methods
- To learn about various interpolation methods
- To distinguish and compare the various elimination methods with numerical examples

UNIT – IV Unconstrained & Constrained Nonlinear Programming

Unconstrained Optimization Techniques: Introduction- Classification of Unconstrained Minimization Methods, General Approach, Rate of Convergence, Scaling of Design Variables; Direct Search methods- Random Search Methods, Grid Search Method, Pattern Directions, Powell's Method and Simplex Method
Constrained Optimization Techniques: Introduction, Characteristics of a Constrained Problem, Direct Search Methods - Random Search Methods, Basic Approach in the Methods of Feasible Directions, Rosen's Gradient Projection Method, Generalized Reduced Gradient Method and Sequential Quadratic Programming.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To distinguish between unconstrained and constrained optimization problems
- To learn about direct search methods in unconstrained NLP problems and comparison
- To understand about direct search methods in constrained NLP problems and comparison
- To do exercises for solving numerical examples of various methods

UNIT – V Dynamic Programming

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution

– Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To know what is DP problem?
- To know about computational procedure in solving DPP
- To know Calculus and Tabular methods of solving with numerical examples of various methods

Course Outcomes:

The student gets thorough knowledge on:

- Basic methods, principles in optimization
- Formulation of optimization models, solution methods in optimization
- Finding initial basic feasible solutions.
- Methods of linear and non-linear (constrained and unconstrained) programming.
- Applications to engineering problems.

TEXT BOOKS:

1. S. S. Rao, "Engineering optimization": Theory and practice 3rd edition, New Age International (P) Limited, 1998.
2. H.S. Kasana & K.D. Kumar, "Introductory Operations Research Springer (India)", 2004.

REFERENCES:

1. R Fletcher, "Practical Methods of Optimization" , 2nd Edition, Wiley Publishers, 2000.
2. Jorge Nocedal and Wright S, "Numerical Optimization Springer", 1st Edition, 1999.
3. by K.V. Mital and C. Mohan, "Optimization Methods in Operations Research and systems Analysis" 3rd Edition, New Age International (P) Limited, 1996.
4. by S.D. Sharma, "Operations Research", Kedar Nath, 2012.
5. by H.A. Taha, "Operations Research", 9th Edition, An Introduction Pearson, 2010.
6. G. Hadley, "Linear Programming", Narosa, 2002.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE-I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE9901	3	0	0	3	CIA	30 M
Course Title	:	**TECHNICAL COMMUNICATION AND PRESENTATION SKILLS**					SEE	70 M

Course Objectives:

- To develop awareness in students of the relevance and importance of technical communication and presentation skills.
- To prepare the students for placements
- To sensitize the students to the appropriate use of non-verbal communication
- To train students to use language appropriately for presentations and interviews
- To enhance the documentation skills of the students with emphasis on formal and informal writin

UNIT -I

Basics of Technical Communication – Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication - LSRW Skills

– Barriers to effective communication

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of LSRW skills
- Identify and overcome the barriers to effective communication
- Realize the need and importance of technical communication

UNIT -II

Informal and Formal Conversation - Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

Learning Outcomes:

At the end of the module, the learners will be able to

- State the difference between formal and informal conversation.
- Apply the knowledge of the difference between the verbal and non-verbal communication

- Evaluate the different aspects of non-verbal communication.

UNIT -III

Written communication – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication- Art of condensation- summarizing and paraphrasing

Learning Outcomes:

At the end of the module, the learners will be able to

- Know the difference between written and spoken communication
- Apply the awareness of features of effective writing.
- Implement the understanding of summarizing and paraphrasing.

UNIT -IV

Presentation Skills – Nature and importance of oral presentation – Defining the purpose – Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing the presentation – Individual and group presentations - Handling stage fright

Learning Outcomes:

At the end of the module, the learners will be able to

- State the importance of presentation skills in corporate climate.
- Analyze the demography of the audience.
- Plan, prepare and present individual and group presentations.

UNIT -V

Interview Skills – The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

Learning Outcomes:

At the end of the module, the learners will be able to

- Identify the characteristics of the job interview.
- Understand the process of Interviews.
- Develop a positive image using strategies in answering FAQs in interviews

Course Outcomes

- Understand the importance of effective technical communication
- Apply the knowledge of basic skills to become good orators
- Analyze non-verbal language suitable to different situations in professional life
- Evaluate different kinds of methods used for effective presentation
- Create trust among people and develop employability skills

TEXT BOOKS:

1. Ashrif Rizvi, "Effective Technical Communication", TataMcGrahill, 2011
2. Meenakshi Raman &Sangeeta Sharma, "Technical Communication", 3rd Edition, O U Press 2015

REFERENCES:

1. Pushpalatha & Sanjay Kumar, "Communication Skills", Oxford Univsesity Press
2. Barron's/Books on TOEFL/GRE/GMAT/CAT/IELTS DELTA/Cambridge University Press.2012.
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications, 2011.
4. Universities Press (India) Pvt Ltd., "Management Shapers Series", Himayatnagar, Hyderabad 2008.
5. John Hughes & Andrew Mallett, "Successful Presentations" Oxford.
6. Edgar Thorpe and Showick Thorpe, "Winning at Interviews" Pearson
7. Munish Bhargava, "Winning Resumes and Successful Interviews", McGraw Hill

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0309P	0	0	3	1.5	CIA	30 M
Course Title	:	**APPLIED THERMODYNAMICS LAB**					SEE	70 M

Course Objectives:

- Understand the functioning and performance of I.C. Engines
- To find heat losses in various engines

LIST OF EXPERIMENTS

1. Demonstration of diesel and petrol engines by cut models
2. Valve timing diagram of 4-stroke diesel engine
3. Port timing diagram of 2-stroke petrol engine
4. Performance of 2-stroke single cylinder petrol engine
5. Morse test on multi cylinder petrol engine
6. Performance of 4-stroke single cylinder diesel engine
7. Performance of two stage reciprocating air compressor
8. Performance of Refrigeration system
9. Performance of Air conditioning system
10. Assembly and disassembly of diesel and petrol engines
11. Performance of heat pipe
12. Performance of heat pump
13. Exhaust gas analysis of orsat apparatus.
14. Determinations of nozzle characteristics.

Course Outcomes

Upon the successful completion of course, students will be able to

- Explain different working cycles of engine
- Describe various types of combustion chambers in ic engines
- Illustrate the working of refrigeration and air conditioning systems
- Evaluate heat balance sheet of ic engine.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0302P	0	0	3	1.5	CIA	30 M
Course Title	:	**MANUFACTURING TECHNOLOGY LAB**					SEE	70 M

Course objectives:

- Familiarize the construction and working of various machine tools.
- Teach selection of parameters for different machining processes.

Contents:

1. Demonstration of construction and operations of general purpose machines : Lathe, drilling machine, milling machine, shaper, slotting machine, cylindrical grinder and surface grinder.
2. Measure the characteristic features of lathe with simple step turning operation.
3. Job on step turning, taper turning, knurling, thread cutting on lathe machine.
4. Perform drilling, reaming and tapping operations.
5. Job on milling (Groove cutting/Gear cutting).
6. Job on shaping and planning.
7. Job on slotting.
8. Job on cylindrical and surface grinding.
9. Job on grinding of tool angles.

Course outcomes:

After completion of this course the student may be able to

- Explain the concept of machining with various machine tools.
- Get hands on experience on various machine tools and machining operations.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	PROJECT	L	T	P	C	Exam	3 Hrs
Course Code	:	19APR0101	0	0	1	0.5	CIA	50 M
Course Title	:	**SOCIALLY RELEVANT PROJECT (15 HRS / SEM)**					SEE	

1. Solid waste conversion into energy (Gasification)
2. Plastic waste into fuel.
3. Bio-gas digester.
4. Development of mechanisms for farmers.
5. Smart irrigation for saving water.
6. Mechanized water segregation.
7. Applications of solar technologies for rural purpose.
8. Power generation from wind turbine.
9. Applications of drones for agriculture.
10. Solar dryi

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester Mechanical Engineering)

Course Category	:	MANDATORY COURSE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9904	3	0	0	0	CIA	30 M
Course Title	:	**INDIAN CONSTITUTION AND SOCIETY**					SEE	

COURSE OBJECTIVES : The objective of this course is

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high cou controller and auditor general of India and Election Commission of India.
- To understand the central-state relation in financial and administrative control

UNIT-I

Introduction to Indian Constitution – Constitution -Meaning of the term - Indian Constitution- Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History and features of Indian constitution
- Learn about Preamble, Fundamental Rights and Duties

UNIT-II

Union Government and its Administration Structure of the Indian Union - Federalism - Centre- State relationship – President's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court

- Powers and Functions

Learning Outcomes:-

After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III

State Government and its Administration - Governor - Role and Position -CM and Council of ministers - State Secretariat-Organization Structure and Functions

Learning Outcomes:-

After completion of this unit student will

- Understand the structure of state government
- Analyze the role of Governor and Chief Minister
- Explain the role of State Secretariat
- Differentiate between structure and functions of state secretariat

UNIT-IV

Local Administration - District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI –Zilla Parishath - Elected officials and their roles – CEO,Zilla Parishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Learning Outcomes:-

After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration's role and importance
- Analyze the role of Mayor and elected representatives of Municipalities
- Learn about the role ofZillaParishath block level organization

UNIT-V

Election Commission - Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women

Learning Outcomes:-

After completion of this unit student will

- Know the role of Election Commission
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze the role of state election commission
- Evaluate various commissions viz SC/ST/OBC and women

Course Outcomes:

At the end of the course, students will be able to

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming goo citizen of India.
- Analyze the decentralization of power between central, state and local se government
- Apply the knowledge in strengthening of the constitutional institutions like
- CAG, Election Commission and UPSC for sustaining democracy.

TEXT BOOKS

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, "Indian Constitution", National Book Trust

REFERENCES:

1. J.A. Siwach, "Dynamics of Indian Government & Politics".
2. H.M.Sreevai, " Constitutional Law of India", 4th edition in 3 volumes (Universal Law Publication)
3. .J.C. Johari, " Indian Government and Politics", Hans India
4. M.V. Pylee, "Indian Constitution", Durga Das Basu, Human Rights in Constitutional Law, Prentice – Hall of India Pvt. Ltd.. New Delhi

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0312	2	1	0	3	CIA	30 M
Course Title	:	**DESIGN OF TRANSMISSION ELEMETS**					SEE	70 M

Course Objectives:

- Explain the various elements involved in a transmission system.
- Focus on the various forces acting on the elements of a transmission system.
- Design the system based on the input and the output parameters.
- Produce working drawings of the system involving pulleys, gears, clutches and brakes.
- Demonstrate the energy considerations in the design of motion control elements.

UNIT I

Power Transmission Elements: Design of shafts subjected to bending, torsion and axial loading. Shafts subjected to fluctuating loads using shock factors and notch sensitivity.
Design of Flexible Elements: Design of Belts - Flat Belts - V Belts - Ropes – Wire ropes– chain drives –merits and demerits – failure of chains- Design of Pulley.

Learning Outcomes:

At the end of this unit, the student will be able to

- Demonstrate the importance of bearings in the transmission system. (l2)
- Design sliding contact bearing using Somerfield number (l4)
- Solve problem on design of sliding contact bearing using McKee’s equation. (l3)
- Identify the factors required for the selection rolling contact bearings (l2)
- Choose various types of flexible power transmission systems. (l3)

UNIT II

Elements of motion control: Internal – Expanding Rim clutches and Brakes – External – Contracting Rim clutches and Brakes – Band type Clutches – Cone clutches and Brakes – Energy considerations – Temperature rise – Friction materials.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain on elements of motion control (L2)
- Outline the importance of clutches and brakes in power transmission (L2)

- Model various types of clutches and brakes. (L3)
- Solve problems on the design of clutches and brakes (L3)
- Calculate the temperature wise due to friction and select materials according. (L4)

UNIT III

Spur gear: Gear geometry – Kinematics – Forces on gear tooth – Stresses in Gear tooth – Selection of gear material based on bending stress and contact stress – Design of Spur gear – Power transmitting capacity.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain Kinematics of different types of gears. (L2)
- Predict various forces and stresses acting on the gear tooth. (L3)
- Select materials for a gear based on bending and contact stresses (L3)
- Analyze the power transmitting capacity of a gear. (L4)
- Design a spur gear (L5)

UNIT IV

Helical, bevel and worm gears: Parallel Helical Gears – Kinematics – Tooth proportions – Force analysis – Stresses in Helical gear – Design of helical gear – Crossed Helical gears – Straight Bevel gears – Kinematics – Force analysis – Stresses in straight bevel gear tooth – Design of bevel gear – Worm gearing – Kinematics – Forces - Friction and Efficiencies – Stresses in worm gear tooth.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the differences between the helical gear and a bevel gear. (l2)
- Solve problems on the design of helical gear. (l3)
- Explain the kinematics of helical, straight bevel gears and worm gears. (l3)
- Predict the various forces acting on the worm gear tooth. (l3)
- Select of helical, bevel and worm gears in power transmission (l3)

UNIT V

Design of bearing: Lubrication- hydrodynamic lubrication theory, Design of sliding contact bearing using Sommerfield number – Design using Mckee’s equation – Design of rolling contact bearing Selection of rolling contact bearings.

Learning Outcomes:

At the end of this unit, the student will be able to

- Select the speed reducers in power transmission (L3)
- Design speed reducers (L4)
- Design of multi speed gear boxes for various applications (L5)
- Draw ray diagrams of gear boxes (L4)

Course Outcomes:

At the end of this Unit the student will be able to

- Design pulleys, chain drives, rope drives and belt drives. (l5)
- Determine performance requirements in the selection of commercially available transmission drives. (l4)
- Design brakes and clutches (l4)
- Design various types of gear boxes. (l5)
- Select materials for various applications in the transmission elements. (l3)

TEXT BOOKS:

1. Joseph Edward Shigley and Charles, R. Mischke, "Mechanical Engineering Design", McGraw – Hill International Editions, 2000.
2. Robert L. Norton, "Machine Design"- an integrated approach, (5th Edition) Pearson publisher, 2000

REFERENCES:

1. "Design Data", PSG College of Technology, DPV Printers, Coimbatore, 2005.
2. Malisa, "Hand Book of Gear Design", Tata Mc Graw Hill, International Edition, 2000.
3. V.B. Bhandari , "Design of Machine Elements", Tata Mc Graw Hill, 2001.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0313T	2	1	0	3	CIA	30 M
Course Title	:	**HEAT TRANSFER**					SEE	70 M

Course Objectives

- To impart the basic laws of conduction, convection and radiation heat transfer and their applications
- To familiarize the convective heat transfer concepts
- To explain basics of radiation heat transfer
- To make conversant with the heat transfer analysis related to thermal systems like heat exchangers, evaporator, and condenser.
- To understand the phenomenon of boiling and condensation to familiarize the mass transfer process

UNIT I **10 hours**

Introduction: Basic modes of heat transfer- rate equations- generalized heat conduction equation - steady state heat conduction solution for plain and composite slabs - cylinders - critical thickness of insulation- heat conduction through fins of uniform cross section- fin effectiveness and efficiency.

Unsteady State Heat Transfer Conduction- Transient heat conduction- lumped system analysis and use of Heisler charts.

Learning Outcomes:

After completion of this unit, students will be able to

- Identify the phenomenon related to different modes of heat transfer (L1)
- Compare different types of conduction heat transfer (L2)
- Apply concept of thermal resistance and its importance in practical problems (L3)

UNIT II **9 hours**

Convection: Basic concepts of convection–heat transfer coefficients - types of convection – forced convection and free convection.

Forced convection in external flow–concepts of hydrodynamic and thermal boundary layers- use of empirical correlations for flow over plates and cylinders. Fluid friction – heat transfer analogy, approximate solution to laminar boundary layer equation for external flow. Internal flow – Use of empirical relations for convective heat transfer in horizontal pipe flow.

Free Convection -development of hydrodynamic and thermal boundary layer along a vertical plate – use of empirical relations for convective heat transfer on plates and cylinders in horizontal and vertical orientation

Learning Outcomes:

After completion of this unit, students will be able to

- Apply the convective heat transfer principles (L3)
- Use analogy between fluid friction and heat transfer (L3)
- To estimate the convention heat to differentiate between forced and free convection engineering problems. (L2)

UNIT III **7 hours**

Radiation: Radiation heat transfer – thermal radiation – laws of radiation - Black and Gray bodies – shape factor-radiation exchange between surfaces - Radiation shields - Greenhouse effect.

Learning Outcomes:

After completion of this unit, students will be able to

- Apply the principles of radiation heat transfer (L3)
- Calculate the radiation heat transfer between two bodies (L2)
- Design a radiation shield for given conditions (L3)
- Examine the effect of greenhouse gases on atmosphere (L4)

UNIT IV **7 hours**

Heat Exchangers: Types of heat exchangers- parallel flow- counter flow- cross flow heat exchangers-overall heat transfer coefficient- LMTD and NTU methods- fouling in heat exchangers.

Learning Outcomes:

After completion of this unit, students will be able to

- Understand the working of different types of heat exchangers (L2)
- Calculate the heat transfer in heat exchangers (L2)
- Design a heat exchanger for a given application (L3)

UNIT V **7 hours**

Boiling and Condensation: Different regimes of boiling- nucleate, transition and film boiling – condensation - filmwise and dropwise condensation.

Mass Transfer: Conservation laws and constitutive equations - Fick's law of diffusion, isothermal equi-mass - Equimolal diffusion- - diffusion of gases and liquids- mass transfer coefficient.

Learning Outcomes:

After completion of this unit, students will be able to

- Interpret the basic modes of condensation heat transfer (L2)
- Identify different regimes of boiling in design of boilers (L3)
- Understand the basic mechanism of mass transfer (L2)
- Differentiate between mass transfer due to convection and diffusion (L4)

Course Outcomes

At the end of the course, the student will be able to

- Apply the concepts of different modes of heat transfer. (l3)
- Apply knowledge of conduction heat transfer in the design of insulation of furnaces and pipes. (l3)
- Analyse free and forced convection phenomena in external and internal flows. (l4)
- Design of thermal shields using the concepts of black body and non-black body radiation. (l5)
- Apply the basics of mass transfer for applications in diffusion of gases. (l3)

Text Book(s)

1. P.K. Nag, “Heat Transfer”, 3rd edition, Tata McGraw-Hill, 2011.
2. S.P. Sukhatme, “A Textbook of Heat Transfer”, Universities Press, TMH publications 2005

References:

1. J.P.Holman, “Heat Transfer”, 9th edition, Tata McGraw-Hill,2008.
2. Cengel. A.Yunus, “Heat Transfer”, A Practical Approach, 4th edition, Tata McGraw-Hill, 2007.
3. Lienhard and Lienhard, “A Heat and Mass Transfer”, Cambridge Press, 2011.
4. C.P. Kothandaraman and S. Subramanyan, “Heat and Mass Transfer databook”, New Age Publications, 2014

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0314	2	1	0	3	CIA	30 M
Course Title	:	**OPERATIONS RESEARCH**					SEE	70 M

Course Objectives:

- To impart the basic concepts of modeling, models and statements of the operations research.
- Formulate and solve linear programming problem/situations.
- Model strategic behaviour in different economic situations.
- To solve transportation problems to minimize cost.
- Apply Queuing theory to solve problems of traffic congestion, counters in banks, railway bookings etc.
- Explain scheduling and sequencing of production runs and develop proper replacement policies.

UNIT I

Introduction to Operations Research (OR): OR definition - Classification of Models, modeling – Methods of solving OR Models, limitations and applications of OR models

Linear Programming(LP): Problem Formulation, Graphical Method, Simplex Method, Big-M Method, Two–Phase Simplex Method, Special Cases of LP- Degeneracy, Infeasibility and Multiple Optimal Solutions; Concept of dual theorem

Learning Outcomes:

At the end of this unit, the student will be able to

- Formulate practical problems given in words into a mathematical model. (l6)
- Quantify or models to solve optimization problems. (l5)
- Formulate linear programming problems and appreciate their limitations. (l6)

UNIT II

Transportation and Assignment Problems: Transportation Problem – Formulation; Different Methods of Obtaining Initial Basic Feasible Solution –North West Corner Rule, Least Cost Method, Vogel's Approximation Method; Optimality Method – Modified Distribution (MODI) Method; Special Cases – Unbalanced Transportation Problem, Degenerate Problem. Assignment
Problem – Formulation, Hungarian Method for Solving Assignment Problems, Traveling Salesman problem.

Learning Outcomes:

At the end of the this unit, the student will be able to

- Model linear programming problems like the transportation. (l3)
- Solve the problems of transportation from origins to destinations with minimum time and cost. (l6)

UNIT III

Game theory: Optimal solution of two person zero sum games, the max min and min max principle. Games without saddle points, mixed strategies. Reduction by principles of dominance, arithmetic, algebraic method and graphical method.
Sequencing: Introduction to Job shop Scheduling and flow shop scheduling, Solution of Sequencing Problem, Processing of n Jobs through two machines, Processing of n Jobs through m machines, graphical method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify strategic situations and represent them as games. (l3)
- Solve simple games using various techniques. (l6)
- Solve problems of production scheduling and develop inventory policies. (l6)

UNIT IV

Queuing Theory: Introduction – Terminology, Arrival Pattern, Service Channel, Population, Departure Pattern, Queue Discipline, Birth & Death Process, Single Channel Models with Poisson Arrivals, Exponential Service Times with finite queue length and non-finite queue length; Multichannel Models with Poisson Arrivals, Exponential Service Times with finite queue length and non finite queue length.

Learning Outcomes:

At the end of this unit, the student will be able to

- Model a dynamic system as a queuing model to compute performance measures. (l3)
- Apply optimality conditions for single- and multiple-variable constrained and unconstrained nonlinear optimization problems. (l3)

UNIT V

Replacement and Maintenance Analysis: Introduction – Types of Maintenance, Make or buy decision. Types of Replacement Problems, Determination of Economic Life of an Asset, and Simple Probabilistic Model for Items which completely fail-Individual Replacement Model, Group Replacement Model.
Dynamic Programming (DP): Introduction –Bellman's Principle of Optimality – Applications of Dynamic Programming – Capital Budgeting Problem – Shortest Path Problem – Solution of Linear Programming Problem by DP.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve problems using dynamic programming. (l3)
- Apply the concept of replacement model. (l3)

Course Outcomes:

At the end of the course, the student will be able to

- Develop mathematical models for practical problems. (l3)
- Apply linear programming to transportation problems. (l3)
- Solve games using various techniques. (l3)
- Solve production scheduling and develop inventory policies. (l6)
- Apply optimality conditions for constrained and unconstrained nonlinear problems. (l3)
- apply dynamic programming methods. (L3)

Text books:

1. Sharma S.D., “Operations Research: Theory, Methods and Applications”, 15th Edition, Kedar Nath Ram Nath, 2010
2. Taha H.A., “Operations Research”, 9th Edition, Prentice Hall of India, New Delhi, 2010.

Reference books:

1. Hiller F.S., and Liberman G.J., “Introduction to Operations Research”, 7th Edition, Tata McGraw Hill, 2010.
2. Sharma J.K., :Operations Research: Theory and Applications”, 4th Edition, Laxmi Publications, 2009.
3. Prem kumar Gupta and Hira, “Operations Research”, 3rd Edition, S Chand Company Ltd., New Delhi, 2003.
4. Pannerselvam R., “Operations Research”, 2nd Edition, Pentice Hall of India, New Delhi, 2006.
5. Sundaresan.V, and Ganapathy Subramanian.K.S, “Resource Management Techniques: Operations Research”, A.R Publications, 2015.

Web References:

http://www2.informs.org/Resources/
http://www.mit.edu/~orc/
http://www.ieor.columbia.edu/
http://www.universalteacherpublications.com/univ/ebooks/or/Ch1/origin.htm
http://www.wolfram.com/solutions/OperationsResearch/
http://nptel.iitm.ac.in/video.php?subjectId=112106134
http://www.youtube.com/watch?feature=player_detailpage&v=ug7O1lSZyg0
http://www2.ensc.sfu.ca/undergrad/courses/ENSC201/Unit09/lecture9.html
http://pakaccountants.com/what-is-depreciated-replacement-cost/
http://www.youtube.com/watch?feature=player_detailpage&v=H58TPQNr2kM
http://www.youtube.com/watch?feature=player_detailpage&v=h0bdo06qNVw
http://www.youtube.com/watch?feature=player_detailpage&v=xGkpXk-AnWU#t=104s
http://nptel.iitm.ac.in/video.php?subjectId=112106134,
http://www. Math.harvard.edu/archive/20_spring_05/handouts

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0306	3	0	0	3	CIA	30 M
Course Title	:	**ALTERNATIVE FUELS AND EMISSION CONTROL**					SEE	70 M

Course Objectives:

The main objectives of this course are to make the student

- Explain various alcohol and gaseous fuels and their use in SI and CI engines.
- Discuss various vegetable oils and their use in CI engines.
- Determine the formation of various emissions from SI engine and control techniques.
- Identify various emission measuring instruments and test procedures.

UNIT I

Alcohol fuels and gaseous fuels: Properties of alcohols, alcohol – gasoline blends, fuel flexible vehicle, methanol reformed gas engine, dual fuel system, Spark assisted diesel engine, surface ignition engine, ignition accelerators, performance, combustion and emission characteristics in SI and CI engines, Properties of Hydrogen, production and storage methods, safety precautions, biogas production and its properties, properties of LPG and CNG, Performance, combustion and emission characteristics of hydrogen, biogas, LPG and CNG in SI and CI engines

Learning Outcomes:

At the end of this unit, the student will be able to

- The properties of alcohols and alcohol gasoline blends (L5)
- Explain the principles of spark assisted diesel engine and surface ignition engine.(l3)
- Identify the performance, combustion and emission characteristics in si and ci engines.(l3)
- Explain production, storage methods and emission characteristics of hydrogen. (l3)

UNIT II

Vegetable oils: Various vegetable oils for diesel engines, structure and properties, problems in using vegetable oils in diesel engines, Methods to improve the engine performance using vegetable oils – preheating, Esterification , blending with good secondary fuels, Semi-adiabatic engine, surface ignition engine, ignition accelerators dual fuelling with gaseous and liquid fuels coils, Performance, combustion and emission characteristics of biodiesel fuelled diesel engines.
At the end of this unit, the student will be able to

- List various vegetable oils and its properties used for diesel engines (L1)
- Identify the problems in using vegetable oils in diesel engines.(L3)
- Explain the methods to improve the engine performance using vegetable oils.(L3)
- Explain the method of blending with good secondary fuels. (L3)

- Determine the performance, combustion and emission characteristics of biodiesel fuelled diesel engine (L3)

UNIT III

Emissions from SI engines and their control: Emission formation in SI engines (CO, HC and NOx), Effect of design and operating variables on emission formation, Control techniques – Thermal reactor, exhaust gas recirculation, Three way catalytic convertor and Charcoal canister control for evaporative emission, Positive crank case ventilation for blow by gas control.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain emission formation in SI engines. (L3)
- Practice the effect of design and operating variables on emission formation in SI engine.(L5)
- Classify various control techniques on SI engine emission formation.(L2)
- Choose a control technique for a given application (L1)
- Explain on positive crank case ventilation for blow by gas control. (L3)

UNIT IV

Emissions from CI engines and their control: Emission formation in CI engines (HC, CO, NOx, Aldehydes, Peroxides, hydroxides smoke and particulates), Effect of design and operating variables on emission formation, Control techniques – Exhaust gas recirculation, NOx selective catalytic reduction, Diesel oxidation catalytic convertor, Diesel particulate filter, NOx versus particulates – Trade off

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain emission formation in CI engines (L3)
- Appraisethe effect of design and operating variables on emission formation in CI engine.(L5)
- Explain various control techniques on CI engine emission formation. (L3)
- Choose a control technique for a given application (L1)

Emission measuring instruments and test procedures: Principle of operation of emission measuring instruments used in SI and CI engines, Measurement of CO_2 and CO by NDIR, Hydrocarbon emission by FID, Chemiluminescent analyser for NOx, Liquid and Gas chromatograph Spot sampling and continuous indication type smoke meters (Bosch, AVL and Hartridge smoke meters) emission test procedures – FTP, Euro and Bharat norms

Lerning Outcomes:

At the end of this unit, the student will be able to

- Classify various emission measuring instruments for SI and CI engines (L2)
- Apply the principle of operation of emission measuring instruments used in SI and CI engines

(L3)

- Explain the method of measurement of CO_2 and CO by NHIR (L3)
- Identify the emission of hydrocarbons using FID (L3)

Course Outcomes:

At the end of this course, the student will be able

- Identify various emissions from SI and CI engines (L3)
- Explain the properties of alcohol fuels and gaseous fuels. (L3)
- Predict the problems by using vegetable oils in diesel engines (L6)
- Choose the use of various emission measuring instruments (L3)

Text book

1. Thipse.S.S, “Alternative Fuels: Concepts, Technologies and Developments”, Jaico Publishing House, 2010.
2. Ganesan V, “ Internal combustion engines”, 4th Edition, Tata McGraw Hill Education, 2012

Reference books

1. Michael F. Hrdeski, “Alternative Fuels: The Future of Hydrogen”, The Fairmont Press, 2008
2. R.K.Rajput, “A textbook of Internal Combustion Engines”, 2nd Edition, Laxmi Publications, 2007
3. “Society of Automotive Engineers”, Alternative Fuels: Fuel Cells and Natural Gas, Society of Automotive Engineers, Incorporated, 2000

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

			L	T	P	C		
Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0310	3	0	0	3	CIA	30 M
Course Title	:	**SIMULATION AND MODELLING OF MANUFACTURING SYSTEMS**					SEE	70 M

Course Objectives:

- Explain the concept of modeling and simulation of manufacturing systems.
- Familiarize manufacturing simulation languages.
- Describe the various approaches to analyze the output data.
- Impart knowledge applications of simulation.
- Expose the students G P S S, SIMAN and SIMSCRIPT.

UNIT – I

System – ways to analyze the system – Model – types of models – Simulation – Definition – Types of simulation models – steps involved in simulation – Advantages & Disadvantages. Parameter estimation – estimator – properties – estimate – point estimate – confidence interval estimates – independent – dependent – hypothesis – types of hypothesis- steps – types 1& 2 errors – Framing – strong law of large numbers.

Learning Outcomes:

At the end of this Unit the student will be able to

- Implement various steps involved in simulation process.(l5)
- Illustrate the advantages and disadvantages of simulation process.(l2)
- List the various types of hypothesis. (l1).
- Apply simulation models to manufacturing systems. (l2)

UNIT – II

Building of Simulation model – validation – verification – credibility – their timing – principles of valid simulation Modeling – Techniques for verification – statistical procedures for developing credible model. Modeling of stochastic input elements – importance – various procedures – theoretical distribution – continuous – discrete – their suitability in modeling.

Learning Outcomes:

At the end of this Unit the student will be able to

- Build the simulation model for manufacturing systems. (l6)
- Apply statistical procedures for developing credible model.(l2)
- Describe modeling of stochastic input elements.(l2)
- Appraise the importance of stochastic input elements. ((l5)
- Illustrate the principles of valid simulation modeling. (l2)

UNIT – III

Generation of random variates – factors for selection – methods – inverse transform – composition – convolution – acceptance – rejection – generation of random variables – exponential – uniform – weibull – normal Bernoullie – Binomial – uniform – poisson. Simulation languages – comparison of simulation languages with general purpose languages – Simulation languages vs Simulators – software features – statistical capabilities – G P S S – SIMAN- SIMSCRIPT –Simulation of M/M/1 queue – comparison of simulation languages.

Learning Outcomes:

At the end of this Unit the student will be able to

- List the various factors for selection of random variates.(l1)
- Explain how random variables can be generate. (l2)
- Compare various simulation languages used for generation of random varients.(l2)
- Select appropriate simulation software's like., gpss, siman-simscript etc,.(l3)

UNIT – IV

Output data analysis – Types of Simulation w.r.t output data analysis – warmup period- Welch algorithm – Approaches for Steady – State Analysis – replication – Batch means methods – comparisons

Learning Outcomes:

At the end of this Unit the student will be able to

- Analyze the output data in manufacturing system.(l4)
- Illustrate the types of simulation w.r.t output data analysis.(l2)
- List the approaches for steady of output data.(l1)
- Explain Welch algorithm for analyze the output data. (L2)

UNIT –V

Applications of Simulation – flow shop system – job shop system – M/M/1 queues with infinite and finite capacities – Simple fixed period inventory system – Newboy paper problem.

At the end of this Unit the student will be able to

- Illustrate the applications of simulation in manufacturing systems. (l2)
- Explain simple fixed period inventory system. (l2)
- Describe flow shop and job shop systems. (l2)
- Solve the manufacturing problems using newboy paper method. (l3)

Course outcomes:

After successful completion of the course, the student will be able to

- Summarizes the various approaches to modelling and simulation of manufacturing systems. (l2)
- Outline the concepts of output data analysis.(l2)
- Identify various software languages for simulation of manufacturing systems.(l3)

TEXT BOOKS:

1. Banks J. & Carson J.S., PH, “Discrete Event System Simulation”, Englewood Cliffs, NJ, 1984
2. Law, A.M. & Kelton, “Simulation Modelling and Analysis”, McGraw Hill, 2nd Edition, New York, 1991.
3. Narahari and M. Vishwanathan Prentice hall England wood Cliffs, “Performance modelling of automated manufacturing systems”. NJ USA 1992.

REFERENCES:

1. Carrie A. / Wiley, NY, “Simulation of Manufacturing Systems”, 1990.
2. Ross, S.M., McMillan, NY, “A Course in Simulation”, 1990. Simulation Modelling and SIMNET / Taha H.A / PH, Englewood Cliffs, NJ, 1987.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0307	3	0	0	3	CIA	30 M
Course Title	:	**MECHANICAL BEHAVIOUR OF MATERIALS**					SEE	70 M

Course Objectives:

The objectives of the course are to

- Explain the structure of material over the effects of mechanical properties.
- Familiarize the defects inside the structure and their effects on the mechanical properties.
- Train the methods for characterization of the mechanical behavior of materials.
- Impart knowledge about strengthening mechanisms of materials.
- Teach mechanisms of failures of materials (fracture, fatigue and creep) and their relationship with the different types of stress.

UNIT – I

Elastic and plastic behavior: Elastic behavior of materials – Hooke's law, plastic behavior: dislocation theory – Burger's vectors and dislocation loops, dislocations in FCC, HCP and BCC lattice, stress fields and energies of dislocations, forces on and between dislocations, slip and twinning.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the elastic behavior of engineering materials.(l2)
- Recall Hooke's law. (l1)
- Explain the dislocation theory. (l2)
- Identify the dislocations in fcc, hcp and bcc lattice (l3)
- Determine the forces on and between dislocations.(l3)

UNIT – II

Strengthening mechanisms: Cold Working, Grain Size Strengthening, Solid Solution Strengthening, Martensitic Strengthening, Precipitation Strengthening, Dispersion Strengthening, Fibre Strengthening, Examples. Yield Point Phenomenon, Strain aging and Dynamic strain aging.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe various strengthening mechanisms.(l2)
- Discuss grain size strengthening and solid solution strengthening.(l6)
- Apply dispersion strengthening and fibre strengthening.(l2)
- Differentiate strain aging and dynamic strain aging.(l3)

UNIT – III

Fracture and fracture mechanics: Types of Fracture, Basic Mechanism of Ductile and Brittle Fracture, Griffith's Theory of Brittle Fracture, Ductile to Brittle Transition Temperature (DBTT),
Factors Affecting DBTT, Determination of DBTT. Fracture Mechanics-Introduction, Modes of Fracture, Stress Intensity Factor, Strain Energy Release Rate, Fracture Toughness and Determination of K_{IC}.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the basic mechanism of ductile and brittle fracture. (l2)
- Identify importance of griffith's theory.(l3)
- Predict factors effecting on dbtt.(l6)
- Classify various modes of fracture.(l1)

UNIT - IV

Fatigue behaviour and testing: Stress Cycles, S-N Curves, Effect of Mean Stress, Factors Affecting Fatigue, Structural Changes Accompanying Fatigue, Cumulative Damage, HCF / LCF, Thermo-mechanical Fatigue, Application of Fracture Mechanics to Fatigue Crack Propagation- Paris law- Fatigue Testing Machines.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain fatigue behavior and testing. (l2)
- Draw the s-n curves for different materials. (l1)
- Discuss the factors affecting fatigue. (l6)
- Apply fracture mechanics in design. (l2)

UNIT - V

Creep behavior and testing: Creep Curve, Stages in Creep Curve and Explanation, Structural Changes during Creep, Creep Mechanisms, Metallurgical Factors Affecting Creep, High Temperature Alloys, Stress Rupture Testing, Creep Testing Machines.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify various stages in creep curve.(l3)
- Determine various structural changes during creep.(l4)
- Predict the metallurgical factors affecting creep.(l6)
- Demonstrate various creep testing machines.(l2)

Course outcomes:

After successful completion of this course, the student will be able to

- Apply materials based on their structure and failure modes.(l2)
- Characterize materials using different machines.(l3)
- Summarize the various strengthening mechanisms with suitable examples.(l2)
- Identify the creep in different materials and its influence in selection of materials.(l3)

Text books:

1. Dieter, G.E., "Mechanical Metallurgy", McGraw-Hill, SI Edition, 1995.
2. Davis. H. E., Troxell G.E., Hauck.G. E. W., "The Testing Of Engineering Materials", McGraw-Hill, 1982.

References:

1. Wulff, The Structure and Properties of Materials, Vol. III "Mechanical Behavior of Materials", John Wiley and Sons, 1983.
2. Honey Combe R. W. K., "Plastic Deformation of Materials", Edward Arnold Publishers, 1984.
3. Suryanarayana, A. V. K., "Testing of Metallic Materials", Prentice Hall India, 1979.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0309	3	0	0	3	CIA	30 M
Course Title	:	**REFRIGERATION & AIR CONDITIONING**					SEE	70 M

Course Objective:

- Provides insights in how thermodynamic principles are applied within the refrigeration and air conditioning industry.
- Introduce the students how real systems used in commercial, industrial refrigeration and air conditioning industries are built-up.
- Expose the students on various refrigeration methods like vcr, var and latest developments.
- Know the various air conditioning methods like summer, winter and year round air conditioning and to make the student to understand the practical applications of refrigeration and air conditioning systems.

UNIT I

INTRODUCTION TO REFRIGERATION: Necessity and Applications, Carnot Refrigerator, First and Second Law Applied to Refrigerating Machines, Unit of Refrigeration, COP, EER, Different Refrigeration Methods.
AIR REFRIGERATION: Bell-Coleman Cycle, Ideal and Actual Cycles, Open and Dense Air Systems - Numerical Problems - Refrigeration Needs of Air Crafts.

Learning Outcomes:

At the end of this unit the student will be able to

- Explain the terminologies associated with refrigeration. (l2)
- Describe the first and second law applied to refrigerating machines.(l2)
- Demonstrate the bell-coleman cycle in air refrigeration. (l2)
- Identify the various refrigeration cycles.

UNIT II

Vapour Compression Refrigeration (VCR) System - Basic Cycle - Working Principle and Essential Components of The Plant - COP - Representation of Cycle On T-S and P-h Charts - Expander Vs. Throttling, Effect of Sub Cooling and Super Heating - Cycle Analysis - Actual Cycle- Influence of Various Parameters on System Performance - Construction and Use of P-h Charts - Numerical Problems. Refrigerants - Desirable Properties - Classification of Refrigerants Used - Nomenclature- Secondary Refrigerants- Lubricants - Ozone Depletion - Global Warming- Newer Refrigerants.

Learning Outcomes:

At the end of this unit the student will be able to

- Appraise the importance of vapour compression refrigeration system. (l5)
- Draw the t-s and p-h charts for representation of cycle.(l1)
- Classify various refrigerants used in vapour compression refrigeration systems. (l1)
- Model the numerical problems on refrigeration cycles. (l3)
- Demonstrate the influence of various parameters on system performance. (l2)

UNIT - III

VAPOR ABSORPTION REFRIGERATION (VAR) SYSTEM- Description and Working of NH_3 - Water System and Li Br -Water (Two Shell & Four Shell) System -Calculation of Max COP, Principle of Operation of Three Fluid Absorption System

STEAM JET REFRIGERATION SYSTEM: Working Principle and Basic Components- Estimation of Motive Steam Unconventional refrigeration systems - Principle and Operation of: (i)Thermo-Electric Refrigerator (ii) Vortex Tube OrHilsch Tube (iii) Acoustic refrigeration system.

Learning Outcomes:

At the end of this unit the student will be able to

- Appraise the importance of vapour absorption refrigeration system. (l5)
- Identify the latest developments of electrolux, thermo electric vortex tube methods.. (l3)
- Illustrate the working of various components of steam jet refrigeration system.(l2)
- Estimate the motive steam required for steam jet refrigeration system.(l6)
- Describe the working principle of themo- electric refrigerator and bortex tube refrigerator.(l2)

UNIT IV

INTRODUCTION TO AIR CONDITIONING: Psychrometric Properties & Processes - Characterization of Sensible and Latent Heat Loads -- Need For Ventilation, Consideration of Infiltrated Air - Heat Load Concepts.

AIR CONDITIONING SYSTEMS: Air Cooler (Evaporative Cooling) ,Window, Split, Summer

, Winter, Year Round, Central Air Conditioning Systems.

Learning Outcomes:

At the end of this unit the student will be able to

- Illustrate the psychrometric properties & processes. (l2)
- Select the air conditioning systems for different realistic situations. (l6)
- Define the terms sensible heat load and latent heat load. (l1)
- Draw the psychrometric charts for various air conditioning environments.(l1)

UNIT V

Air Conditioning Equipment - Humidifiers - Dehumidifiers - Air Filters, Fans and Blowers. **HUMAN COMFORT:** Requirements of Temperature, Humidity And Concept of Effective Temperature, Comfort Chart. Heat Pump - Heat Sources - Different Heat Pump Circuits.

Learning Outcomes:

At the end of this unit the student will be able to

- Appraise the importance of humidifiers and dehumidifiers. (l5)
- Select the requirements of temperature and humidity for human comfort. (l6)
- Demonstrate the heat pump working and its components. (l2)
- List the various air conditioning equipments. (l1)

Course Outcomes

After completing the course, the student will be able to

- Summarize the various refrigeration and air conditioning equipments and it'sworking.
- Apply the basic knowledge to operate the refrigeration systems.
- Evaluate the cop for vapour absorptionsystem.

TEXT BOOKS:

1. CPArora, "Refrigeration and Air Conditioning" , TMH, 15th edition, 2013.
2. S.CArora&Domkundwar, "A Course in Refrigeration and Air conditioning", Dhanpatrai

REFERENCE BOOKS:

1. Manohar Prasad, " Refrigeration and Air Conditioning", New Age, 2nd edition, 2013
2. Dossat, " Principles of Refrigeration", Pearson Education, 4th edition,2007
3. P.L.Ballaney, "Refrigeration and Air Conditioning", 2nd edition, 2012.
4. P.N.Ananthanarayanan / TMH, "Basic Refrigeration and Air-Conditioning", 4th edition, 2013.

NOTE: Tables/Codes: Thermal Engineering Data Book containing refregerent and Psychrometricproperty Tables and charts are permitted inExam

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0308	3	0	0	3	CIA	30 M
Course Title	:	**PRODUCT MARKETING**					SEE	70 M

Course Objectives:

- Introduce the basic concepts of Product marketing.
- Familiarize with market information systems and research
- Understand the nature and importance of industrial market
- Discuss the major stages in new product development
- Identify the factors affecting pricing decisions

UNIT I:

Introduction (7 Hours)

Historical development of marketing management, Definition of Marketing, Core marketing concepts, Marketing Management philosophies, Micro and Macro Environment, Characteristics affecting Consumer behaviour, Types of buying decisions, buying decision process, Classification of consumer products, Market Segmentation Concept of Marketing Myopia. Importance of marketing in the Indian Socio economic system.

Learning Outcomes:

At the end of this student, the student will be able to

- Define Marketing. (L1)
- Discuss marketing philosophies. (L2)
- Sketch the buying decision process. (L3)
- Understand the importance of marketing in the Indian socio economic system. (L2)

UNIT II:

Marketing of Industrial Products (6 Hours)

Components of marketing information system–benefits & uses marketing research system, marketing research procedure, Demand Estimation research, Test marketing, Segmentation Research - Cluster analysis, Discriminate analysis. Sales forecasting: objective and subjective methods. Nature and importance of the Industrial market, classification of industrial products,
participants in the industrial buying process, major factors influencing industrial buying behavior, characteristics of industrial market demand. Determinants of industrial market demand Buying power of

Industrial users, buying motives of Industrials users, the industrial buying process, buying patterns of industrial users.

Learning Outcomes:

At the end of this student, the student will be able to

- Identify the components of marketing information system. (L2)
- List the advantages and uses of marketing research system. (L1)
- Demonstrate sales forecasting. (L3)
- Explain the major factors influencing industrial buying behaviour. (L2)

UNIT III:

Product Management And Branding (7 Hours)

The concept of a product, features of a product, classification of products, product policies – product planning and development, product line, product mix – factors influencing change in product mix, product mix strategies, meaning of "New – product; major stages in new – product development product life cycle. Branding: Reasons for branding, functions of branding features of types of brands, kinds of brand name.

Learning Outcomes:

At the end of this student, the student will be able to

- Indentify the factors influencing change in product mix. (L2)
- Sketch various stages in product life cycle. (L2)
- Recall the features of a product and product policies. (L1)
- Demonstrate on features, functions and reasons of branding. (L3)

UNIT IV:

Pricing and Packaging (7Hours)

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions Labeling: Types, functions advantages and disadvantages, Packaging**:** Meaning, growth of packaging, function of packaging, kinds of packaging.

Learning Outcomes:

At the end of this student, the student will be able to

- List the factors affecting pricing decisions. (L1)
- Explain the procedure for price determination. (L2)
- Employ Pricing strategies and decisions. (L3)
- Understand the functions of labelling and packaging. (L2)

UNIT V:

Product Promotion (6Hours)

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions. Advertising and sales promotion**:** Objectives of advertisement function of advertising, classification of advertisement copy, advertisement media – kinds of media, advantages of advertising. Objectives of sales promotion, advantages sales promotion. Personal Selling **:** Objectives of personal selling, qualities of good salesman, types of salesman, major steps in effective selling

Learning Outcomes:

At the end of this student, the student will be able to

- Discuss the procedures for price determination. (L2)
- Explain the objectives of advertisement function of advertising. (L2)
- List the advantages and disadvantages of advertising. (L1)
- Describe the major steps in effecting selling. (L2)

Course Outcomes:

At the end of the course, the student will be able to

- Understand basic marketing management concepts and their relevance to business development. (L2)
- Prepare a questionnaire for market research. (L5)
- Design marketing research plan for business organizations. (L5)
- Optimize marketing mix to get competitive advantage. (L4)

Text Books:

1. Philip Kotler, “Principles of Marketing”, Prentice – Hall.
2. Philip Kotler, “Marketing Management”, Prentice – Hall.

Reference Books:

1. Wiliam J Stanton, “Fundamentals of Marketing”, McGraw Hill
2. R.S.N. Pillai and Mrs.Bagavathi, “Marketing”, S. Chand & Co. Ltd
3. Rajagopal, “Marketing Management Text & Cases”, Vikas Publishing House

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0104	3	0	0	3	CIA	30 M
Course Title	:	**INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT**					SEE	70 M

Course Objectives:

- To teach Health and Environment Concerns in waste water management
- To teach material balance and design aspects of the reactors used in waste water treatment.
- To impart knowledge on selection of treatment methods for industrial waste water
- To teach common methods of treatment in different industries
- To provide knowledge on operational problems of common effluent treatment plant

UNIT –I

Industrial water Quantity and Quality requirements:

Boiler and cooling waters–Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills Selection of source based on quality, quantity and economics. Use of Municipal wastewater in Industries – Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, Elutriation, Removal of Colour, Odour and Taste.

Learning Outcomes:

At the end of the unit, students will be able to:

- Learn the procedures for assessment of quality of Industrial water
- Suggest different processes of handling waste water

UNIT –II

Basic theories of Industrial Wastewater Management: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis -Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction – Neutralization and Equalization, Segregation and proportioning- recycling, reuse and resources recovery

Learning Outcomes:

At the end of the unit, students will be able to:

- Measure industrial waste water flow
- Characterize waste water
- Suggest techniques for treatment of waste water.

UNIT –III

Industrial wastewater disposal management: Discharges into Streams, Lakes and oceans and associated problems, Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand options for waste water disposal.
- Explain functioning of common effluent treatment plants

UNIT – IV

Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand the character of waste water from Steel plants and refineries
- Suggest suitable waste water treatment techniques

UNIT – V

Process and Treatment of specific Industries-2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Pharmaceutical Plants

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand the character of waste water from tanneries and distilleries
- Suggest suitable waste water treatment techniques

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Design treatment methods for any industrial wastewater.
- Examine the manufacturing process of various industries.
- Assess need for common effluent treatment plant for an industry
- Test and analyze BOD, COD, TSS and MPN in waste water.

TEXT BOOK

1. M. N. Rao and A. K. Dutta, “Wastewater Treatment”, Oxford & IBH, New Delhi.
2. K.V. S. G. Murali Krishna, “Industrial Water and Wastewater Management”.

REFERENCES

1. A. D. Patwardhan, “Industrial Wastewater treatment”, PHI Learning, Delhi
2. Metcalf and Eddy Inc., “Wastewater Engineering”, Tata McGraw Hill co., New Delhi.
3. G. L. Karia & R.A. “Christian Wastewater Treatment- Concepts and Design Approach”, Prentice Hall of India.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0103	3	0	0	3	CIA	30 M
Course Title	:	**BUILDING SERVICES AND MAINTAINANCE**					SEE	70 M

Course Objectives:

- To impart knowledge in concepts of building maintenance
- To insists the student to observe various practices of good building maintenance
- To teach the importance safety in buildings
- To demonstrate the use of ventilation in buildings.
- To give the list of different types of machineries in buildings

UNIT – I

PLUMBING SERVICES: Water supply system- fixing of pipes in buildings – maintenance of buildings- water meters-sanitary fittings-design of building drainage- gas supply systems

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand water supply system
- Understand the building drainage system.

UNIT – II

VENTILATION: Necessity of ventilation – functional requirements – systems of ventilation-natural ventilation-artificial ventilation-air conditioning-systems of air conditioning-essentials of air conditioning-protection against fire caused by air conditioning systems.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand concepts of ventilation
- Understand concepts of air conditioning

UNIT – III

THERMAL INSULATION: Heat transfer system-thermal insulating materials-methods of thermal insulation-economics of thermal insulation-thermal insulation of exposed walls, doors,windows and roofs.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand methods of insulation
- Understand materials of insulation

UNIT – IV

FIRE SAFETY: Causes of fire in buildings-fire safety regulations-charecteristics of fire resisting materials- fire resistant construction-heat and smoke detecters-fire alarms-fire fighting pump and water storage.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand safety regulations of fire system
- Know about the implementation and usage of various fire resistant materials in building construction

UNIT – V

MACHINERIES IN BUILDINGS: Lifts-essential requirements-design considerations- escalators-essential requirements-electrical installations in buildings-lighting in buildings-methods of electrical wiring-earthing

Learning Outcomes:

At the end of the unit, students will be able to:

- Understanding of different machineries of buildings
- Understanding of electrical installation of buildings

Course Outcomes:

Student will be able to understand

- Concepts of plumbing, drainage system and gas supply system
- Concepts of ventilation and air conditioning
- Concepts of thermal insulation and economics of thermal insulation
- Concepts of fire safety in buildings and fire resistant construction
- Concepts of different machineries of buildings

TEXT BOOKS:

1. B.C.Punmia, Er. Ashok K jain, Arun K Jain "Building construction", Laxmi publications pvt.ltd. New Delhi.
2. Janardhan Jah, S.K Sinha, "Building construction", Khanna publishers
3. Rangwala, "Building construction", Charothar publishing house.

REFERENCE BOOKS:

1. David V Chaddrton, "Building services engineering", Outledge
2. P.C Varghees "Building construction", Printice hall india

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

			L	T	P	C		
Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0304	3	0	0	3	CIA	30 M
Course Title	:	**INDUSTRIAL AUTOMATION**					SEE	70 M

Course Objectives:

- To understand the basic concepts of Automation
- To understand the concepts of automation cycle and hardware components
- To gain knowledge about pneumatic and hydraulic devices
- To understand the concepts of sensors and actuators
- To know the use of Robotics used in industries automation

UNIT -I:

Introduction to Automation

Definition and fundamentals of automation, reasons for Automating, basic elements of an automated system: Power, Program and control system, safety, maintenance & repair diagnosis, error detection and recovery, Automation principles and strategies: USA principle, strategies of automation and production system, automation migration strategy

Learning Outcomes:

At the end of the unit, students will be able to:

- To understand the fundamental concepts of automation and its basic elements
- To understand system safety requirements
- To understand about maintenance and repair strategies
- To know about production system automation

UNIT- II:

Mechanization and Automation

Basic principles of Mechanization and automation, product cycle, hard Vs flexible automation, Capital-intensive Vs low cost automation. Types of systems-mechanical, electrical, hydraulic, pneumatic and hybrid systems, Automation using CAMS, Geneva mechanisms, gears etc.
Assembly line Automation: automated assembly systems, transfer systems, vibratory bowl feeders, non-vibratory feeders, part orienting, feed track, part placing & part escapement systems. Introduction to Material storage/ handling and transport systems, and its automation using AS/RS, AGVS and conveyors etc.

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about how to analyse the various automation methods
- To know about assembling and placing of various parts
- To distinguish between mechanization and automation of systems
- To know about material storage, handling and automation using various approaches

UNIT -III:

Pneumatics and hydraulics

Hydraulic and pneumatic devices-Different types of valves, Actuators and auxiliary elements in Pneumatics & hydraulics , their applications and use of their ISO symbols. Synthesis and design of circuits (up to 3 cylinders)–pneumatic, electro pneumatics and hydraulics. Design of Electro- Pneumatic Circuits using single solenoid and double solenoid valves; with and without grouping.

Learning Outcomes:

At the end of the unit, students will be able to:

- To know design of various pneumatic and hydraulic components
- To understand about synthesis and design of Pneumatic circuits
- To understand about electro pneumatic circuits
- To design using various solenoid valves with and without grouping

UNIT -IV:

Sensors & Actuators Sensors

Selection of sensors (Displacement, temperature, acceleration, force /pressure) based on static and dynamic characteristics. Interfacing: Concept of interfacing, bit accuracy and sampling speed, amplifying electronics, and microcontroller. Actuators: Principle and selection of electro mechanical actuators (1) DC motors (2) Stepper Motors (3) Solenoid Actuators (4) Servo Motors

(5) BLDC

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about selection of sensors and actuators based on dynamic characteristics
- To understand about necessity of interfacing sensors with Microcontroller
- To understand principle and selection of actuators
- To apply various electro mechanical actuators to certain machines

UNIT- V:

Robots and their applications

Introduction to robots, Types, Classifications, Selection of robots, Robot Degrees of freedom, Robot configuration, Accuracy and repeatability, Specification of a robot, Robot feedback controls: Point to point control and Continuous path control, Control system for robot joint, Adaptive control, Drives and transmission systems, End effectors, Industrial robot applications of robots

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about Robots, classification, selection and specifications
- To understand the use of robotics in industrial applications
- To know about various feedback controls of Robot
- To understand how adaptive control strategies can be used in Robots

Course Outcomes:

1. Understand the basic concepts of Industrial automation
2. Design and analysis of automation methods, placing and assembling of various parts
3. Design of various processing and control circuits using pneumatic and hydraulic elements
4. Selection of sensors based on the industrial application
5. Role of robotics in industrial applications

TEXT BOOKS:

1. Stamatios Manesis and George Nikolakopoulos, “Introduction to Industrial Automation”, CRC Press, 2018.
2. Frank Lamb, “Industrial Automation”, Hands on, Mc Graw Hill Education, 2013.

REFERENCES:

1. Richerd L. Shell and Ernest L. Hall, “Hand Book of Industrial Automation”, CRC Press, 2000.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0202	3	0	0	3	CIA	30 M
Course Title	:	**SYSTEM RELIABILITY CONCEPTS**					SEE	70 M

Course Objectives:

To make the students learn about:

- The Basic concepts, rules for combining probabilities of events, failure density and distribution functions.
- Evaluation of network Reliability / Unreliability and types of redundancies.
- Evaluation of network Reliability / Unreliability using conditional probability method.
- Expected value and standard deviation of Exponential distribution and Measures of reliability.
- Evaluation of Limiting State Probabilities of one, two component repairable models.

UNIT-I:

Basic Probability Theory

Basic concepts – Rules for combining Probabilities of events – Failure Density and Distribution functions – Bernoulli's trials – Binomial distribution – Expected value and standard deviation for binomial distribution – Examples

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about basic rules for probabilities of events
- To distinguish between pdf and cdf
- Get detailed information about Probability of failure density and distribution functions
- Obtain the expected value and standard deviation for binomial distribution.

UNIT-II:

Network Modeling and Reliability Evaluation

Basic concepts – Evaluation of network Reliability / Unreliability – Series systems, Parallel systems, Series - Parallel systems, partially redundant systems – Types of redundancies - Evaluation of network Reliability / Unreliability using conditional probability method – Paths based and Cutset based approach – complete event tree and reduced event tree methods - Examples.

Learning Outcomes:

At the end of the unit, students will be able to:

- How to find the Probability of success and failures of network using different approaches for series-parallel configurations.
- Classification of redundancies.
- To find reliability / unreliability of complex systems using different methods
- Comparison of approaches to solve probability index of SISO system

UNIT-III:

Time Dependent Probability

Basic concepts – Reliability functions f(t), Q(t), R(t), h(t) – Relationship between these functions

– Bath tub curve – Exponential failure density and distribution functions - Expected value and standard deviation of Exponential distribution – Measures of reliability – MTTF, MTTR, MTBF
– Evaluation of network reliability / Unreliability of simple Series, Parallel, Series-Parallel systems - Partially redundant systems - Evaluation of reliability measure – MTTF for series and parallel systems – Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of time domain functions and relationship between them.
- Obtain the expected value and standard deviation for exponential distribution.
- Obtain the values of probabilistic measures for series and parallel configurations.
- To obtain probabilistic measures for fully redundant and partially redundant configurations

UNIT-IV:

Discrete Markov Chains & Continuous Markov Processes

Markov Chains: Basic concepts – Stochastic transitional Probability matrix – time dependent probability evaluation – Limiting State Probability evaluation – Absorbing states.
Markov Processes: Modeling concepts – State space diagrams – time dependent reliability evaluation of single component repairable model – Evaluation of Limiting State Probabilities of one, two component repairable models – Frequency and duration concepts – Frequency balance approach - Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of Stochastic Transitional Probability Matrix, Limiting State Probability
- To know about evaluation for one and two component repairable models.
- Understand the concept of Frequency balance approach.
- To distinguish between Markov chains and Markov processes

UNIT-V:

Multi Component & Approximate System Reliability Evaluation

Recursive relation for evaluation of equivalent transitional rates– cumulative probability and cumulative frequency and 'n' component repairable model – Series systems, Parallel systems, Basic probability indices – Series, Parallel systems – Complex Systems– Cutset approach – Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of recursive relation for evaluation of equivalent transitional rates.
- Obtain the cumulative probability and cumulative frequency for different systems
- To know about computation of basic probability indices for series, parallel configurations
- To know how to evaluate basic probability indices using cut set approach

Course Outcomes:

After completing the course, the student should be able to do the following:

- Understand the concepts for combining Probabilities of events, Bernoulli's trial, and Binomial distribution.
- Network Reliability/Unreliability using conditional probability, path and cutset based approach, complete event tree and reduced event tree methods.
- Understanding Reliability functions and to develop relationship between these functions, expected value and standard deviation of Exponential distribution and measures of reliabilities.
- Analyze the time dependent reliability evaluation of single component repairable model, frequency and duration concepts, Frequency balance approach.
- Recursive relation for evaluation of equivalent transitional rates, cumulative probability and cumulative frequency and 'n' component repairable model.

Text Books:

1. Roy Billinton and Ronald N. Allan, "Reliability Evaluation of Engineering Systems", Reprinted in India B. S. Publications, 2007.
2. E. Balagurusamy, "Reliability Engineering", Tata McGraw Hill, 2003.

Reference Books:

1. E. E. Lewis , "Introduction to Reliability Engineering" Wiley Publications.
2. Charles E. Ebeling, "Reliability and Maintainability Engineering", Tata McGraw Hill, 2000.
3. by Ajit Kumar Verma, Srividya Ajit and Durga Rao Karanki, Springer, "Reliability and Safety Engineering" 2nd edition, 2016.
4. Rausand and Arnljot Hoyland, "System Reliability Theory Marvin", Wiley Publictions.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0305	3	0	0	3	CIA	30 M
Course Title	:	**INTRODUCTION TO MECHATRONICS**					SEE	70 M

Course Objectives:

- Familiarize the technologies behind modern mechatronic systems.
- Explain fundamentals for the development of fully automated system.
- Develop a robotic or automated systems focusing on the hardware and software integration.
- Demonstrate the development and design of mechatronic system and MEMS.

UNIT – I

Introduction: Definition of Mechatronics, Need for Mechatronics in Industry, Objectives of mechatronics, mechatronics design process, Mechatronics key elements, mechatronics applications – Computer numerical control (CNC) machines, Tool monitoring systems, Flexible manufacturing system (FMS), Industrial Robots, Automatic packaging systems, Automatic inspection systems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the role of mechatronics in industry.(l2)
- Identify the application of mechatronics in automation industry.(l3)

UNIT – II

Sensors: Static characteristics of sensors, Displacement, Position and Proximity sensors, Force and torque sensors, Pressure sensors, Flow sensors, Temperature sensors, Acceleration sensors, Level sensors, Light sensors, Smart material sensors, Micro and Nano sensors, Selection criteria for sensors.

Learning Outcomes:

At the end of the unit, the student will be able to

- Classify various types of sensors. (l2)
- Choose sensors for particular application. (l3)
- Measure different quantity's using sensors. (l4)

UNIT – III

Actuators: Mechanical, Electrical, Hydraulic and Pneumatic Actuation systems, Characteristics and their limitations, Design of Hydraulic and Pneumatic circuits, Piezoelectric actuators, Shape memory alloys, Selection criteria for actuators.

Learning Outcomes:

At the end of the unit, the student will be able to

- Classify various actuation systems. (l2)
- Choose the criterion for different actuators. (l1)

UNIT – IV

Microprocessors, Microcontrollers and Programmable Logic Controllers: Architecture of of Microprocessor, Microcontroller and Programmable Logic Controller, PLC Programming using ladder diagrams, logics, latching, sequencing, timers relays and counters, data handling, Analog input/output, selection of controllers.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the architecture of microprocessors, microcontrollers and PLC. (L2)
- Formulate various programs using PLC. (L6)

UNIT – V

Design of mechotronics systems**,** Mechotronics design elements, Traditional mechatronics systems, Embedded systems, Procedure for designing a mechotronic systems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understanding design of mechotronics . (L2)
- Various Mechotronics systems. (L4)
- Design Aspects of Mechotronic systems. (L2)

Course Outcomes

Upon successful completion of this unit, the student will be able to:

- Explain mechatronics systems in industry. (l2)
- Identify mechatronic systems encountered in practice. (l3)
- Examine the components of a typical mechatronic system. (l4)
- Compare the various techniques used for development of mems. (l4)
- Develop programs using plc. (l6)

Text books:

1. Er R. Rajput, " A Text book of Mechatronics", S.Chand,2nd edition-2016.
2. James J Allen, "Micro Electro Mechanical Systems Design", CRC Press Taylor & Francis group, 2005.

Reference Text books:

1. WBolton, "Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering", 3rd edition, Pearson Education Press, 2005.
2. Devadas Shetty and Richard A Kolk, "Mechatronic System Design", 2nd edition, Cengage learning, 2010.
3. Clarence W. de Silva, "Mechatronics an Integrated Approach", CRC Press, 2004.
4. Ganesh S Hedge, "Mechatronics", Jones & Bartlett Learning, 2010.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

			L	T	P	C		
Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0407	3	0	0	3	CIA	30 M
Course Title	:	**OPTIMIZATION TECHNIQUES THROUGH MATLAB**					SEE	70 M

Course Objectives

- Introduce basics of MATLAB
- Familiarize the fundamentals of optimization
- Explain single variable optimization using various methods
- Implement multi variable optimization using various methods
- Train various evolutionary algorithms.

UNIT -I

Introduction to MAT LAB: Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

Learning Outcomes:

After completion of this unit, students will be able to

- Write simple codes in MATLAB. (L3)
- Plot the data using MATLAB. (L3)
- Implement optimization models in MATLAB. (L3)

UNIT -II

Introduction to Optimization: Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

Learning Outcomes:

After completion of this unit, students will be able to

- Build optimization problem. (l1)
- Solve various optimization problems(l3)
- Compare convex and concave programming (l4)

UNIT -III

Single Variable Optimization: Finite difference method, Central difference method, Runge- Kutta method, interval halving method, golden section method with MATLAB code.

Learning Outcomes:

After completion of this unit, students will be able to

- Understand various methods involving single variable optimization. (I2)
- Develop codes in matlab for different methods. (I3)
- Identify methods for solving a single variable optimization problem. (I3)

UNIT- IV

Multi Variable Optimization: Conjugate gradient method, Newton's method, Powell's method, Flectcher-Reeves method, Hook and Jeeves method, interior penalty function with MATLAB code.

Learning Outcomes:

After completion of this unit, students will be able to

- Apply various methods involving multi variable optimization. (I2)
- Develop codes in matlab for solving various multi variable optimization problems. (I3)
- Choose methods for solving a multi variable optimization problem. (I3)

UNIT -V

Evolutionary Algorithms: Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

Learning Outcomes:

After completion of this unit, students will be able to

- Apply different types of genetic algorithms. (I3)
- Model optimization problems using genetic algorithms in matlab. (I3)
- Compare different genetic algorithms for performance. (I5)

Course Outcomes:
After completion of this course the student can be able to

- Use optimization terminology and concepts, and understand how to classify an optimization problem.(I4)
- Apply optimization methods to engineering problems.(I3)
- Implement optimization algorithms.(I3)
- Compare different genetic algorithms. (I5)
- Solve multivariable optimization problems. (I4)

TEXT BOOKS

1.
2. Cesar Perez Lopez, “MATLAB Optimization Techniques”, Academic press, Springer publications, 2014.
3. Steven C.Chapra, “Applied Numerical Methods with MATLAB for Engineers and scientists”: 4th edition, McGraw-Hill Education, 2018.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0405	3	0	0	3	CIA	30 M
Course Title	:	**BASICS OF VLSI**					SEE	70 M

Course Objectives:

The objectives of the course are to

- Learn and Understand IC Fabrication process steps required for various MOS circuits
- Understand and Experience VLSI Design Flow
- Learn Transistor-Level CMOS Logic Design
- Understand VLSI Fabrication and Experience CMOS Physical Design
- Learn to Analyze Gate Function and Timing Characteristics

UNIT – I

Introduction: Introduction to MOS Technology – MOS, PMOS, NMOS, CMOS and BiCMOStechnologies, fabrication fundamentals: Oxidation, Lithography, Diffusion, Ionimplantation, Metallization and Encapsulation.

Basic Electrical Properties: Basic Electrical Properties of MOS,CMOS and BiCMOS Circuits, I_{DS}-V_{DS}relationships, MOS transistor threshold Voltage, g_m, g_{ds}, figure of merit ωo,

Passtransistor, NMOS inverter, Various pull - ups, Determination of pull-up to pulldown ratio

(Z_{pu} / Z_{pd}) , CMOS Inverter analysis and design, BiCMOS inverters,Latch-up in CMOS circuits.

Learning Outcomes:

After completion of this unit, students will be able to

- Demonstrate a clear understanding of CMOS fabrication flow and technology scaling (L2)
- Analyze the electrical properties of MOS and BiCMOS circuits (L3)
- Design MOSFET based logic circuit (L4)

UNIT – II

VLSI Circuit Design Processes:VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layouts,Lambda based design rules, Contact cuts , CMOS Lambda based design rules,Layout Diagrams for logic gates, Transistor structures, wires and vias, Scaling ofMOS circuits- Scaling models, scaling factors, scaling factors for device parameters, Limitations of Scaling.

After completion of this unit, students will be able to

- Understand the design rules and layout diagram for logic gates, limitations of scaling (L1)
- Draw the Layout of simple MOS circuit using Lambda based design rules (L2)

UNIT – III

Gate Level Design and Layout: Architectural issues, Switch logic networks: Gate logic, Alternate gate circuit:Pseudo-NMOS Dynamic CMOS logic. Basic circuit concepts, Sheet ResistanceR_S and its concept to MOS, Area Capacitance Units, Calculations, The delay unitT, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-inand fan-out, Choice of layers

Learning Outcomes:

After completion of this unit, students will be able to

- Apply basic circuit concepts to MOS circuits. (L2)
- Estimate the propagation delays in CMOS circuits (L3).

UNIT – IV

Subsystem Design: Subsystem Design, Shifters, Adders, ALUs, Multipliers: Array multiplier, SerialParallel multiplier, Parity generator, Comparators, Zero/One Detectors, Up/DownCounter, Memory elements: SRAM, DRAM, ROM, Serial Access Memories.

Learning Outcomes:

After completion of this unit, students will be able to

- Apply the Lambda based design rules for subsystem design (L2)
- Design of Adders, Multipliers and memories etc(L4)
- Design digital systems using MOS circuits(L4)

UNIT – V

Semiconductor Integrated Circuit Design:PLDs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic,Programmable Logic Array Design Approach.

Learning Outcomes:

After completion of this unit, students will be able to

- Analyze various architectures and device technologies of PLDs(L3)
- Design simple logic circuit using PLA, PAL, FPGA and CPLD.(L4)

Course Outcomes:

- Learn the basic fabrication process of MOS transistors, study CMOS inverter circuits, basic circuit concepts such as Sheet Resistance, Area Capacitance and Delay calculation, Field programmable gate arrays and realization techniques, CPLDs and FPGAs for implementing the various logic functions.
- Apply CMOS technology-specific layout rules in the placement and routing of transistors and

interconnect, and to verify the functionality.

- Analyze the performance of CMOS Inverter circuits
- Compare various Scaling models and understand the effect of scaling on device parameters

TEXT BOOKS:

1. Kamran Eshraghian, "Essentials of VLSI circuits and systems", EshraghianDouglesand

   A. Pucknell, PHI, 2005 Edition

2. Wayne Wolf, "Modern VLSI Design", 3rd Edition, Pearson Education, 1997.

REFERENCE BOOKS:

1. John .P. Uyemura, "CMOS logic circuit Design", Springer, 2007.
2. Neil H. E Weste, "CMOS VLSI Design – A Circuits and Systems Perspective", 3rd edition, DavidHarris, Ayan Banerjee, Pearson, 2009.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0404	3	0	0	3	CIA	30 M
Course Title	:	**PRINCIPLES OF COMMUNICATION**					SEE	70 M

Course Objectives:

- To understand the concept of various modulation schemes and multiplexing.
- To apply the concept of various modulation schemes to solve engineering problems.
- To analyse various modulation schemes.
- To evaluate various modulation scheme in real time applications.

UNIT-I:

Amplitude Modulation

Introduction to Noise and Fourier Transform. An overview of Electronic Communication Systems. Need for Frequency Translation, Amplitude Modulation: DSB-FC, DSB-SC, SSB-SC and VSB. Frequency Division Multiplexing. Radio Transmitter and Receiver.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of noise, Fourier transform, career modulation and frequency division multiplexing (L1).
- Apply the concept of amplitude modulationto solve engineering problems (L2).
- Analyse various amplitude modulation schemes (L3).
- Evaluate various amplitude modulation schemes in real time applications (L3).

UNIT-II:

Angle Modulation

Angle Modulation, Tone modulated FM Signal, Arbitrary Modulated FM Signal, FM Modulation and Demodulation. Stereophonic FM Broadcasting.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of angle modulation and its components (L1).
- Apply the concept of frequency modulation to solve engineering problems (L2).
- Analyse angle modulation schemes (L3).

- Evaluate frequency modulation scheme in real time applications (L3).

UNIT-III:

Pulse Modulation

Sampling Theorem: Low pass and Band pass Signals. Pulse Amplitude Modulation and Concept of Time Division Multiplexing. Pulse Width Modulation. Digital Representation of Analog Signals.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of various pulse modulation schemes and time division multiplexing (L1).
- Analyse various pulse modulation schemes (L3).

UNIT-IV:

Digital Modulation

Binary Amplitude Shift Keying, Binary Phase Shift Keying and QuadraturePhase Shift Keying, Binary Frequency Shift Keying. Regenerative Repeater.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of various digital modulation schemes (L1).
- Analyze various digital modulation schemes (L3).

UNIT-V:

Communication Systems

Satellite, RADAR, Optical, Mobile and Computer Communication (Block diagram approach only).

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of various communication systems (L1).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

Course Outcomes:

- Understand the concept of various modulation schemes and multiplexing (L1).
- Apply the concept of various modulation schemes to solve engineering problems (L2).
- Analyse various modulation schemes, and evaluate various modulation scheme in real time applications (L3).

TEXT BOOKS:

1. Herbert Taub, Donald L Schilling and Goutam Saha, “Principles of Communication Systems”, 3rd Edition, Tata McGraw-Hill Publishing Company Ltd., 2008.

REFERENCES:

1. B. P. Lathi, Zhi Ding and Hari M. Gupta, “Modern Digital and Analog Communication Systems”, 4th Edition, Oxford University Press, 2017.
2. K. Sam Shanmugam “Digital and Analog Communication Systems”, Wiley India Edition, 2008.

Blooms’ Learning levels:

L1: Remembering and Understanding L2: Applying
L3: Analyzing, Evaluating

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)
(Common to CSE & IT)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0506	3	0	0	3	CIA	30 M
Course Title	:	**FUNDAMENTALS OF VR/AR/MR**					SEE	70 M

Course Objectives:

This course is designed to:

- Explore the history of spatial computing and design interactions
- Understand the foundational principles describing how hardware, computer vision algorithms function
- Learn Virtual reality animation and 3D Art optimization
- Demonstrate Virtual reality
- Introduce to the design of visualization tools

UNIT-I

How Humans interact with Computers: Common term definition, introduction, modalities through the ages (pre- 20th century, through world war-II, post world war-II, the rise of personal computing, computer miniaturization), why did we just go over all of this?, types of common HCI modalities, new modalities, the current state of modalities for spatial computing devices, current controllers for immersive computing systems, a note on hand tracking and hand pose recognition.

Designing for our Senses, Not our Devices: Envisioning a future, sensory technology explained, who are we building this future for?, sensory design, five sensory principles, Adobe's AR story.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain common modalities and their pros and cons.(L2)
- Demonstrate Mapping modalities to current industry inputs(L2)
- Explore the importance of design with spatial computing(L5)

UNIT-II

Virtual Reality for Art: A more natural way of making 3D art, VR for animation.

3D art optimization: Introduction, draw calls, using VR tools for creating 3D art, acquiring 3D models vs making them from scratch.

How the computer vision that makes augmented reality possible works: Who are we?, a brief history of AR, how and why to select an AR platform, mapping, platforms, other development considerations, the AR cloud.

Learning Outcomes:

At the end of the unit, students will be able to:

- Utilize VR tools for creating 3D Animations(L3)
- Analyze how and why to Select an AR Platform(L4)

UNIT-III

Virtual reality and augmented reality: cross platform theory: Why cross platform? The role of game engines, understanding 3D graphics, portabiltity lessons from video game design, simplifying the controller input.
Virtual reality toolkit: open source framework for the community: What is VRTK and why people use it?, the history of VRTK, welcome to the steam VR unity toolkit, VRTK v4, the future of VRTK, success of VRTK.

Three virtual reality and augmented reality development practices: Developing for virtual reality and augmented reality, handling locomotion, effective use of audio, common interaction paradigms.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain why the design approach should be considered at a holistic high level based on the goal of the experience(L2)
- Build VR solutions using Virtual reality toolkit(L6)
- Interpret the development practices in three Virtual reality and Augmented reality development(L2)

UNIT-IV

Data and machine learning visualization design and development in spatial computing: Introduction, understanding data visualization, principles for data and machine learning visualization design and development in spatial computing, why data and machine learning visualization works in spatial computing, 2D data visualization vs 3D data visualization in spatial computing, interactivity in data visualizations and in spatial computing, animation, failures in data visualization, good data visualization design optimize 3D spaces, data representations, info graphics, and interactions, defining distinctions in data visualization and big data for machine, how to create data visualization: data visualization creation pipeline, webXR, data visualization challenges in XR, data visualization industry use case examples of data visualization, 3D reconstruction and direct manipulation of real world data, data visualization is for everyone, hands on tutorials, how to create data visualization, resources.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand, define, and set data and machine visualization design and development principles in embodied reality(L1)
- Demonstrate best practices, and practical tools to create beautiful and functional data visualizations.(L2)

UNIT-V

Character AI and Behaviors: Introduction, behaviors, current practice: Reactive AI, more intelligence in the system, Deliberative AI, machine learning.

The virtual and augmented reality health technology ecosystem: VR/AR health technology application design, standard UX isn't intuitive, tutorial: insight Parkinson's experiment, companies, case studies from leading Academic institutions.

Learning Outcomes:

At the end of the unit, students will be able to:

- Design a behavioral AI system for a video game(L6)
- Identify issues related to design of virtual reality (VR) and augmented reality (AR) experiences deployed in a health-care context(L3)
- Explain the use of motion data from controllers to reduce the visible tremor of a Parkinson's patient in a virtual environment(L2)

Course outcomes

Upon completion of the course, the students should be able to:

- Explain how the humans interact with computers (L2)
- Apply technical and creative approaches to make successful applications and experiences. (L3)
- Design audio and video interaction paradigms (L6)
- Design Data visualization tools (L6)
- Apply VR/MR/AR in various fields in industry (L3)

Text book

1. Erin Pangilinan, Steve lukas, and Vasanth Mohan, "Creating Augmented & Virtual Realities", 1st edition, O'REILLY, 2019.

References

1. Steve Aukstakalnis, "Practical Augmented Reality", Pearson Education, 2017.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Common to CSE & IT)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0505	3	0	0	3	CIA	30 M
Course Title	:	**DATA SCIENCE USING PYTHON**					SEE	70 M

Course Objectives:

This course is designed to:

- Understand the approaches for handling data related problems
- Explore the mathematical concepts required for Data science
- Explain the basic concepts of data science.
- Elucidate various Machine Learning algorithms.
- Introduce Natural Language Processing and Recommender Systems

UNIT- I

Introduction to Data Science, A Crash Course in Python, Visualising Data.

Learning Outcomes:

At the end of the unit, students will be able to:

- Describe the importance of data analysis (L1).
- Identify the key connectors of Data Science (L4).
- Interpret and Visualize the data using bar charts, line charts and scatter plots (L3).

UNIT-II

Linear Algebra, Statistics, Probability, Hypothesis and Inference, Gradient Descent.

Learning Outcomes:

At the end of the unit, students will be able to:

- Identify the Correlation between two vectors (L4).
- Test a given hypothesis (L3).
- Compute mean, median and mode for the given data (L3).

UNIT-III

Getting Data, Working with Data, Machine Leaning, k-Nearest Neighbors, Naïve Bayes.

Learning Outcomes:

At the end of the unit, students will be able to:

- Compute dimensionality reduction using PCA (L3).
- Differentiate supervised and unsupervised learning methods (L4).
- Describe overfitting, under fitting, bias, variance and goodness of learning (L1).
- Solve classification problem using k-nearest neighbour classifier (L3).
- Apply Naïve Bayes classifier to solve decision making problem (L3).

UNIT-IV

Simple Linear Regression, Multiple Regression, Logistic Regression, Decision Trees, Neural Networks.

Learning Outcomes:

At the end of the unit, students will be able to:

- Describe gradient descent approach, maximum likelihood estimation and method of least squares (L1).
- Apply SVM to determine a hyperplane with maximum margin (L3).
- Determine decision tree for given data (L5).
- Describe Perceptron and Back Propagation (L3).

UNIT-V

Clustering, Natural Language Processing, Network Analysis, Recommender Systems. Database and SQL, MapReduce

Learning Outcomes:

At the end of the unit, students will be able to:

- Determine Clusters in data using k-means and Hierarchical Clustering methods (L5).
- Apply basic SQL Operations using NotQuiteABase (L3).
- Compare User-Based and Item-Based Collaborative Filtering (L2).
- Describe Grammer and MapReduce (L1).

Course Outcomes:

After completion of this course the student would be able to

- Visualize the data using bar charts, line charts and scatter plots (L4).
- Analyse Correlation between two data objects (L4).
- Demonstrate feature selection and dimensionality reduction.(L2)
- Solve decision making problems using k-NN, Naïve Bayes, SVM and Decision. Trees (L3).
- Determine Clusters in data using k-means and Hierarchical Clustering methods (L3).
- Design basic SQL Operations using NotQuiteABase (L6)
- Demonstrate the way to use machine learning algorithms using python. (L2)

Text Books:

1. Data Science from Scratch, First Principles with Python - Joel Grus, O'Reilly, First Edition.

Reference Books:

1. The Data Science Handbook, Field Cady, WILEY.
2. An Introduction to Data Science, Jeffrey M. Stanton, Jeffrey Stanton, 2012

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0408	3	0	0	3	CIA	30 M
Course Title	:	**WAVELET TRANSFORMS AND ITS APPLICATIONS**					SEE	70 M

Course Objective:

This course provides the students to understand Wavelet transforms and its applications.

UNIT-I

Wavelets

Wavelets and Wavelet Expansion Systems - Wavelet Expansion- Wavelet Transform- Wavelet System- More Specific Characteristics of Wavelet Systems -Haar Scaling Functions and Wavelets -effectiveness of Wavelet Analysis -The Discrete Wavelet Transform The Discrete- Time and Continuous Wavelet Transforms.

Learning Outcomes:

Students will be able to

- Understand wavelets and wavelet expansion systems.
- Find wavelet transforms in continuous as well as discrete domains.

UNIT-II

A Multiresolution Formulation of Wavelet Systems

Signal Spaces -The Scaling Function -Multiresolution Analysis - The Wavelet Functions - The Discrete Wavelet Transform- A Parseval's Theorem - Display of the Discrete Wavelet Transform and the Wavelet Expansion.

Learning Outcomes:

Students will be able to

- Illustrate the multi resolution analysis, scaling function.
- Implement parseval theorem.

UNIT-III

Filter Banks and the Discrete Wavelet Transform : Analysis - From Fine Scale to Coarse Scale- Filtering and Down-Sampling or Decimating -Synthesis - From Coarse Scale to Fine Scale -Filtering and Up-Sampling or Stretching - Input Coefficients - Lattices and Lifting - - Different Points of View.

Learning Outcomes:
Students will be able to

- Form fine scale to coarse scale analysis.
- Perform decimating synthesis.
- Find the lattices and lifting.

UNIT-IV

Multiresolution versus Time-Frequency Analysis- Periodic versus Nonperiodic Discrete Wavelet Transforms -The Discrete Wavelet Transform versus the Discrete-Time Wavelet Transform- Numerical Complexity of the Discrete Wavelet Transform.

Learning Outcomes:

Students will be able to

- Perform multi resolution versus time frequency analysis.
- Perform numerical complexity of discrete wavelet transforms.

UNIT-V

Bases, Orthogonal Bases, and Biorthogonal Bases -Matrix Examples - Fourier Series Example - Sine Expansion Example - Frames and Tight Frames - Matrix Examples -Sine Expansion as a Tight Frame Example.

Learning Outcomes:

Students will be able to

- Understand the orthogonal bases and Biorthogonal Bases.
- Find the Frames and Tight Frames using Fourier series.

Course Outcomes:
After the completion of course, students will be able to

- Understand wavelets and wavelet expansion systems.
- Illustrate the multi resolution analysis ad scaling functions.
- Form fine scale to coarse scale analysis.
- Find the lattices and lifting.
- Perform numerical complexity of discrete wavelet transforms.
- Find the frames and tight frames using fourier series.

TEXT BOOKS:

1. C. Sidney Burrus, Ramesh A. Gopinath, "Introduction to Wavelets and Wavelets Transforms",Prentice Hall, (1997).
2. James S. Walker, "A Primer on Wavelets and their Scientific Applications", CRCPress, (1999).

REFERENCE BOOKS:

1. Raghuveer Rao, "Wavelet Transforms", Pearson Education, Asia.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

			L	T	P	C		
Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE9902	3	0	0	3	CIA	30 M
Course Title	:	**SOFT SKILLS**					SEE	70 M

Course Objectives

- To develop awareness in students of the relevance and importance of soft skills
- To provide students with interactive practice sessions to make them internalize soft skills
- To develop Time management, Positive thinking & Decision making skills
- To enable to manage stress effectively
- To enable them to develop employability skills

SYLLABUS

UNIT – I

INTRODUCTION

Definition – Scope – Importance- – Methods of improving soft skills – Limits- Analysis – Interpersonal and intrapersonal skills - Verbal and Non-verbal skills.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of soft skills
- Identify the methods of improving soft skills
- Analyze various soft skills in different situations
- Distinguish various soft skills
- Apply various soft skills in day to day life and in workplace

UNIT – II INTRAPERSONAL SKILLS

Knowing self/temperaments/traits - Johari windows – quotient skills(IQ, EQ, SQ), creativity, decision-making-Attitude – Confidence Building - Positive Thinking –Time Management – Goal setting.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand self and its temperament.
- Apply various techniques to know the self.
- Develop positive thinking
- Develop creative thinking and decision-making skills
- Apply self-knowing tools in day to day and professional life.

UNIT – III INTERPERSONAL SKILLS

Leadership Skills – Negotiation skills –- Team-building – Crisis Management – Event Management – Ethics and Etiquettes.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of interpersonal skills
- Analyze various tactics in negotiation skills.
- Develop team building spirit.
- Develop crisis management
- Apply interpersonal skills through etiquettes.

UNIT – IV

VERBAL SKILLS

Importance of verbal skills in corporate climate, Listening skills –Mother Tongue Influence (MTI) - Speaking skills – Public speaking - Oral presentations - Writing skills –E-mail etiquettes

– Memos - Indianism

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of verbal skills in corporate climate.
- Explain the need of listening skills.
- Explore MTI and suggest remedies to avoid it.
- Interpret various contexts of speaking.
- Apply verbal skills in personal and professional life.

UNIT – V
NON-VERBAL SKILLS

Importance of body language in corporate culture – body language-Facial expressions – eye contact – posture – gestures – Proxemics – Haptics – Dress Code – Paralanguage –Tone, pitch, pause& selection of words

Learning Outcomes:

At the end of the module, the learners will be able to

- Comprehend the importance of non-verbal communication.
- Expound the need of facial expressions, postures and gestures.
- Analyze proxemics,haptics etc.
- Understand the importance of dress code.
- Apply various techniques to use para language

Course Outcomes

- Recognize the importance of verbal and non verbal skills
- Develop the interpersonal and intrapersonal skills
- Apply the knowledge in setting the SMART goals and achieve the set goals
- Analyze difficult situations and solve the problems in stress-free environment
- Create trust among people and develop employability skills

Text Books

1. Meenakshi Raman &ShaliniUpadhyay " Soft Skills",Cengage Learning, 2018.
2. S. Balasubramaniam, "Soft Skills for Interpersonal Communication", Orient Black Swan, 2017.

References

1. Barun K. Mitra, "Personality Development and Soft Skills**", –**OXFORD Higher Education 2018.
2. AlkaWadkar, "Life Skills for Success ", Sage Publications 2016.
3. Robert M Sheffield, "Developing Soft Skills", Pearson, 2010.
4. DianaBooher, "Communicate With Confidence",Tata McGrawhill, 2012.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	HUMANITIES SCIENCES	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9907	3	0	0	3	CIA	30 M
Course Title	:	**ENTREPRENEURSHIP & INCUBATION**					SEE	70 M

COURSE OBJECTIVES :

The objective of this course is

- To make the student understand about Entrepreneurship
- To enable the student in knowing various sources of generating new ideas in setting up of Ne enterprise
- To facilitate the student in knowing various sources of finance in starting up of a business
- To impart knowledge about various government sources which provide financial assistance entrepreneurs/ women entrepreneurs
- To encourage the student in creating and designing business plans

Syllabus

UNIT-I

Entrepreneurship - Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality - Recent trends in Entrepreneurship.

Learning Outcomes:

At the end if the Unit, the learners will be able to

- Understand the concept of Entrepreneur and Entrepreneurship in India
- Know Entrepreneurship process and emergence of Entrepreneurship
- Analyze the differences between Entrepreneur and Intrapreneur
- Develop a creative mind set and personality
- Understand recent trends in Entrepreneurship across the globe

UNIT-II

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas - Opportunity recognition - Feasibility study - Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

Learning Outcomes:

At the end if the Unit, the learners will be able to

- Know the process of starting a new venture
- Analyze the sources of new methods in generating business idea
- Evaluate market feasibility, financial feasibility and technical feasibility
- Design and draw business plans in project preparation and prepare project reports

UNIT-III

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions in aid of entrepreneurship development

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Know the various sources of finance to start a new venture
- Contrast & compare between Long term & Short term finance sources
- Analyze the role of banks and other financial institutions in promoting entrepreneurship in India
- Evaluate the need and importance of MSMEs in the growth of country

UNIT-IV

Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India - Issues & Challenges - Entrepreneurial motivations.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand the role of government in promoting women entrepreneurship
- Know various incentives, subsidies and grants available to women entrepreneurs
- Analyze the role of export-oriented units
- Know about the tax concessions available for Women entrepreneurs
- Prepare to face the issues and challenges.

UNIT-V

Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation and the business incubator and how they operate and influence the Type/benefits of incubators - Corporate/educational / institutional incubators - Broader business incubation environment - Pre-Incubation and Post - Incubation process - Idea lab, Business plan structure - Value proposition

Learning Outcomes:

At the end of the Unit, the learners will be able to:

- Understand the importance of business incubation
- Apply brilliant ideas in the process of business incubation
- Analyze the process of business incubation/incubators.
- Contrast & Compare between business incubation and business incubators.
- Design their own business incubation/incubators as viable-business unit.

Course Outcomes:

At the end of the course, students will be able to

- Understand the concept of Entrepreneurship and challenges in the world of competition.
- Apply the Knowledge in generating ideas for New Ventures.
- Analyze various sources of finance and subsidies to entrepreneur/women Entrepreneurs.
- Evaluate the role of central government and state government in promoting Entrepreneurship.
- Create and design business plan structure through incubations.

TEXT BOOKS

1. D F Kuratko and T V Rao, “Entrepreneurship” - A South-Asian Perspective – Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com)
2 . Nandan H, “ Fundamentals of Entrepreneurship”, PHI, 2013

REFERENCES

1. Vasant Desai, “Small Scale Industries and Entrepreneurship”, Himalaya Publishing 2012.
2. Rajeev Roy “Entrepreneurship”, 2nd Edition, Oxford, 2012.
3. B.Janakiramand M.Rizwanal “Entrepreneurship Development: Text & Cases”, Excel Books, 2011.
4. Stuart Read, Effectual “Entrepreneurship”, Routledge, 2013.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI semester Mechanical Engineering)

Course Category	:	MANDATORY COURSES	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9905	3	0	0	3	CIA	30 M
Course Title	:	**ESSENCE OF INDIAN KNOWLEDGE TRADITION**					SEE	

Course Objectives:

To facilitate the students with the concepts of Indian traditional knowledge and to make them understand the Importance of roots of knowledge system
The course aim of the importing basic principle of third process reasoning and inference sustainability is at the course of Indian traditional knowledge system
To understand the legal framework and traditional knowledge and biological diversity act 2002 and geographical indication act 2003
The courses focus on traditional knowledge and intellectual property mechanism of traditional knowledge and protection
To know the student traditional knowledge in different sector

UNITI

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

Learning Outcomes:
At the end of the unit, the student will able to:
- Understand the traditional knowledge.
- Contrast and compare characteristics importance kinds of traditional knowledge.
- Analyze physical and social contexts of traditional knowledge.
- Evaluate social change on traditional knowledge.

UNIT II

Protection of traditional knowledge: the need for protecting traditional knowledge Significance of TK Protection, value of TK in global economy, Role of Government to harness TK.

Learning Outcomes:
At the end of the unit, the student will able to:
- Know the need of protecting traditional knowledge.
- Apply significance of tk protection.
- Analyze the value of tk in global economy.
- Evaluate role of government

UNIT III

Legal framework and TK: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of

Forest Rights) Act, 2006, Plant Varieties Protection and Farmers Rights Act, 2001 (PPVFR Act);B:The Biological Diversity Act 2002 and Rules 2004, the protection of traditional knowledge bill, 2016. Geographical indications act 2003.

Learning Outcomes:
At the end of the unit the student will able to:

- Understand legal framework of TK.
- Contrast and compare the ST and other traditional forest dwellers
- Analyze plant variant protections
- Evaluate farmers right act

UNIT IV

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

Learning Outcomes:
At the end of the unit, the student will able to:

- Understand TK and IPR
- Apply systems of TK protection.
- Analyze legal concepts for the protection of TK.
- Evaluate strategies to increase the protection of TK.

UNIT V

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Learning Outcomes:
At the end of the unit, the student will able to:

- Know TK in different sectors.
- Apply TK in engineering.
- Analyze TK in various sectors.
- Evaluate food security and protection of TK in the country.

Reference Books:

Traditional Knowledge System in India, by Amit Jha, 2009.
Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, PratibhaPrakashan 2012.
Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
"Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino

e-Resources:
https://www.youtube.com/watch?v=LZP1StpYEPM
http://nptel.ac.in/courses/121106003/

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	MANDATORY COURSES	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0313P	0	0	2	1	CIA	30 M
Course Title	:	**HEAT TRANSFER LAB**					SEE	70M

Course Objectives:

Students undergoing this course would

- Understand different modes of heat transfer
- Gain knowledge about natural and force convection phenomenon
- Estimate experimental uncertainty in measurements

LIST OF EXPERIMENTS

1. Determine the overall heat transfer coefficient across the width of composite wall
2. Determine the thermal conductivity of a metal rod
3. Determine the thermal conductivity of insulating powder material through concentric sphere apparatus
4. Determine the thermal conductivity of insulating material through lagged pipe apparatus
5. Determine the efficiency of a pin fin in natural and forced convection.
6. Determine the heat transfer coefficient for a vertical cylinder in natural convection
7. Determine the heat transfer coefficient in forced convection of air in a horizontal tube.
8. Determine the heat transfer coefficients on film and drop wise condensation apparatus.
9. Determine the effectiveness of a parallel and counter flow heat exchanger.
10. Study the pool boiling phenomenon and different regimes of pool boiling.
11. Experiment on pool boiling
12. Determine the emissivity of the test plate surface.
13. Experiment on Stefan-Boltzmann apparatus
14. Determine the heat transfer rate coefficient in fluidized bed apparatus

Course Outcomes

Upon the successful completion of course, students will be able to

- Explain different modes of heat transfer
- Identify parameters for measurement for calculating heat transfer
- Determine effectiveness of heat exchanger
- Design new equipment related to heat transfer
- Apply principles of heat transfer in wide application in industries.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester Mechanical Engineering)

Course Category	:	HUMANITIES SCIENCES	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9906	0	0	3	1.5	CIA	30 M
Course Title	:	**ADVANCED ENGLISH LANGUAGE COMMUNICATION SKILLS LAB (AECS LAB)**					SEE	70 M

Course Objectives

- students will be exposed to a variety of self instructional, learner friendly modes of language learning
- students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
- students will learn better pronunciation through stress, intonation and rhythm
- students will be trained to use language effectively to face interviews, group discussions, public speaking
- students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

UNIT I

1. Phonetics for listening comprehension of various accents - 2
2. Formal Presentations using PPT slides without Graphic Elements
3. Paraphrasing

Learning Outcomes

At the end of the module, the learners will be able to

- Understand different accents spoken by native speakers of English
- Make formal structured presentations on general topics using PPT slides without graphical elements
- Paraphrase short academic texts using suitable strategies and conventions

UNIT II

1. Debate – 2 (Following Argument)
2. Listening to short speeches/ short stories for note-making and summarizing
3. E-mail Writing

Learning Outcomes

At the end of the module, the learners will be able to

- Participate in formal discussions and speak clearly on a specific topic using suitable discourse markers
- Make formal structured presentations on academic topics using ppt slides with relevant graphical elements
- Write formal emails in the standard format

UNIT III

1. Listening for Discussions
2. Group Discussions
3. Writing Persuasive/argumentative essays on general topics

Learning Outcomes

At the end of the module, the learners will be able to

- Follow a discussion to identify the salient points
- Participate in group discussions using appropriate conventions and language strategies
- Produce logically coherent persuasive/argumentative essays

UNIT IV

1. Reviewing film/ book
2. Group Discussions – reaching consensus in Group Work
3. Resume Writing – Cover Letter – Applying for Internship

Learning Outcomes

At the end of the module, the learners will be able to

- Judge a film or book
- Express thoughts and ideas with acceptable accuracy and fluency with a view to reach consensus in group discussions
- Prepare a CV and write a cover letter to seek internship/ job

UNIT V

1. Writing Project Reports
2. Editing Short Texts
3. Answering FAQs in Interviews

Learning Outcomes

At the end of the module, the learners will be able to

- Collaborate with a partner to make effective presentations
- Understand the structure and produce an effective project report.
- Edit short texts according to different needs of the work place.

Course Outcomes

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
- Apply communication skills through various language learning activities
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional settings
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

SUGGESTED SOFTWARE:

1. Walden Infotech English Language Communication Skills.
2. iTell- Orell Digital Language Lab
3. Digital Teacher
4. LES(Learn English Select) by British council
5. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
6. DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.
7. Lingua TOEFL CBT Insider, by Dreamtech
8. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
9. Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:

The software consisting of the prescribed topics elaborated above should be procured and used.

1. Meenakshi Raman &Sangeeta Sharma, "Technical Communication" O U Press 2009.
2. Barron's Books on TOEFL/GRE/GMAT/CAT/IELTS /DELTA/Cambridge University Press.2012.
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications, 2011.
4. "Practice Psychometric Tests": How to familiarize yourself with genuine recruitment tests, 2012.
5. David A McMurrey& Joanne Buckely "Handbook for Technical Writing" CENGAGE Learning 2008.
6. "A Textbook of English Phonetics for Indian Students", 2nd Edition, T.Balasubramanyam. (Macmillan), 2012.
7. "A Handbook for English Laboratories", E. Suresh Kumar, P. Sreehari, Foundation Books, 2011

Note: Links provided by APSHE on LSRW, grammar and vocabulary

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSES	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0315T	3	0	0	3	CIA	30 M
Course Title	:	**INTRODUCTION TO CAD/CAM**					SEE	70 M

Course Objectives:

- Understand the basics of CAD/CAM, geometric representation, transformations.
- Explain geometric modeling methods in CAD.
- Familiarize numerical control (NC), computer numerical control (CNC) and direct numerical control (DNC) machines.
- Impart knowledge on manual part programming and computer aided part programming.
- Explain the principles robotics, CIM, AR,VR and AI in CIM

UNIT I **8hrs**

CAD/CAM: Introduction, hardware and software, I/O devices, benefits. graphics standards- Neutral file formats – IGES, STEP.

2D and 3D geometric transformations: Translation, scaling, rotation, mirroring, homogenous transformations, concatenation of transformations, viewing transformations.

Learning Outcomes:

At the end of this unit, the student will be able to

- List various input and output devices (L1)
- Apply geometric transformations in 2D and 3D (L3)
- Apply window to viewport transformation (L3)

UNIT II: Geometric Modeling: **10hrs**

Parametric representation: Representation of curves, Hermite curves, Spline, Bezier and B- spline curves in two dimensions; Geometric modelling of surfaces: Surface patch, Coons and bicubic patches, Bezier and B-spline surfaces, sweep surfaces, surface of revolution, blending of surfaces;
Geometric Modelling of Solids: Wireframe, surface modelling, solid entities, boolean operations, CSG approach and B-rep of solid modelling, geometric modelling of surfaces.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the concepts of parametric representation to curves and surfaces. (l3)
- Create surfaces such as coons, bezier and b-spline (l6)
- Differentiate wireframe, surface and solid modeling. (l4)
- Apply the solid modeling concepts. (l3)

UNIT III **8hrs**

Computer Aided Manufacturing (CAM): Structure of numerical control (NC) machine tools, designation of axes, drives and actuation systems, feedback devices, computer numerical control (CNC) and direct numerical control (DNC), adaptive control system, CNC tooling, automatic tool changers and work holding devices, functions of CNC and DNC systems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the differences between NC, CNC and DNC. (L3)
- Use devices and activation systems. (L3)
- Apply adaptive control system. (L3)
- Apply different tooling and tool chargers, working holding devices. (L3)

UNIT IV **8 hrs**

Part Programming: Part programming instruction formats, information codes, preparatory functions, miscellaneous functions (G-codes, M-codes). Tool codes and tool length offset, interpolations canned cycles.

APT Programming: APT language structure, APT geometry, Definition of point, line, circle, plane.

APT Motion Commands: set-up commands, pint to point motion commands; continuous path motion commands part programming preparation for typical examples (milling and turning operation)

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the fundamentals of part programming in CNC. (L3)
- Use G codes, M codes in CNC part programs. (L3)
- Apply the concept of canned or fixed cycles for the hole making operations. (L3)
- Identify geometric features in APT language. (L3)
- Apply motion commands in APT to generate surfaces. (L3)

UNIT V **8 hrs**

Automation: Anatomy and configuration of robot, characteristics of robots, grippers, application of robots in manufacturing, robot programming languages. Computer integrated manufacturing (CIM): Elements of

CIM, Virtual Reality (VR), Augmented Reality (AR), Artificial Intelligence (AI) and expert systems in CIM.

Learning Outcomes:

At the end of this unit, the student will be able to

- Summarize the fundamentals of robotics. (l2)
- Categorize the cim environment and its elements. (l4)
- Explain the role vr, ar and ai in manufacturing engineering. (l3)

Course Outcomes:

At the end of the course, the student will be able to

- Apply the basics of geometric representation and transformations in CAD/CAM. (L3)
- Choose geometric modeling methods for building CAD models. (L1)
- Compare NC, CNC and DNC. (L2)
- Develop manual and computer aided part programming for turning and milling operations. (L3)
- Summarize the principles of robotics AR,VR and AI in CIM. (L2)

Text books:

1. P. N. Rao, CAD/CAM: "Principles and applications", 3rd edition, Tata McGraw-Hill, Delhi, 2017
2. Ibrahim Zeid, R.Siva Subramanian, "CAD/CAM: Theory and Practice", 2nd edition, Tata McGraw-Hill, Delhi, 2009

Reference books:

1. Mikell P. Groover, Emory W. Zimmers , "CAD/CAM", 5th edition, Pearson Prentice Hall of India, Delhi, 2008
2. P. Radhakrishnan, S. Subramanyan & V. Raju, "CAD/CAM/CIM", 3rd edition, New Age International Publishers, 2008
3. Tien Chien Chang, "Computer Aided Manufacturing", 3rd edition, Pearson, 2008
4. SJ Martin, "Numerical control of machine tools", London, Hidden & Stoughton, 1982.
5. Solid cam, "Software packages", solid works or equivalent.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSES	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0316T	3	0	0	3	CIA	30 M
Course Title	:	**METROLOGY AND MEASUREMENTS**					SEE	70 M

Course Objectives:

- Introduce the basic concepts of metrology and measurement methods.
- Demonstrate the importance of metrology in manufacturing
- Explain the concepts of transducers and its practical applications.
- Expose with various measuring instruments
- Familiarize calibration methods of various measuring instruments.

UNIT I **10 hrs**

Concept of Measurement: General concept-generalized measurement system, units and standards, measuring instruments, sensitivity, readability, range of accuracy, precision, static and dynamic response, repeatability, systematic and random errors, correction, calibration, terminology and limits fits and tolerances, hole basis and shaft basis system, interchangeability. **Linear and Angular Measurement:** Linear measuring instruments: Vernier instruments, micrometers, slip gauges, tool makers microscope. Comparators: Mechanical, pneumatic and electrical. Angular measurements: Sine bar, bevel protractor and angle dekkor, rollers and spheres used to determine the tapers.

Learning Outcomes:

At the end of this unit the student will be able to

- Identify important parameters in metrology. (l3).
- Differentiate interchangeability and selective assembly. (l4).
- Select limits and tolerances for different assemblies. (l1)
- Explain the principles of measurement of various comparators. (l2).
- Discuss about the principles of slip gauges, micrometers and vernier height gauges. (l2)

UNIT II **8 hrs**

Flatness Measurement: Measurement of flatness – straight edges – surface plates, optical flat and autocollimators, interferometers and their applications.
Surface Roughness Measurement: Terminology systems, differences between surface roughness and surface waviness- Numerical assessment of surface finish - CLA, R,M,S Values-

Ra , Rz values, Methods of measurement of surface finish-profilograph, talysurf, BIS symbols for indication of surface roughness, classification of automatic inspections systems, co-ordinate- measuring machines, non-contact inspection techniques-machine vision, laser scanning systems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Inspect the flatness of surfaces. (l4)
- Recall the terms used in surface roughness measurement. (l1)
- Explain the factors affecting the surface finish in machining. (l2)
- Demonstrate the application of different surface measuring instruments. (l2)

UNIT III **8 hrs**

Metrology of Screw Threads:
Screw thread measurements: Elements of threads, errors in screw threads, various methods for measuring external and internal screw threads, screw thread gauges.
Gear Measurement: Gear tooth terminology, measurement of gear elements-runout, lead, pitch backlash, profile, pressure angle, tooth thickness, diameter of gear, constant chord and base tangent method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the errors in screw threads. (l3)
- Explain the principles of gear measuring instruments. (l2)
- Select the tools and methods for measuring screw thread, gear profiles. (l1)

UNIT IV **8 hrs**

Measurement of Displacement: Theory and construction of various transducers to measure displacement - Piezo electric, inductive, capacitance, resistance, ionization and photoelectric transducers, calibration procedures.
Measurement of Speed: Mechanical tachometers - Electrical tachometers - Stroboscope, Noncontact type of tachometer.
Measurements of Strain: Various types of electrical strain gauges, gauge factor, method of usage of resistance strain gauge for bending, compressive and tensile strains, usage for measuring torque, strain gauge rosettes.

Learning Outcomes:

At the end of this unit, the student will be able to

- List various types of transducers used for the measurement of displacement and speed. (L1)
- Explain the static and dynamic characteristics of transducers. (L3)
- Classify the transducers with respect to change in resistance, capacitance and inductance. (L4)
- experiment with measurement of strain (L3)

UNIT V **8 hrs**

Measurement of Force: Direct method - analytical balance, platform balance; elasticmembers

– load cells, cantilever beams and proving rings.

Measurement of Torque: Torsion bar dynomometer, servo controlled dynamometer and absorption dynamometer.

Measurement of Temperature: Standards and calibration, thermal expansion methods, thermo electric sensors (thermocouples), Electrical Resistance sensors, Junction semiconductor sensors, Digital thermometers, Radiation methods.

Measurement of Pressure and Sound: Standards and calibration, basic methods of pressure measurement, dead weight gauges and manometers, Elastic transducers, vibrating cylinder, resonant transducers, High and low pressure measurement.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify various types of transducers used for the measurement of force, torque, temperature, pressure and sound. (l3)
- Explain methods of measurement of force, torque, temperature, pressure and sound. (l2)
- Develop the techniques for calibration of force, torque, temperature, pressure and sound measuring devices. (l3)

Course Outcomes:

- List various measuring instruments used in metrology. (L4)
- Examine geometry of screw threads and gear profiles. (L4)
- Measure force, torque, temperature, pressure and sound. (L5)
- Calibrate various measuring instruments. (L4)

Textbooks:

1. Thomas G.Beckwith, Marangoni, Linehard, "Mechanical Measurements", 6th edition, PHI, 2013.
2. R.K. Jain, "Engineering Metrology", 20th edition, Khanna Publishers, 2013.

Reference Books:

1. Mahajan, "Engineering Metrology", 2nd edition, Dhanpat Rai, 2013.
2. S.Bhaskar, Basic Principles - Measurments and Control Systems, Anuradha Publications, 2014.

3. Anand K Bewoor & Vinay A Kulkarni, “Metrology & Measurement”, 15th edition, McGrawHill, 2015

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0312	3	0	0	3	CIA	30 M
Course Title	:	**AUTOMOTIVE TRANSMISSION SYSTEM**					SEE	70 M

Course Objectives:

- Explain operation and performance of various clutches and gear boxes.
- Familiarize hydrodynamic drives.
- Teach various types of gear boxes used for automotive transmission
- Impart principle of operation and performance of various hydrostatic and electric drives provide.
- Identify the applications of automatic transmission

UNIT – I

Clutch & gear box: Requirements of transmission system and role of clutch in driving system, Types of Clutches, Construction and Working of Single Plate, Multi Plate, Cone Clutch, Centrifugal and Semi Centrifugal clutch and its operating characteristics, Equation for torque capacity of a single plate clutch. Need for a gear box in an automobile and types of Gear boxes – Construction and working of Sliding mesh, Constant mesh gear box, Synchromesh gear box and principle of synchronizers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the requirements of transmission system (L2)
- Recognize the role of clutch in driving system (L1)
- List various types of clutches. (L1)
- Explain the need of gear box in an automobile (L2)
- Discuss the construction and working principles of gear boxes (L3)

UNIT II:

Gear trains: Construction and working Principle of Epi-cyclic gear train, Planetary gear box, Ford T Model gear box, Wilson gear box, Cotal electromagnetic transmission and Automatic over drive. Gear ratios for Wilson gear box and Automatic Over drive. Hydraulic control system for Automatic transmission.

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate working of epic cyclic and planetary gear boxes. (l2)
- Explain electromagnetic transmission.(l2)

- Demonstrate hydraulic control system for automatic transmission. (l2)

UNIT – III

Hydrostatic drives: Introduction to hydrostatic drives, Working principle, types, Advantages and limitations of Hydrostatic drives, Comparison of hydrostatic drive with hydro dynamic drive, Construction and working of Janny Hydrostatic drive.

Hydrodynamic and hydrokinetic drives: Introduction to fluid coupling, Fluid coupling – Construction, Principle of operation and Performance characteristics, Drag torque and various drag reducing devices of fluid coupling, Problems on design and torque capacity of fluid coupling, Construction and working of Torque converter, converter coupling, Multistage torque converter, and Poly phase torque converter - Performance characteristic of multistage and poly phase torque converters.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain hydrostatic drives. (l2)
- Differentiate hydrostatic and hydrodynamic drives. (l2)
- Summarize construction and working of janny hydrostatic drive. (l2)
- Give the advantages and limitations of hydrostatic drives.
- Solve the problems on fluid coupling and will be able to predict the torque capacity.

UNIT IV:

Automatic transmission: Layout of Automatic transmission system, construction and working of Turbo glide transmission, Power glide transmission, ECT- intelligent transmission, Automatic transmission with intelligent electronic control systems, Hydraulic clutch actuation for Automatic transmission.

Learning Outcomes:

At the end of this unit, the student will be able to

- Draw layout of automatic transmission system. (l3)
- Compare construction and working different types of transmission. (l4)
- Explain the working of turbo glide transmission and power glide transmission(l3)
- Identify the importance of intelligent electronic control systems in automatic transmission.(l2)
- Demonstrate hydraulic clutch activation for automatic transmission. (l2)

UNIT V:

ELECTRIC DRIVES: Introduction to Electric drive: Layout Advantages, limitations and performance characteristics of Electric drive, Principle of Early Ward Leonard control system of electric drive. Principle of Modified Ward Leonard control system of electric drive.

Course Outcomes:

At the end of this course, the student will be able to

- Understand the working principles of clutches and gearboxes
- Analyze the working of planetary gear box systems.
- Identify the differences between the hydrostatic and hydrodynamic drives.
- Discuss various types of automatic transmission systems
- Design the automatic transmission system.

Text books

1. Harald Naunheimer , Bernd Bertsche , Joachim Ryborz , Wolfgang Novak "Automotive Transmission: Fundamentals, Selection, Design and Application", 2nd Edition, Springer, 2011.

Reference books

1. Heldt P.M, "Torque converters", Chilton Book Co., 1992.
2. Newton Steeds & Garrot, "Motor Vehicles", SAE International and Butterworth Heinemann, 2001.
3. CDX Automotive, "Fundamentals of Automotive Technology, Principles and practice", Jones & Barlett Publishers, 2013.
4. SAE Transactions 900550 & 930910.
5. Crouse W.H, Anglin D.L, "Automotive Transmission and Power Train construction", McGraw Hill, 1976.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0311	3	0	0	3	CIA	30 M
Course Title	:	**ADDITIVE MANUFACTURING**					SEE	70 M

Course Objectives

- Familiarize of additive manufacturing / rapid prototyping and its applications in various fields.
- Impart reverse engineering technologies.
- Explain different processes available in additive manufacturing.
- Bring awareness on 3d printing materials and geometric issues related to additive manufacturing applications.

UNIT – I **10 Hours**

Introduction to Additive Manufacturing (AM) Systems: History and Development of AM, Need of AM, Difference between AM and CNC, Classification of AM Processes: Based on Layering Techniques, Raw Materials and Energy Sources, AM Process Chain, Benefits and Applications of AM, Representation of 3D model in STL format, RP data formats: SLC, CLI, RPI, LEAF, IGES, CT, STEP, HP/GL.

Learning Outcomes:

At the end of the unit, the student will be able to

- Identify the applications for additive manufacturing processes. (l3)
- Explain the process of additive manufacturing. (l2)
- Represent a 3d model in stl format and other rp data formats to store and retrieve the geometric data of the object. (l3)

UNIT – II **8 Hours**

CAD & Reverse Engineering: Basic Concept, Digitization techniques, Model Reconstruction, Data Processing for Additive Manufacturing Technology: CAD model preparation, Part Orientation and support generation, Model Slicing, Tool path Generation, Software's for Additive Manufacturing Technology: MIMICS, MAGICS. Reverse Engineering (RE) –Meaning, Use, RE – The Generic Process, Phase of RE Scanning, Contact Scanners, Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Learning Outcomes:

At the end of the unit, the student will be able to

- Apply various digitalization techniques. (l3)
- Explain the concept of reverse engineering and scanning tools. (l2)

UNIT – III **8 Hours**

Solid and Liquid Based AM Systems: Stereolithography (SLA): Principle, Process, Materials, Advantages, Limitations and Applications. Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications. Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications. Laminated Object Manufacturing (LOM): Principle, Process, Materials, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the principles, advantages, limitations and applications of solid and liquid based AM systems. (L2)
- Identify the materials for solid and liquid based AM systems. (L3)

UNIT – IV **8 Hours**

Powder Based AM Systems: Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the principles, advantages, limitations and applications of powder based AM systems. (L2)
- Apply SLS, LENS and EBM 3D printing methods. (L3)

UNIT – V **8 Hours**

Other Additive Manufacturing Systems: Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitationsand Applications. Ballistic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain principles and limitation of 3D printing using BPM and SDM. (L2)
- Use BPM and SDM 3D printing methods. (L3)

Course Outcomes:

At the end of the course, the student will be able to

- Demonstrate various additive manufacturing and rapid prototyping techniques applications.
- Describe different additive manufacturing processes.
- Apply methods in rapid prototyping.
- Use powder based am system.
- Model 3d printing using sdm and bpm methods.

Text Books:

1. Ian Gibson, David W. Rosen, Brent Stucker, “Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing”, 1st edition, Springer, 2010.
2. Chua C.K., Leong K.F. and Lim C.S., “Rapid Prototyping: Principles and Applications”, 2nd edition, World Scientific Publishers, 2003.
3. Liou W. Liou, Frank W., Liou, “Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development”, CRC Press, 2007.

Reference Books:

1. Pham D.T. and Dimov S.S., “Rapid Manufacturing; The Technologies and Application of RPT and Rapid Tooling”, Springer, London 2001.
2. Gebhardt A., “Rapid prototyping”, Hanser Gardener Publications, 2003.
3. Hilton P.D. and Jacobs P.F., “Rapid Tooling: Technologies and Industrial Applications”, CRC Press, 2005.
4. RafiqNoorani, “Rapid Prototyping: Principles and Applications in Manufacturing”, John Wiley & Sons, 2006.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0313	3	0	0	3	CIA	30 M
Course Title	:	**MECHANICS OF COMPOSITE MATERIALS**					SEE	70 M

Course Objectives:

- Understand the properties of composite materials.
- Familiarize the manufacturing methods for composites.
- Teach the practical requirements associated with joining and manufacturing

UNIT-1

Introduction To Composite Materials

Introduction To Composite Materials: Definition, classification and characteristics of composite Materials – fibrous composites, laminated composites, particulate composites. **Applications:** Automobile, Aircrafts. missiles. Space hardware, Electrical and electronics, Marine, recreational and sports equipment, future potential of composites.

Fiber Reinforced Plastic Processing: Lay up and curing, fabricating process, open and closed mould process, hand layup techniques; structural laminate bag molding, production procedures for bag molding; filament winding, pultrusion, pulforming, thermo-forming, injection molding, blow molding.

Learning Outcomes:

At the end of this student, the student will be able to

- Define Composite Materials. (L1)
- List the applications of composite materials. (L1)
- Compare open and closed mould process. (L3)
- Demonstrate the processing methods of ceramic materials. (L3)

UNIT-2

Micro Mechanical Analysis of a Lamina:

Micro Mechanical Analysis of a Lamina: Introduction, Evaluation of the four elastic moduli by Rule of mixture, Numerical problems.

Macro Mechanics of a Lamina: Hooke's law for different types of materials, Number of elastic constants, Two - dimensional relationship of compliance and stiffness matrix. Hooke's law for
two-dimensional angle lamina, engineering constants - Numerical problems. Stress-Strain relations for lamina of arbitrary orientation, Numerical problems.

Learning Outcomes:

At the end of this student, the student will be able to

- Solve numerical problems on evaluation of the four elastic moduli by rule of mixture.. (L4)
- Understand the hooke's law for different types of materials. (L2)
- Explain the two dimensional relationship of compliance and stiffness matrix. (L2)
- Discuss the stress strain relationship for lamina of arbitrary orientation. (L2)

UNIT-3

Biaxial Strength Theories

Maximum stress theory, Maximum strain theory, Tsai-Hill theory, Tsai, Wu tensor theory, Numerical problems.

Macro Mechanical Analysis of Laminate

Introduction, code, Kirchoff hypothesis, CL T, A, B, and D matrices (Detailed derivation) , Special cases of laminates, Numerical problems.

Learning Outcomes:

At the end of this student, the student will be able to

- Discuss the maximum stress theory and maximum strain theory. (L2)
- Differentiate between CL, T, A, B and D matrices. (L4)
- List the special cases of macro mechanical analysis of laminates (L1)
- Solve problems on Kirchoff hypothesis. (L4)

UNIT-4

Metal Matrix Composites: Metal Matrix Composites: Reinforcement materials, types, characteristics and selection base metals selection. Need for production MMC's and its application.

Fabrication Process For MMC's: Powder metallurgy technique, liquid metallurgy technique and secondary processing, special fabrication techniques.

Study Properties Of Mmc's: Physical Mechanical, Wear, machinability and Other Properties. Effect of size, shape and distribution of particulate on properties.

Learning Outcomes:

At the end of this student, the student will be able to

- Identify the importance of metal matrix composites. (L2)
- Give the applications of metal matrix composites (L1)
- Recall the fabrication processes for MMC's. (L1)
- Demonstrate on the various properties of MMC's. (L2)

UNIT-5

Failure Theories: Micromechanics of Failure of Unidirectional Lamina, Anisotropic Strength and Failure Theories, Importance of Shear Strength, Choice of Failure Criteria, Examples.

Learning Outcomes:

At the end of this student, the student will be able to

- Discuss the failure theories of unidirectional lamina. (L2)
- Explain the anisotropic strength of unidirectional lamina . (L2)
- Understand the choice of failure criteria with help of examples. (L2)

Course Outcomes:

At the end of the course, the student will be able to

- Design and manufacture composite materials for various applications. (L5)
- Conduct mechanical testing of composite structures and analyse failure modes. (L4)
- Synthesize structures for environmental effects. (L5)
- Analyse economic aspects of using composites. (L4)

Text Books

1. K.K. Chawla, "Composite Materials", Springer-Verlag, New York. (1998),
2. Madhujit Mukhopadhya, "Mechanics of composite materials and structures",. Universities Press 2004.

References

1. B.T. Astrom “Manufacturing of Polymer Composites”, Chapman & Hall. , (1997),
2. Stuart M Lee, J. Ian Gray, Miltz, “Reference Book for Composites Technology”, CRC press. (1989),
3. Frank L Matthews and R D Rawlings, “Composite Materials: Engineering and Science”, Taylor and Francis. (2006),
4. D. Hull and T.W. Clyne, “Introduction to Composite Materials”, Cambridge University Press. (1996),
5. M.R. Piggott, “Load Bearing Fibre Composites”, Pergamon press, Oxford. (1998),
6. F. Ashby and D.R.H. Jones, (1999), Engineering Materials, Pergamon press.
7. R.W. Davidge and A. Kelly, (1999), Mechanical behavior of ceramics, Cambridge University press.
8. Andrew C. Marshall, (1998), Composite Basics, Marshall Consulting. Mode of Evaluation Quiz/Assignment/ Seminar/Written Examination.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0315	3	0	0	3	CIA	30 M
Course Title	:	**SOLAR AND WIND ENERGY**					SEE	70 M

Course Objectives:

The main objectives of this course are to make the student

- Familiarize with basics of solar radiation, available solar energy and its measurement.
- Familiarize with solar collectors, construction and operation of solar collectors.
- Understand solar energy conversion systems, applications and power generation.
- Familiarize the wind energy sources assessment
- Explain basics of designing aerofoil

UNIT – I:

Solar radiation and collectors: Solar angles – Sun path diagrams – Radiation - extra terrestrial characteristics - measurement and estimation on horizontal and tilted surfaces - flat plate collector thermal analysis - testing methods-evacuated tubular collectors - concentrator collectors

– classification - design and performance parameters - tracking systems - compound parabolic concentrators - parabolic trough concentrators - concentrators with point focus - Heliostats – performance of the collectors.

Solar thermal technologies: Principle of working, types, design and operation of - Solar heating and cooling systems - Thermal Energy storage systems – Solar Desalination – Solar cooker : domestic, community – Solar pond – Solar drying.

Learning Outcomes:

At the end of this course, the student will be able to

- Explain the basic concepts of solar radiation and solar collectors (L2)
- Develop sun path diagrams (L3)
- Explain the concepts of tracking systems (L2)
- Discuss the working principles of solar thermal technologies (L6)
- Develop design and operation of solar heating and cooling systems (L3)
- Explain the principles of thermal storage systems (L2)

UNIT – II

Solar PV fundamentals: Semiconductor – properties - energy levels - basic equations of semiconductor devices physics. Solar cells - p-n junction: homo and hetro junctions - metal- semiconductor interface - dark and illumination characteristics - figure of merits of solar cell - efficiency limits - variation of efficiency with band-gap and temperature - efficiency measurements - high efficiency cells – Solar thermo-photovoltaics.

SPV system design and applications: Solar cell array system analysis and performance prediction- Shadow analysis: reliability - solar cell array design concepts - PV system design - design process and optimization - detailed array design - storage autonomy - voltage regulation - maximum tracking - centralized and decentralized SPV systems - stand alone - hybrid and grid connected system - System installation - operation and maintenances - field experience - PV market analysis and economics of SPV systems.

Learning Outcomes:

At the end of this course, the student will be able to

- Explain the properties of a semiconductor (L2)
- Apply the principles of solar thermo photovoltaics (L3)
- Outline the applications of SPV system (L2)
- Analyze the performance of a solar cell array system (L4)
- Utilize centralized and decentralized SPV systems (L3)

UNIT III

Introduction: Historical Perspectives on Wind Turbines- Indian Energy Scenario - Global Energy Scenario - Introduction to Indian Wind Industry - Wind Energy potential of India and Global Wind Installations.

Basics of Wind Resource Assessment: Power in the wind –Wind Characteristics - Measurement of wind using anemometers (cup anemometer, propeller anemometer, pressure plate anemometer, pressure tube anemometer, sonic anemometer and other remote wind speed sensing techniques) –Turbulence-Wind Power Density –Average wind speed calculation - Statistical models for wind data analysis (Weibull and Rayleigh distribution). Energy estimation of wind regimes – Wind Rose, Wind Monitoring Station Siting and Instrumentation.

Learning Outcomes:

After completion of this unit, students will be able to

- Recall historical perspective of wind turbines(L1)
- Relate Indian and globalenergy requirements(L1)
- Interpret power in the wind (L2)
- Classify different wind speed measuring instruments(L2)
- Apply different statistical models for wind data analysis (L3)

UNIT - IV

Wind Energy Conversion Systems: Types - Components of Modern Wind Turbine (HAWT and VAWT) - Fixed and Variable Speed operations - Power Control (Passive stall, Active pitch, Passive pitch and Active stall) - Electrical aspects of wind turbine, Safety of wind turbines.

Learning Outcomes:

After completion of this unit, students will be able to

- Utilize different wind parameters for design of rotor (L3)
- Make use of power curve for energy estimation (L3)
- List different components of modern wind turbine (L1)
- Explain how to control the power of a wind turbine (L2)
- Name different safety measures of wind turbine (L1)

UNIT V

Wind Farm Design and Health (Condition) Monitoring: Planning of wind farm, Site selection, Micro siting, Grid Integration, Power evacuation, Wind Farm Feasibility Studies, Preparation of DPR, Environmental Benefits and Impacts.

Small Wind Turbines: Water pumping wind mills, offshore wind energy, Wind turbine testing, future developments.

Learning Outcomes:

After completion of this unit, students will be able to

- Plan the wind farm(L3)
- Analyze the feasibility of wind farm(L4)
- List the environmental benefits and impacts (L1)
- Explain about small wind turbines(L2)

Text Book(s)

1. Goswami D.Y., Kreider, J. F. and Francis., "Principles of Solar Engineering', Taylor and Francis, 2000.
2. Chetan Singh Solanki, "Solar Photovoltatics – Fundamentals, Technologies and Applications", PHI Learning Private limited, 2011.
3. Sukhatme S.P.,. Nayak.J.P, 'Solar Energy – Principle of Thermal Storage and collection", Tata McGraw Hill, 2008.
4. Sathyajith Mathew, "Wind Energy Fundamentals, Resource Analysis and Economics", Springer Publications, (2006).
5. Wei Tong, "Wind Power Generation and Wind Turbine Design", WIT Press, (2010).

References:

1. Farm, and Business, Paul Gipe, "Wind Power, Revised Edition: Renewable Energy for Home", Chelsea Green Publishing, 2004,.

2. A. R. Jha, “Wind Turbine Technology”, CRC Press, (2010).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0314	3	0	0	3	CIA	30 M
Course Title	:	**PRODUCTION AND OPERATIONS MANAGEMENT**					SEE	70 M

Course Objectives:

At the end of the course, the student will be able to learn

- Introduction to the technical design and manufacturing operations and supply management to the sustainability of an enterprise.
- Need for forecasting and types of forecasting.
- Import the basic principles of project management and other business functions such as value engineering, purchasing, marketing, finance etc.
- Analyze the new demands of the globally competitive business environment that supply chain managers face today.
- Knowledge on various scheduling algorithms applicable to single machine, parallel machines, flow shop and job shop models.

UNIT – I **10 Hours**

Introduction: Operations Management – Definition, Objectives, Types of Production System, Difference between OM & PM, Historical Development of Operations Management, Current Issues in Operation Management, Product Design – Requirements of Good Product Design, Product Development – Approaches, Concepts in Product Development, Standardization, Simplification, Speed to Market, Introduction to Concurrent Engineering.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of operations management, production systems.(L1)
- Analyze steps in design a new product.(L4)

UNIT – II **8 Hours**

Forecasting: Introduction, Statistical Forecasting Techniques, Moving Average, Exponential Smoothing Technique, Errors in Forecasting and Evaluation of Forecasting Techniques.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concept of forecasting.(L1)
- Understand and analyze the various methods of forecasting.(L1)

UNIT – III **8 Hours**

Value Engineering and Plant Layout: Value Engineering – Objectives, Types of Values, Function and Cost, Product Life Cycle, Steps in Value Engineering, Methodology in Value Engineering, FAST Diagram and Matrix Method. Facility Location and Layout – Factor Considerations in Plant Location, Comparative Study of Rural and Urban Sites, Methods of Selection of Plant Layout, Objectives of Good layout, Principles, Types of Layout, Line Balancing.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of value engineering.(L1)
- Identify the factors for locating a Plant Layout.(L3)
- Understand types of plant layout and line balancing.(L1)

UNIT – IV **8 Hours**

Aggregate Planning and MRP: Aggregate Planning – Definition, Different Strategies, Various Models of Aggregate Planning- Transportation and Graphical Models, Master scheduling, Material Requirement Planning(MRP)- Terminology, Types of Demands, Inputs to MRP, Techniques of MRP, Lot Sizing Methods, Benefits and Drawbacks of MRP, Manufacturing Resources Planning (MRP II), Just in Time (JIT) Philosophy, Kanban System, Calculation of Number of Kanbans, Pull Systems vs. Push Systems, Requirements for Implementation of JIT, JIT Production Process, Benefits of JIT.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of aggregate planning, material requirement planning and JIT.(L1)
- Implement the concepts of JIT.(L5)

UNIT – V **8 Hours**

Scheduling: Policies, Types of Scheduling, Scheduling Strategies, Scheduling and Loading Guidelines, Forward and Backward Scheduling, Grant Charts, Priority Decision Rules, Flow Shop Scheduling, Job Shop Scheduling, Line of Balance.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand types and policies of scheduling.(L1)
- Analyze and implement single machine, parallel machine, flow shop, and job shop scheduling algorithms.(L6)

Course Outcomes:

At the end of the course, the student will be able to

- Demonstrate the operations and supply management to the sustainability of an enterprise.(L2)
- Identify the need for forecasting and understand different forecasting methods.(L3)
- Identify various production and plant layouts.(L3)
- Examine the quality control of the production.(L4)
- Apply Just in Time (JIT) basic principles and applications.(L2)
- Recommend the production schedule for productivity.(L4)
- Design, analyze and implement single machine, parallel machine, flow shop and job shop scheduling algorithms.(L6)

Text Books:

1. Buffa E.S. and Sarin R.K., “Modern Production / Operations Management”, 8th Edition, Wiley India Pvt. Ltd., New Delhi, 2009.
2. Joseph G. Monks, “Operations Management-Theory and Problems”, 3rd Edition, McGraw Hill Education, 1987.
3. Dipak Kumar Bhattacharyya, “Production and operations Management”, University press, 2012.

Reference Books:

1. James L. Riggs, Jim Rigs, “Production Systems: Planning, Analysis and Control”, 4th Edition, Wave Land Press, 1992.
2. Chary S.N., “Production and Operations Management”, 5th Edition, McGraw Hill Education, 2017.
3. Richard B.Chase, Ravi Shankar, Robert Jacobs F., “Operations and Supply Chain Management”, 15th Edition, McGraw Hill Education, 2018.
4. Pannerselvam R., “Production and Operations Management”, 3rd Edition, PHI Learning Pvt. Ltd., New Delhi, 2012.
5. Steven Nahmias, Tava Lennon Olsen, “Production and Operation Analysis: Strategy – Quality – Analytics – Applications”, 7th Edition, Waveland Press Inc., 2015.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0105	3	0	0	3	CIA	30 M
Course Title	:	**AIR POLLUTION AND CONTROL**					SEE	70 M

Course Objectives:

- To identify the sources of air pollution
- To know the composition and structure of atmosphere
- To know the pollutants dispersion models
- To understand the working of air pollution control equipments
- To identify the sources of noise pollution and their controlling methods

UNIT I

Introduction: sources, effects on – ecosystems, characterization of atmospheric pollutants, air pollution episodes of environmental importance. Indoor Air Pollution– sources, effects.

Learning Outcomes:

After completing this Unit, students will be able to

- To understand the character of atmospheric pollutants and their effects

UNIT II

Meteorology - composition and structure of the atmosphere, wind circulation, solar radiation, lapse rates, atmospheric stability conditions, wind velocity profile, Maximum Mixing Depth (MMD), Temperature Inversions, Wind rose diagram.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the composition and structure and structure of atmosphere
- To understand the maximum mixing depth and windrose diagram

UNIT III

General characteristics of stack emissions, plume behaviour, heat island effect. Pollutants dispersion models – description and application of point, line and areal sources. Monitoring of particulate matter and gaseous pollutants –respirable, non-respirable and nano - particulate
matter. CO, CO2, Hydrocarbons (HC), SOX and NOX, photochemical oxidants.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the general characteristics of stack emissions and their behavior
- To understand the monitoring of particulate matter and gaseous pollutants

UNIT IV

Air Pollution Control equipment for particulate matter & gaseous pollutants– gravity settling chambers, centrifugal collectors, wet collectors, fabric filters, electrostatic precipitator (ESP). – Adsorption, Absorption, Scrubbers, Condensation and Combustion.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the various air pollution control equipments

UNIT V

Noise - sources, measurements, effects and occupational hazards. Standards, Noise mapping, Noise attenuation equations and methods, prediction equations, control measures, Legal aspects of noise.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the noise sources, mapping, prediction equations etc.,

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Identify the sources of air pollution
- Understand the composition and structure and structure of atmosphere.
- Know about the general characteristics of stack emissions and their behavior
- Know about the general characteristics of stake emission and their behavior
- Know about the noise sources, mapping, prediction equations etc.,

REFERENCES:

1. WarkK ., Warner C.F., and Davis W.T., “Air Pollution - Its Origin and Control”, Harper & Row Publishers, New York.
2. Lee C.C., and Lin S.D., “Handbook of Environmental Engineering Calculations”, McGraw Hill, New York.
3. Perkins H.C., “Air Pollution”, McGraw Hill.
4. Crawford M., “Air Pollution Control Theory”, TATA McGraw Hill.
5. Stern A.C., “Air Pollution”, Vol I, II, III.
6. Seinfeld N.J.,, “Air Pollution”, McGraw Hill.
7. Stern A.C. Vol. V, “Air Quality Management”.
8. M N Rao and HVN Rao, Air Pollution” Tata McGraw Hill publication

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0106	3	0	0	3	CIA	30 M
Course Title	:	**BASICS OF CIVIL ENGINEERING**					SEE	70 M

Course Objectives:

- To identify the traditional materials that are used for building constructions
- To know the principles of building planning
- To know the causes of dampness in structures and its preventive measures
- To know about the low cost housing techniques
- To know the basic principles of surveying

UNIT I

Traditional materials: Stones- Types of stone masonry -Brick-types of brick masonry- lime Cement – Timber – Seasoning of timber - their uses in building works

Learning Outcomes:

After completing this Unit, students will be able to

- To understand the characteristics of different building materials.

UNIT II

Elements of building planning- basic requirements-orientation-planning for energy efficiency- planning based on utility-other requirements.

Learning Outcomes:

After completing this Unit, students will be able to

- To understand the principles of planning in buildings

UNIT III

Dampness and its prevention: Causes of dampness- ill effects of dampness-requirements of an ideal material for damp proofing-materials for damp proofing –methods of damp proofing.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the causes of dampness in buildings and its ill effects
- To know about the general characteristics of ideal material for damp proofing

UNIT IV

Cost effective construction techniques in mass housing schemes: Minimum standards –Approach to cost effective mass housing schemes- cost effective construction techniques.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the various cost effective techniques in mass housing schemes.

UNIT V

Introduction to Surveying: Object and uses of surveying- Primary divisions in surveying- Fundamental principles of surveying- Classification of surveying-plans and maps-scales-types of graphical scales- units and measurements

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the objects of surveying and its classification.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Identify the traditional building materials that are used in building construction.
- Plan the buildings based on principles of planning.
- Identify the sources of dampness and its ill effects on buildings and its prevention.
- Know the cost effective construction in mass housing schemes.
- Know the importance of surveying in planning of the buildings.

Text books:

1. S.S.Bhavikatti, "Basic civil engineering", New age international publishers.
2. S.S.Bhavikatti, "Building Construction:, Vikas Publishing house, New Delhi.
3. G.C.Sahu and Joygopal jena, "Building materials and Construction", McGraw Hill Education.

Reference books:

1. N.Subramanian, "Building Materials testing and sustainability", Oxford university press.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0204	3	0	0	3	CIA	30 M
Course Title	:	**RENEWABLE ENERGY SYSTEMS**					SEE	70 M

Course Objectives:

At the end of the course the student will be able to

- Identify various sources of Energy and the need of Renewable Energy Systems.
- Understand the concepts of Solar Radiation, Wind energy and its applications.
- Distinguish between solar thermal and solar PV systems
- Interpret the concept of geo thermal energy and its applications.
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

UNIT -I

Solar Energy

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy-thermal storage.

Learning Outcomes:

- At the end of the course the student will be able to
    - To understand about solar thermal parameters
    - To distinguish between flat plate and concentrated solar collectors
    - To know about thermal storage requirements
    - To know about measurement of solar radiation

UNIT – II

PV Energy Systems

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the concept of PV effect in crystalline silicon and their characteristics
- Understand other PV technologies
- To know about electrical characteristics of PV cells & modules
- To know about grid connected PV systems

UNIT - III

Wind Energy

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations.

Learning Outcomes:

After completing this Unit, students will be able to

- To understand basics of wind energy conversion and system
- To distinguish between VAWT and HAWT systems
- To understand about design considerations
- To know about site selection considerations of WECS

UNIT - IV

Geothermal Energy

Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the Geothermal energy and its mechanism of production and its applications
- Analyze the concept of producing Geothermal energies
- To learn about disadvantages and advantages of Geo Thermal Energy Systems
- To know about various applications of GTES

UNIT -V

Miscellaneous Energy Technologies

Ocean Energy: Tidal Energy-Principle of working, performance and limitations. Wave Energy- Principle of working, performance and limitations.
Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration **Fuel**

cell: Principle of working of various types of fuel cells and their working, performance and limitations.

Learning Outcomes:

After completing this Unit, students will be able to

- Analyze the operation of tidal energy
- Analyze the operation of wave energy
- Analyze the operation of bio mass energy
- Understand the principle, working and performance of fuel cell technology
- Apply these technologies to generate power for usage at remote centres

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells

Text Books:

1. Stephen Peake, "Renewable Energy Power for a Sustainable Future", Oxford International Edition, 2018.
2. G. D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, 2000.

References:

1. S. P. Sukhatme, "Solar Energy",3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd, 2008.
2. B H Khan , " Non-Conventional Energy Resources", 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
3. S. Hasan Saeed and D.K.Sharma,"Non-Conventional Energy Resources",3rd Edition, S.K.Kataria & Sons, 2012.
4. G. N. Tiwari and M.K.Ghosal, "Renewable Energy Resource: Basic Principles and Applications", Narosa Publishing House, 2004.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0203	3	0	0	3	CIA	30 M
Course Title	:	**ELECTRIC VEHICLE ENGINEERING**					SEE	70 M

Course Objectives:

After completing this Unit, students will be able to

- To get exposed to new technologies of battery electric vehicles, fuel cell electric vehicles
- To get exposed to EV system configuration and parameters
- To know about electro mobility and environmental issues of EVs
- To understand about basic EV propulsion and dynamics
- To understand about fuel cell technologies for EV and HVEs
- To know about basic battery charging and control strategies used in electric vehicles

UNIT-I

Introduction to EV Systems and Parameters

Past, Present and Future EV, EV Concept, EV Technology, State-of-the Art EVs, EV configuration, EV system, Fixed and Variable gearing, single and multiple motor drive, in-wheel drives, EV parameters: Weight, size, force and energy, performance parameters.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about past, present and latest technologies of EV
- To understand about configurations of EV systems
- To distinguish between EV parameters and performance parameters of EV systems
- To distinguish between single and multiple motor drive EVs
- To understand about in-wheel EV

UNIT-II

EV and Energy Sources

Electro mobility and the environment, history of Electric power trains, carbon emissions from fuels, green houses and pollutants, comparison of conventional, battery, hybrid and fuel cell electric systems

Learning Outcomes:

After completing this Unit, students will be able to

- To know about various types of EV sources
- To understand about e-mobility
- To know about environmental aspects of EV
- To distinguish between conventional and recent technology developments in EV systems

UNIT-III

EV Propulsion and Dynamics

Choice of electric propulsion system, block diagram, concept of EV Motors, single and multi motor configurations, fixed and variable geared transmission, In-wheel motor configuration, classification, Electric motors used in current vehicle applications, Recent EV Motors, Vehicle load factors, vehicle acceleration.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about what is meant by propulsion system
- To understand about single and multi motor EV configurations
- To get exposed to current and recent applications of EV
- To understand about load factors in vehicle dynamics
- To know what is meant acceleration in EV

UNIT-IV

Fuel Cells

Introduction of fuel cells, basic operation, model, voltage, power and efficiency, power plant system – characteristics, sizing, Example of fuel cell electric vehicle.
Introduction to HEV, brake specific fuel consumption, comparison of series, series-parallel hybrid systems, examples

Learning Outcomes:

After completing this Unit, students will be able to

- To know about fuel cell technology of EV
- To know about basic operation of FCEV
- To know about characteristics and sizing of EV with suitable example
- To get exposed to concept of Hybrid Electric Vehicle using fuel cells
- To know about the comparison of various hybrid EV systems

UNIT-V

Battery Charging and Control

Battery charging: Basic requirements, charger architecture, charger functions, wireless charging, power factor correction.
Control: Introduction, modelling of electro mechanical system, feedback controller design approach, PI controllers designing, torque-loop, speed control loop compensation, acceleration of battery electric vehicle

Learning Outcomes:

After completing this Unit, students will be able to

- To understand about basic requirements of battery charging and its architecture
- To know about charger functions
- To get exposed to wireless charging principle
- To understand about block diagram, modelling of electro mechanical systems of EV
- To be able to design various compensation requirements

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- To understand and differentiate between conventional and latest trends in Electric Vehicles
- To know about various configurations in parameters of EV system
- To know about propulsion and dynamic aspects of EV
- To understand about fuel cell technologies in EV and HEV systems
- To understand about battery charging and controls required of EVs

TEXT BOOKS:

1. C.C Chan, K.T Chau: “Modern Electric Vehicle Technology”, Oxford University Press Inc., New York 2001.
2. James Larminie, John Lowry, “Electric Vehicle Technology Explained”, Wiley, 2003.

REFERENCE BOOKS:

1. Iqbal Husain,, “Electric and Hybrid Vehicles Design Fundamentals”, CRC Press 2005.
2. Ali Emadi, “Advanced Electric Drive Vehicles”, CRC Press, 2015.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0306	3	0	0	3	CIA	30 M
Course Title	:	**FINITE ELEMENT METHODS**					SEE	70 M

Course Objectives:

- Familiarize basic principles of finite element analysis procedure.
- Explain theory and characteristics of finite elements that represent engineering structures.
- Apply finite element solutions to structural, thermal, dynamic problem.
- Learn to model complex geometry problems and solution techniques.

UNIT – I

Introduction to finite element methods for solving field problems, Stress and equilibrium, Boundary conditions, Strain-Displacement relations, Stress- strain relations for 2D and 3D Elastic problems.Potential energy and equilibrium, The Rayleigh-Ritz method, Formulation of Finite Element Equations.

One dimensional problems: Finite element modeling coordinates and shape functions. Assembly of global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concept of nodes and elements.(l2)
- Understand the general steps of finite element methods.(l2)
- Understand the role and significance of shape functions in finite element formulations (l2)
- Formulate and solve axially loaded bar problems. (l6)

UNIT - II

Analysis of trusses: Stiffness Matrix for plane truss element. Stress Calculations and Problems. **Analysis of beams:** Element Stiffness Matrix for two noded, two degrees of freedom per node beam element and simple problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the use of the basic finite elements for structural applications using truss and beam. (l2)

- Formulate and analyze truss and beam problems. (l6)

UNIT - III

Finite element modeling of two dimensional stress analysis - constant strain triangles- quadrilateral element-treatment of boundary conditions. Estimation of load Vector, Stresses.Finite element modeling of Axi-symmetric solids subjected to axi-symmetric loading with triangular elements.Two dimensional four nodedIsoparametric elements and problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the formulation of two – dimensional elements (Triangular and Quadrilateral Elements). (L2)
- Apply the formulation techniques to solve two – dimensional problems using triangle and quadrilateral elements. (L3)
- Formulate and solve axisymmetric problems.(L6)

UNIT - IV

Steady state heat transfer analysis: One dimensional analysis of slab and fin, two dimensional analysis of thin plate.

Analysis of a uniform shaft subjected to torsion loading.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the application and use of the Finite Element Methods for heat transfer problems. (L2)
- Formulate and solve heat transfer problems. (L6)
- Analyse the

UNIT V

Dynamic analysis: Formulation of finite element model,element –mass matrices,evaluation of Eigen values and Eigen vectors for a stepped bar truss.
3D Problems: Finite Element formulation- Tetrahedron element-Stiffness matrix.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand problems involving dynamics using Finite Element Methods.
- Evaluate the Eigen values and Eigen Vectors for steeped bar.
- Develop the stiffness matrix for tetrahedron element.

Course Outcomes:

Upon successful completion of this course you should be able to

- Understand the concepts behind variational methods and weighted residual methods in FEM.
- Identify the application and characteristics of FEA elements such as bars, beams, and isoparametric elements, and 3-D element.
- Develop element characteristic equation procedure and generation of global stiffness equation will be applied.
- Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
- Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer and fluid flow.

TEXT BOOKS

1. Chandraputla, Ashok &Belegundu, "Introduction to Finite Element in Engineering", Prentice Hall.
2. S.S.Rao, "The Finite Element Methods in Engineering", 2nd Edition, Elsevier Butterworth - Heinemann 2011.

REFERENCE BOOKS

1. J N Reddy, "An introduction to the Finite Element Method", McGraw – Hill, New York, 1993.
2. R D Cook, D S Malkus and M E Plesha, "Concepts and Applications of Finite Element Analysis", 3rd Edition, John Wiley, New York, 1989.
3. K J Bathe, "Finite Element Procedures in Engineering Analysis", Prentice-Hall, Englewood Cliffs,1982.
4. T J R Hughes, "the Finite Element Method, Prentice", Hall, Englewood Cliffs, NJ, 1986.
5. C Zienkiewicz and R L Taylor, "the Finite Element Method", 3rd Edition. McGraw-Hill, 1989.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0307	3	0	0	3	CIA	30 M
Course Title	:	**PRODUCT MARKETING**					SEE	70 M

Course Objectives

- Introduce the basic concepts of Product marketing.
- Familiarize with market information systems and research
- Understand the nature and importance of industrial market
- Discuss the major stages in new product development
- Identify the factors affecting pricing decisions

UNIT I:

Introduction **(7 Hours)**

Historical development of marketing management, Definition of Marketing, Core marketing concepts, Marketing Management philosophies, Micro and Macro Environment, Characteristics affecting Consumer behaviour, Types of buying decisions, buying decision process, Classification of consumer products, Market Segmentation Concept of Marketing Myopia. Importance of marketing in the Indian Socio economic system.

Learning Outcomes:

At the end of this student, the student will be able to

- Define Marketing. (L1)
- Discuss marketing philosophies. (L2)
- Sketch the buying decision process. (L3)
- Understand the importance of marketing in the Indian socio economic system. (L2)

UNIT II:

Marketing of Industrial Products **(6 Hours)**

Components of marketing information system–benefits & uses marketing research system, marketing research procedure, Demand Estimation research, Test marketing, Segmentation Research - Cluster analysis, Discriminate analysis. Sales forecasting: objective and subjective methods. Nature and importance of the Industrial market, classification of industrial products, participants in the industrial buying process, major factors influencing industrial buying behavior, characteristics of industrial market demand. Determinants of industrial market demand Buying power of Industrial users, buying motives of Industrials users, the industrial buying process, buying patterns of industrial users.

Learning Outcomes:

At the end of this student, the student will be able to

- Identify the components of marketing information system. (L2)
- List the advantages and uses of marketing research system. (L1)
- Demonstrate sales forecasting. (L3)
- Explain the major factors influencing industrial buying behaviour. (L2)

UNIT III:

Product Management And Branding **(7 Hours)**

The concept of a product, features of a product, classification of products, product policies – product planning and development, product line, product mix – factors influencing change in product mix, product mix strategies, meaning of "New – product; major stages in new – product development product life cycle. Branding: Reasons for branding, functions of branding features of types of brands, kinds of brand name.

Learning Outcomes:

At the end of this student, the student will be able to

- Indentify the factors influencing change in product mix. (L2)
- Sketch various stages in product life cycle. (L2)
- Recall the features of a product and product policies. (L1)
- Demonstrate on features, functions and reasons of branding. (L3)

UNIT IV:

Pricing And Pacakaging **(7Hours)**

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions Labeling: Types, functions advantages and disadvantages, Packaging**:** Meaning, growth of packaging, function of packaging, kinds of packaging.

Learning Outcomes:

At the end of this student, the student will be able to

- List the factors affecting pricing decisions. (L1)
- Explain the procedure for price determination. (L2)
- Employ Pricing strategies and decisions. (L3)
- Understand the functions of labelling and packaging. (L2)

UNIT V:

Product Promotion **(6Hours)**

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions. Advertising and sales promotion**:** Objectives of advertisement function of advertising, classification of advertisement copy, advertisement media – kinds of media, advantages of advertising. Objectives of sales promotion, advantages sales promotion. Personal Selling **:** Objectives of personal selling, qualities of good salesman, types of salesman, major steps in effective selling

Learning Outcomes:

At the end of this student, the student will be able to

- Discuss the procedures for price determination. (L2)
- Explain the objectives of advertisement function of advertising. (L2)
- List the advantages and disadvantages of advertising. (L1)
- Describe the major steps in effecting selling. (L2)

Course Outcomes:

At the end of the course, the student will be able to

- Understand basic marketing management concepts and their relevance to business development. (L2)
- Prepare a questionnaire for market research. (L5)
- Design marketing research plan for business organizations. (L5)
- Optimize marketing mix to get competitive advantage. (L4)

Text Books:

1. Philip Kotler, “Principles of Marketing”, Prentice – Hall.
2. Philip Kotler, “Marketing Management”, Prentice – Hall.

Reference Books:

1. Wiliam J Stanton, “Fundamentals of Marketing”, McGraw Hill
2. R.S.N. Pillai and Mrs.Bagavathi, “Marketing”, S. Chand & Co. Ltd
3. Rajagopal, “Marketing Management Text & Cases”, Vikas Publishing House

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0409	3	0	0	3	CIA	30 M
Course Title	:	**INTRODUCTION TO MICROCONTROLLERS & APPLICATIONS**					SEE	70 M

Course Objectives:

This course will enable students to:

- Describe the Architecture of 8051 Microcontroller and Interfacing of 8051 to external memory.
- Write 8051 Assembly level programs using 8051 instruction set.
- Describe the Interrupt system, operation of Timers/Counters and Serial port of 8051.
- Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051.

UNIT – I
8051 Microcontroller:

Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture-Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the importance of Microcontroller and acquire the knowledge of Architecture of 8051 Microcontroller. (L1)
- Analyze interface required memory of RAM & ROM. (L3)

UNIT – II

Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Bit manipulation instructions. Simple Assembly language program examples to usethese instructions.

Learning Outcomes:

At the end of this student, the student will be able to

- Explain different types instruction set of 8051. (L1)

- Develop the 8051 Assembly level programs using 8051 instruction set. (L3)

UNIT – III

8051 Stack, Stack and Subroutine instructions. Simple Assembly language program examples to use subroutine instructions.8051 Timers and Counters – Operation and Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode- 2 on a port pin.

Learning Outcomes:

At the end of this student, the student will be able to

Describe Stack and Subroutine of 8051. (L1)
Design Timer /counters using of 8051. (L4)

UNIT –IV

8051 Serial Communication- Basics of Serial Data Communication, RS- 232 standard, 9 pin RS232 signals, Simple Serial Port programming in Assembly and C to transmit a message and to receive data serially.**8051 Interrupts**. 8051 Assembly language programming to generate an external interrupt using a switch.

Learning Outcomes:

At the end of this student, the student will be able to

- Acquire knowledge of Serial Communication and develop serial port programming. (L1)
- Develop an ALP to generate an external interrupt using a switch. (L3)

UNIT – V

8051 C programming to generate a square waveform on a port pin using a Timer interrupt. Interfacing 8051 to ADC-0804, DAC, LCD and Interfacing with relays and opto isolators, Stepper Motor Interfacing, DC motor interfacing, PWM generation using 8051.

Learning Outcomes:

At the end of this student, the student will be able to

- Apply and Interface simple switches, simple LEDs, ADC 0804 and LCD to using 8051 I/O ports. (L2)
- Design Stepper Motor and f motor interfacing of 8051. (L4)

Course outcomes:

- Understand the importance of Microcontroller and Acquire the knowledge of Architecture of 8051 Microcontroller.
- Apply and Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to using 8051 I/O ports.
- Develop the 8051 Assembly level programs using 8051 instruction set.
- Design the Interrupt system, operation of Timers/Counters and Serial port of 8051.

TEXT BOOKS:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; “The 8051 Microcontroller and Embedded Systems – using assembly and C”, PHI, 2006 / Pearson, 2006.
2. Kenneth J. Ayala, “The 8051 Microcontroller”, 3rd Edition, Thomson/Cengage Learning.

REFERENCE BOOKS:

1. Manish K Patel, “The 8051 Microcontroller Based Embedded Systems”, McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. Raj Kamal, “Microcontrollers: Architecture, Programming, Interfacing and System Design”, Pearson Education, 2005.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0411	3	0	0	3	CIA	30 M
Course Title	:	**PRINCIPLES OF DIGITAL SIGNAL PROCESSING**					SEE	70 M

Course Objectives:

- To explain about signals and perform various operations on it.
- To understand discrete time signals and systems.
- To solve Laplace transforms and z-transforms for various signals.
- To find Discrete Fourier Transform of a sequence by using Fast Fourier Transform.
- To design and realize IIR and FIR filters.

UNIT- I:

INTRODUCTION TO SIGNALS

Classification of Signals: Analog, Discrete, Digital, Deterministic & Random, Periodic & Aperiodic, Even & Odd, Energy & Power signals. Basic operations on signals: Time shifting, Time scaling, Time reversal, Amplitude scaling and Signal addition. Elementary Signals: Unit step, Unit ramp, Unit parabolic, Impulse, Sinusoidal function, Exponential function, Gate function, Triangular function, Sinc function and Signum function.

Learning Outcomes:

At the end of this student, the student will be able to

- Define basic signals and its operations, Classify discrete time signals and systems. (L1)
- Understand various basic operations on signals (L1)

UNIT – II:

DISCRETE TIME SIGNALS AND SYSTEMS

Discrete Time Signals: Elementary discrete time signals, Classification of discrete time signals: power and energy signals, even and odd signals. Simple manipulations of discrete time signals: Shifting and scaling of discrete-time signals.

Discrete Time Systems: Input-Output description of systems, Block diagram representation of discrete time systems, Linear Constant Coefficient Difference Equations, Classification of discrete time systems: linear and nonlinear, time-invariant and variant systems, causal and non causal, stable and unstable systems.

Learning Outcomes:

At the end of this student, the student will be able to

- Define basic signals and its operations, Classify discrete time signals and systems. (L1)
- Understand various basic operations on signals (L1)

UNIT- III:

LAPLACE TRANSFORMS AND Z- TRANSFORMS

Laplace Transforms: Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of Region of Convergence (ROC), Constraints on ROC for various classes of signals, Properties of Laplace transforms.
Z-Transforms: Concept of Z-transform of a discrete sequence, Region of convergence in Z- Transform, constraints on ROC for various classes of signals, inverse Z-transform, properties of Z-Transforms.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the basic concepts of Laplace and Z transforms (L1)
- Apply the transform techniques to solve the problems (L2)

UNIT – IV:

FAST FOURIER TRANSFORMS

Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Radix-2 Fast Fourier Transforms (FFT), Decimation in Time and Decimation in Frequency FFT Algorithms: radix-2 DIT-FFT, DIF-FFT, and Inverse FFT: IDFT-FFT.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the importance of DTFT, DFT, FFT and their inverse transforms with respect to signals and systems (L1)
- Analyze the Decimation in time and frequency algorithms (L3)

UNIT – V:

IIR AND FIR DIGITAL FILTERS

IIR DIGITAL FILTERS: Analog filters approximations: Butterworth and Chebyshev, Design of IIR digital filters from analog filters. Realization of IIR filters: Direct form-I, Direct form-II, cascade form and parallel form.
FIR DIGITAL FILTERS: Characteristics of FIR digital filters, frequency response. Design of FIR digital

filters using window techniques: Rectangular window, Triangular or Bartlett window, Hamming window, Hanning window, Blackman window. Realization of FIR filters: Linear phase and Lattice structures.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the importance of IIR and FIR digital Filters (L1)
- Realize IIR filters and analyze various windowing techniques in FIR filters (L2)
- Design IIR and FIR filters (L4)

Course outcomes:

- Define basic signals and its operations, Classify discrete time signals and systems.
- Solve Laplace Transform and z-Transform for various signals, Calculate DFT of a given sequence by using Fast Fourier Transform.
- Analyze the continuous and discrete signals and systems
- Design and realize IIR and FIR filters from the given specifications.

TEXT BOOKS:

1. B. P. Lathi, “Signals, Systems and Communications”, BS Publications, 2008.
2. John G. Proakis, Dimitris G. Manolakis, “Digital signal processing, principles, Algorithms and applications” , 4th edition , Pearson Education/PHI, 2007.
3. A.V. Oppenheim and R.W. Schaffer, “Discrete Time Signal Processing”, 2nd edition., PHI.

REFERENCES:

1. A.V. Oppenheim, A.S. Will sky and S.H. Nawab, “Signals and Systems”, PHI, 2nd Edition, 2013.
2. A. Anand Kumar, “Signals and Systems”, PHI Publications, Third Edition, 2013
3. P. Ramesh Babu. “Digital Signal Processing”.
4. Andreas Antoniou, “Digital signal processing”, Tata McGraw Hill, 2006.
5. R S Kaler, M Kulkarni,, Umesh Gupta, “A Text book on Digital Signal processing” –I K International Publishing House Pvt. Ltd.
6. M H Hayes, Schaum’s Outlines, “Digital Signal Processing”, Tata Mc-Graw Hill, 2007.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

(Common to CSE & IT)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0509	3	0	0	3	CIA	30 M
Course Title	:	**FUNDAMENTALS OF GAME DEVELOPMENT**					SEE	70 M

Course Objectives:

This course is designed to:

- Get familiarized with the various components in a game and game engine.
- Explore the leading open source game engine components.
- Elaborate on game physics.
- Introduce to the game animation.
- Expose to network-based gaming issues.

Unit – 1: Introduction to Game

What is a Game? The Birth of Games, The Rise of Arcade Games, The Crash and Recovery, The Console Wars, Online Games and Beyond.

The Game Industry: Game Industry Overview, Game Concept Basics, Pitch Documentation, pitching a Game to a Publisher, Managing the developer-Publisher Relationship, Legal Agreements, Licenses, Console Manufacturers Approval.

Roles on the Team: Production, Art, Engineering, Design, Quality Assurance Testing, Team Organization, Corporate.

Learning Outcomes:

After completing this Unit, students will be able to

- Demonstrate online games and beyond. [L2]
- Outline the process carried out in the Game Industry [L2]
- Inspect the roles on the Team[L4]

Unit – 2: Teams

Project Leadership, Picking Leads, Team Building, Team Buy-in and Motivation.

Effective Communication: Written Communication, Oral Communication, Nonverbal Communication, Establishing Communication Norms, Communication Challenges.

Game Production Overview: Production Cycle, Preproduction, Production, Testing, Postproduction.

Learning Outcomes:

After completing this Unit, students will be able to

- Build a team and pick a leader. [L6]
- Develop Effective communication. [L3]
- Outline the Game Production cycle [L2]

Unit – 3: Game Concept

Introduction, Beginning the Process, Defining the Concept, Game Programming Basics, Prototyping, Risk Analysis, Pitch Idea, Project Kickoff.

Characters, setting, and Story: Story Development, Gameplay, Characters, Setting, Dialogue, Cinematics, Story Documentation.

Game Requirements: Define Game Features, Define Milestones and Deliverables, Evaluate Technology, Define Tools and Pipeline, Documentation, Approval, Game Requirements Outline

Learning Outcomes:

After completing this Unit, students will be able to

- Design a game. [L6]
- Demonstrate the game play. [L2]
- Identify the Game requirements [L3]

Unit – 4 : Game Plan

Dependencies, Schedules, Budgets, Staffing, Outsourcing, Middleware, Game Plan Outline. **Production Cycle**: Design Production Cycle, Art Production Cycle, Engineering Production Cycle, Working Together.
Voiceover and Music: Planning for Voiceover, choosing a Sound Studio, Casting Actors, Recording Voiceover, Voiceover Checklist, Planning for Music, Working with a Composer, Licensing Music.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the Game plan. [L2]
- Define the production cycle. [L1]
- Make use of voiceover and music in game development. [L3]

Unit – 5 :Localization

Creating International Content, Localization-Friendly Code, Level of Localization, Localization Plan, Testing, Localization Checklist.

Testing and Code Releasing: Testing Schedule, Test Plans, Testing Pipeline, Testing Cycle, External Testing, Determining Code Release, Code Release Checklist, Gold Masters, Postmortems.

Marketing and Public Relations: Software Age Ratings, Working with Marketing, Packaging, Demos, Marketing Assets, Game Builds, Working with Public Relations, Asset Deliverable Checklist.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the importance of localization. [L2]
- Summarize Testing and code releasing [L2]
- Illustrate Marketing and public relations. [L2]

Course Outcomes:

Upon completion of the course, the students should be able to:

- Design games for commercialization (L6)
- Predict the trends in game development (L5)
- Design Game Plan and production cycle (L6)
- Dramatize the game playing environment (L4)

Text Book:

1. Heather Maxwell Chandler, and Rafael Chandler, "Fundamentals of Game Development", Jones& Bartlett Learning, 2011.

References:

1. Flint Dille and John Zuur Platten, The Ultimate guide to Video Game Writing, Loan Eagle publisher, 2008.
2. Adams, Fundamentals of Game Design, 3rd edition, Pearson Education India, 2015.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0508	3	0	0	3	CIA	30 M
Course Title	:	**CYBER SECURITY**					SEE	70 M

Course Objectives:

This course is designed to:

- Understand essential building blocks and basic concepts of cyber security
- Explore Web security and Network security
- Explain the measures for securing the networks and cloud
- Understand privacy principles and policies
- Describe the legal issues and ethics in computer security

UNIT I

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control, and Cryptography, Authentication, Access Control, Cryptography.
Programs and Programming: Unintentional (Non-malicious) Programming Oversights, Malicious Code—Malware, Countermeasures.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain Vulnerabilities, threats and. Counter measures for computer security[L2]
- Interpret the design of the malicious code [L2]

UNIT II

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks.
Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the attacks on browser, Web and email. [L2]
- Explain the security aspects of Operating Systems. [L3]

UNIT III

Network Security: Network Concepts, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service Strategic Defenses:
Security Countermeasures, Cryptography in Network Security, Firewalls, Intrusion Detection and Prevention Systems, Network Management .
Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

Learning Outcomes:

After completing this Unit, students will be able to

- Identify the network security threats and attacks. [L3]
- Design the Counter measures to defend the network security attacks. [L6]
- Analyze the security tools and techniques for Cloud computing [L4]

UNIT IV

Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed.
Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

Learning Outcomes:

After completing this Unit, students will be able to

- Interpret the need for Privacy and its impacts of Emerging Technologies. [L2]
- Explain how to handle incidents and deal with Disaster. [L2]

UNIT V

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics, Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

Learning Outcomes:

After completing this Unit, students will be able to

- Adapt legal issues and ethics in computer security. [L6]
- Elaborate on the Emerging topics. [L6]

Course Outcomes:

Upon completion of the course, the students should be able to:

- Illustrate the broad set of technical, social & political aspects of Cyber Securityand security management methods to maintain security protection (L2)
- Assess the vulnerabilities and threats posed by criminals, terrorist and nation statesto national infrastructure (L5)
- Identify the nature of secure software development and operating systems (L3)
- Demonstrate the role security management in cyber security defense (l2)
- Adapt the legal and social issues at play in developing solutions.(L6)

Text Books:

1) Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5th edition.
2) Schneier, Bruce. Applied Cryptography, Second Edition, John Wiley & Sons, 1996

Reference Books:

1) Rhodes-Ousley, Mark. Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts and Practice, McGraw-Hill, 2013.
2) Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT and Infosec Managers. Boston, MA: Course Technology, 2011.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	HUMANITIES SCIENCES	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9908	2	0	0	2	CIA	30 M
Course Title	:	**MANAGEMENT SCIENCE**					SEE	70 M

Course objectives :

The objectives of this course are

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.
- To make the students understand the role of management in Production
- To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
- To make the students aware of the contemporary issues in management

UNIT- I

NTRODUCTION TO MANAGEMENT

Management - Concept and meaning - Nature-Functions - Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles - Eltan Mayo's Human relations - Systems Theory - **Organisational Designs** - Line organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of Organization - Social responsibilities of Management.

Learning Outcomes:

At the end if the Unit, the learners will be able to

- Understand the concept of management and organization
- Apply the concepts & principles of management in real life industry.
- Analyze the organization chart & structure for an enterprise.
- Evaluate and interpret the theories and the modern organization theory.

UNIT II

OPERATIONS MANAGEMENT

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control - Deming's contribution to Quality. **Material Management -** Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Purchase Procedure and Stores Management - **Marketing Management -** Concept - Meaning - Nature- Functions of Marketing - Marketing Mix - Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on Product Life Cycle.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand the core concepts of Management Science and Operations Management
- Apply the knowledge of Quality Control, Work-study principles in real life industry.
- Evaluate Materials departments & Determine EOQ
- Analyze Marketing Mix Strategies for an enterprise.
- Create and design advertising and sales promotion

UNIT III

HUMAN RESOURCES MANAGEMENT (HRM)

HRM - Definition and Meaning – Nature - Managerial and Operative functions - Evolution of HRM - Job Analysis - Human Resource Planning(HRP) - Employee Recruitment-Sources of Recruitment - Employee Selection - Process and Tests in Employee Selection - Employee Training and Development - On-the- job & Off-the-job training methods - Performance Appraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration

Learning Outcomes:

At the end if the Unit, the learners will

- Understand the concepts of HRM in Recruitment, Selection, Training & Development
- Apply Managerial and operative Functions
- Analyze the need of training
- Evaluate performance appraisal
- Design the basic structure of salaries and wages

UNIT IV
STRATEGIC & PROJECT MANAGEMENT

Definition& Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis - **Project Management -** Network Analysis - Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project within given time - Project Cost- Analysis - Project Crashing (Simple problems).

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand Mission, Objectives, Goals & strategies for an enterprise
- Apply SWOT Analysis to strengthen the project
- Analyze Strategy formulation and implementation
- Evaluate PERT and CPM Techniques
- Creative in completing the projects within given time

UNIT V

CONTEMPORARY ISSUES IN MANAGEMENT

The concept of Management Information System(MIS) - Materials Requirement Planning (MRP)

- Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management(SCM) - Enterprise Resource Planning (ERP) - Performance Management - Business Process Outsourcing (BPO) - Business Process Re- engineering and Bench Marking - Balanced Score Card - Knowledge Management.

Learning Outcomes:

At the end if the Unit, the learners will be able to

- Understand modern management techniques
- Apply Knowledge in Understanding in modern
- Analyze CRM, MRP, TQM
- Evaluate Six Sigma concept and SCM

Course Outcomes:

At the end of the course, students will be able to

- Understand the concepts & principles of management and designs of organization
- in a practical world
- Apply the knowledge of Work-study principles & Quality Control techniques in
- industry
- Analyze the concepts of HRM in Recruitment, Selection and Training &
- Development.
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time &
- cost of project & to analyze the business through SWOT.
- Create Modern technology in management science.

TEXT BOOKS:

1. A.R Aryasri, "Management Science", TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 2012.

REFERENCES:

1. Koontz & Weihrich, "Essentials of Management", 6th edition, TMH, 2005.
2. Thomas N.Duening & John M.Ivancevich, "Management Principles and Guidelines", Biztantra.
3. Kanishka Bedi, "Production and Operations Management", Oxford University Press, 2004.
4. Samuel C.Certo, "Modern Management", 9th edition, PHI, 2005

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	MANDATORY COURSE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9906	3	0	0	0	CIA	30 M
Course Title	:	**RESEARCH METHODOLOGY**					SEE	

Course Objectives :

The objective of this course is

- To understand the basic concepts of research and research problem
- To make the students learn about various types of data collection and sampling design
- To enable them to know the method of statistical evaluation
- To make the students understand various testing tools in research
- To make the student learn how to write a research report
- To create awareness on ethical issues n research

Syllabus

UNIT I

Meaning of Research – Objectives of Research – Types of Research – Research Approaches – Guidelines for Selecting and Defining a Research Problem – Research Design – Concepts related to Research Design – Basic Principles of Experimental Design.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of research and its process
- Explain various types of research
- Know the steps involved in research design
- Understand the different research approaches

UNIT II

Sampling Design – steps in Sampling Design –Characteristics of a Good Sample Design – Random Sampling Design. Measurement and Scaling Techniques-Errors in Measurement – Tests of Sound Measurement – Scaling and Scale Construction Techniques – Time Series Analysis – Interpolation and

Extrapolation. Data Collection Methods – Primary Data – Secondary data – Questionnaire Survey and Interviews.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of sampling and sampling design
- Explain various techniques in measurement and scaling
- Learn various methods of data collection
- Design survey questionnaires for different kinds of research
- Analyze the questionnaires

UNIT III

Correlation and Regression Analysis – Method of Least Squares – Regression vs Correlation – Correlation vs Determination – Types of Correlations and Their Applications

Learning Outcomes:-

After completion of this unit student will

- Know the association of two variables
- Understand the importance of correlation and regression
- Compare and contrast correlation and regression
- Learn various types of correlation
- Apply the knowledge of C&R Analysis to get the results

UNIT IV

Statistical Inference: Tests of Hypothesis – Parametric vs Non-parametric Tests – Hypothesis Testing Procedure – Sampling Theory – Sampling Distribution – Chi-square Test – Analysis of variance and Co-variance – Multivariate Analysis

Learning Outcomes:-

After completion of this unit student will

- Know the statistical inference
- Understand the hypothesis testing procedure
- Compare and contrast Parametric and Non-parametric Tests
- Understand the use of chi-square test in investigating the distribution of categorical variables
- Analyze the significance of variance and covariance

UNIT V

Report Writing and Professional Ethics: Interpretation of Data – Report Writing – Layout of a Research Paper – Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars – Professional Ethics in Research.

Learning Outcomes:-

After completion of this unit student will

- Learn about report writing
- Understand how to write research paper
- Explain various techniques of interpretation
- Understand the importance of professional ethics in research
- Design a scientific paper to present in the conferences/seminars

Course Outcomes:

At the end of the course, students will be able to

- Understand basic concepts and i methodologies
- Demonstrate the knowledge of researc processes
- Read. comprehend and explain research articles in their academ discipline
- Analyze various types of testing tools used in research
- Design a research paper without any ethical issues

Text books:

1. C.R.Kothari, "Research Methodology:Methods and Techniques",2nd edition, New Age International Publishers.
2. A Step by Step Guide for Beginners, "Research Methodology": Ranjit Kumar, Sage Publications

REFERENCES:

1. P.Narayana Reddy and G.V.R.K.Acharyulu, "Research Methodology and Statistical Tools", 1st Edition, Excel Books,New Delhi.
2. Donald R. "Business Research Methods", Cooper & Pamela S Schindler, 9th edition.

S C Gupta, "Fundamentals of Statistics", 7th edition Himalaya Publications

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0316P	0	0	3	1.5	CIA	30 M
Course Title	:	**METROLOGY AND MEASUREMENT LABORATORY**					SEE	70M

Course objectives:

- To experiment with measuring equipments used for linear and angular measurements.
- To find common types of errors in measurement equipment.
- To experiment with different types of sensors, transducers and strain gauges equipment.
- To make use of instruments for measurement of temperature, speed and vibrations

Any 4 experiments from each section

Section A:

1. Measurement of bores by internal micrometers and dial bore indicators.
2. Use of gear teeth vernier calipers and checking the chordal addendum and chordal height of spur gear.
3. Alignment test on the lathe and milling machine using dial indicators
4. Study of Tool makers microscope and its application
5. Angle and taper measurements by Bevel protractor, Sine bars, spirit level etc.
6. Thread measurement by Two wire/ Three wire method.
7. Surface roughness measurement by Talysurf instrument.
8. Use of straight edge and sprit level in finding the flatness of surface plate.

Section B:

1. Calibration of Pressure Gauges
2. Study and calibration of Mcleod gauge for low pressure.
3. Calibration of transducer or thermocouple for temperature measurement.
4. Calibration of LVDT transducer for displacement measurement.
5. Calibration of capacitive transducer for angular measurement.
6. Calibration of photo and magnetic speed pickups for the measurement of speed.
7. Study and use of a Seismic pickup for the measurement of vibration amplitude of an

   engine bed at various loads.

Course outcomes:

At the end of course the students will be able to:

- Apply different instruments to measure length, width, depth, bore diameters, internal and external tapers, tool angles, and surface roughness. (l3)
- Measure effective diameter of thread profile. (l5)
- Conduct different machine alignment tests.(l6)
- Measure temperature, displacement, and pressure. (l3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0315P	0	0	3	1.5	CIA	30 M
Course Title	:	**CAD/CAM LAB**					SEE	70M

Course Objectives:

- To write program for CAD modeling.
- To learn part programming and path generation from a CAD model.
- To train on machining of various parts in CNC machines.

GEOMETRIC MODELING

Introduction to 3D Modeling (4 or 5 exercises).

1. Write program for translation, scaling and rotation.
2. Write program for generating spline Bezier and B-spline.
3. Write program for sweep surfaces and surface of revolution.
4. Blend surfaces using any software.
5. Create wireframe, surface and solid models.
6. Introduction to CNC Machines and G-Code, M-Codes
7. CNC part programming for operations like turning, step turning, taper turning, threading.
8. CNC program for plane milling, drilling operations.
9. Generation of CNC part programming with CAM packages for a given 3D models.
10. Development of APT programming for 2D objects
11. Programming for Robot pick and place and continuous path.

Course Outcomes:

After successful completion of this lab the student will be able to

- Generate CAD models.
- Write CNC programs for various machining operations.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0316	3	0	0	3	CIA	30 M
Course Title	:	**AUTOTRONICS**					SEE	70M

Course Objectives:

- Familiarize automotive systems.
- Introduce role of Automotive Grade Microcontrollers in ECU design and choice of appropriate Hardware and Software.
- Explain sensors and sensor monitoring mechanisms aligned to automotive systems, different signal conditioning techniques, interfacing techniques and actuator mechanisms.
- Facilitate design and model various automotive control systems using Model based development technique.
- Impart safety standards, advances in autonomous vehicles, and vehicle on board and off board diagnostics.
- Demonstrate the various display devices those are used in automobiles.

UNIT I

Introduction to Automotive Systems: Need for electronic control in automobiles; various sub- systems of automobile: Engine, Transmission System, Steering and Brake Systems; Classification and working of IC engine: Gasoline, Diesel engines, 2-stroke, 4-stroke engines; Engine Control methods: Air-fuel ratio control, Spark timing, Start of fuel injection, etc.

Learning Outcomes:

After completion of this unit, the students will be able to

- Classify working of various types of IC engines. (L2)
- Explain need for electronic controls in automobiles. (L2)
- Impart engine control methods. (L1)

UNIT II

Introduction to microcomputer: Microcomputer: Buses, memory, timing, CPU registers; Microprocessor architecture: Initialization, operation codes, program counter, branch and jump instructions, subroutine. Analog to digital converters and Digital to analog converters, sampling, polling and interrupts, digital filters, lookup table.

Learning Outcomes:

After completion of this unit, students will be able to

- Explain role of automotive grade microcontrollers. (l2)
- Identify various components of microcomputer. (l1)
- Use different types of microcontrollers. (l3)

UNIT III

Sensors and actuators: Speed sensors, Pressure sensors: Manifold Absolute Pressure sensor, knock sensor, Temperature sensors: Coolant and Exhaust gas temperature, Exhaust Oxygen level sensors, Position sensors: Throttle position sensors, accelerator pedal position sensors and crankshaft position sensors, Air mass flow sensors. Solenoids, stepper motors and relays.

Learning Outcomes:

After completion of this unit, students will be able to

- Explain sensors, actuators and sensor monitoring mechanisms aligned to automotive systems. (l3)
- Use different signal conditioning techniques, interfacing techniques and actuator mechanisms. (l3)

UNIT IV

Electronic engine and vehicle management system: Electronic engine control: Input, output and control strategies, electronic fuel control system, fuel control modes: open loop and closed loop control at various modes, EGR control, Electronic ignition systems–Spark advance correction schemes, fuel injection timing control. Cruise control system, Antilock braking system, electronic suspension system, electronic steering control, traction control system, Transmission control, Safety: Airbags, collision avoiding system, low tire pressure warning system.

Learning Outcomes:

After completion of this unit, the students will be able to

- Summarize the advancements in the fuel injection systems. (l2)
- Illustrate the electronic engine control systems in automobile engines.(l2)
- Explain the electronic fuel injection system in si and ci engines. (l2)
- Contrast direct fuel injection and indirect fuel injection system. (l2)
- Apply sensors in the management of the vehicle control (l3)
- Outline active and passive safety systems in automobiles.(l2)
- Compare various types of advanced braking systems.(L2)

UNIT V

Automotive instrumentation system: Input and output signal conversion, multiplexing, fuel quantity measurement, coolant temperature and oil pressure measurement, display devices- LED, LCD, VFD and CRT, On-board diagnostics (OBD), OBD-II, off-board diagnostics.

Learning Outcomes:

After completion of this unit, students will be able to

- Identify input and output signal conversion. (l3)
- Explain the basic mechanism off board diagnostics. (l3)
- Differentiate between led, lcd, vfd and crt, on-board diagnostics(obd). (l3)

Course outcomes:

After completion of this course the student can be able to:

- Explain need for automotive electronic systems. (l2)
- Illustrate automotive components, like sensors, actuators, communication protocols and safety systems. (l2)
- Interface automotive sensors and actuators with microcontrollers. (l4)
- Model various automotive control systems. (l4)
- Utilize various display devices that are used in automobiles. (l3)
- Justify importance of safety standards and vehicle on board and off board diagnostics. (l1)

Text Books:

1. William BRibbens, “Understanding Automotive Electronics”, NewneButterworth -Heinermann, 2003.
2. Crouse W H, “Automobile Electrical Equipment”, McGraw Hill, New York 2005.

References:

1. Bechhold “Understanding Automotive Electronics”, SAE, 1998.
2. Robert Bosch “Automotive Hand Book”, SAE 5/e, 2000.
3. Tom Denton, “Automobile Electrical and Electronic Systems” 3/e, Edward Arnold, London, 2004.
4. Eric Chowanietz, “Automotive Electronics”, SAE International, USA, 1995.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0319	3	0	0	3	CIA	30 M
Course Title	:	**ROBOTICS AND APPLICATIONS IN MANUFACTURING**					SEE	70M

Course Objectives:

The objectives of this course are to

- Learn the fundamental concepts of industrial robotic technology.
- Apply the basic mathematics to calculate kinematic and dynamic forces in robot manipulator.
- Understand the robot controlling and programming methods.
- Describe concept of robot vision system .

UNIT – I **10 hrs**

Fundamentals of Robots: Introduction, definition, classification and history of robotics, robot characteristics and precision of motion, advantages, disadvantages and applications of robots. Introduction to matrix representation of a point in a space a vector in space, a frame in space, Homogeneous transformation matrices, representation of a pure translation, pure rotation about an axis.

Learning Outcomes:

at the end of this unit the student will be able to

- Define a robot and homogeneous transformations.(L1)
- Compare the types of robot manipulators based on applications.(L2)
- List out the various advantages, disadvantages and applications of robot.(L1)
- Explain the robot characteristics.(L2)

UNIT – II **8 hrs**

Kinematics of robot: Forward and inverse kinematics of robots- forward and inverse kinematic equations for position and orientation, Denavit-Hartenberg(D-H) representation of forward kinematic equations of robots, The inverse kinematic of robots, Degeneracy and Dexterity, simple problems with D-H representation.

Differential motions and Velocities: Introduction, differential relationship, Jacobian, differential motions of a frame-translations, rotation, rotating about a general axis, differential transformations of a frame. Differential changes between frames, differential motions of a robot and its hand frame, calculation of Jacobian, relation between Jacobian and the differential operator, Inverse Jacobian.

Learning Outcomes:

at the end of this unit the student will be able to

- Evaluate D-H notations for simple robot manipulator.(L4)
- Identify the position of robot gripper within work volume.(L3)
- Use the Jacobian, Lagrange-Euler and Newton- Euler formations to solve manipulator dynamic problems.(L5)
- Explain the concepts of manipulator kinematics and dynamics.(L2)

UNIT – III **8 hrs**

Control of Manipulators: Open- and Close-Loop Control, the manipulator control problem, linear control schemes, characteristics of second-order linear systems, linear second-order SISO model of a manipulator joint, joint actuators, partitioned PD control scheme, PID Control Scheme, computer Torque control, force control of robotic manipulators, description of force- control tasks, force control strategies, hybrid position/force control, impedance force/torque control.

Learning Outcomes:

at the end of this unit the student will be able to

- Understand the basic concepts of robot controlling systems.(L2)
- Describe PD and PID control schemes.(L2)
- Use the force control strategies to determine the forces in robot.(L5)
- Explain the force control and torque control techniques.(L2)

UNIT – IV **8 hrs**

Robot Vision: Introduction, architecture of robotic vision system, image processing, image acquisition camera, image enhancement, image segmentation, imaging transformation, Camera transformation and calibrations, industrial applications of robot vision.

Learning Outcomes:

at the end of this unit the student will be able to

- Identify the components of robot vision system.(L3)
- Understand the concept of image enhancement, segmentation and transformation.(L2)
- List the various components of robot vision system.(L1)
- Illustrate the industrial applications of robot vision system.(L2)

UNIT – V **8 hrs**

Robot Applications In Manufacturing: Material Transfer - Material handling, loading and unloading - Process - spot and continuous arc welding & spray painting - Assembly and Inspection.

Learning Outcomes:

at the end of this unit the student will be able to

- Understand the use of robot for material transferring system.(L2)
- List the various industrial applications of robotics.(L1)

Course Outcomes:

at the end of the course, the student will be able to

- Illustrate the industrial applications of robot vision system.(L3)
- Understand the basic concepts of robot controlling systems.(L2)
- Evaluate D-H notations for simple robot manipulator.(L4)
- Define a robot and homogeneous transformations.(L1)

TEXT BOOKS

1. Mikell P. Groover and Mitchell Weiss, Roger N. Nagel,Nicholas G.Odrey , “Industrial Robotics” — Mc Graw Hill, 1986.
2. John.J.Craig Addison, “Introduction to Robotics: Mechanics and Control”, Wesley, 1999.
3. K.S. FU, R.C. Gonzalez and C.S.G Lee, “Robotics: Control, sensing, vision, and intelligence” . Mc Graw Hill, 1987.

REFERENCES

1. Saeed B. Niku, “Introduction to Robotics – Analysis, System, Applications”, 2nd Edition, John Wiley & Sons, 2010.
2. H. Asada and J.J.E. Slotine, “Robot Analysis and Control”, 1st Edition Wiley- Interscience, 1986.
3. Robert J. Schillin, “Fundamentals of Robotics: Analysis and control”, Prentice-Hall Of India Pvt. Limited, 1996.
4. Mohsen shahinpoor, “A robot Engineering text book”, Harper & Row Publishers,1987.
5. Richard D. Klafter, “Thomas Robotic Engineering an integrated approach”, PHI publications 1988.
6. R K Mittal and I J Nagrath, “Robotics and control”, Illustrated Edition, Tata McGraw Hill India 2003.
7. Ashitava Ghoshal, “Robotics, Fundamental concepts and analysis”, Oxford University Press,2006

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0318	3	0	0	3	CIA	30 M
Course Title	:	**MECHANICAL VIBRATIONS**					SEE	70M

Course Objective

- Demonstrate basic concepts and definitions of mechanical vibrations. To write equation of motion for discrete spring-mass systems with different configuration using classical and energy methods.
- To train the students about basic concepts of forced vibrations, vibration transmissibility and isolation and seismic instruments. Further to understand about various vibration control methods.
- To familiarize the students about two degree freedom system and various types of vibration absorbers.
- To analyze the two degree and multi degree of freedom systems.

UNIT I

Single Degree Freedom Systems: Un-damped free vibration: Classical method, Energy method, equivalent systems, torsional systems. Damped free vibration- Viscous damping, under damping, critical damping, over damping. Coulomb damping, equivalent damping coefficient. Simple problems.

Learning Outcomes:

After completion of this unit student will able to

- Find natural frequency of un-damped single degree freedom systems.(l4)
- Find the behavior of single degree freedom systems with damping.(l4)

UNIT II

Forced vibrations of Single Degree Freedom Systems : Steady state forced vibration, sources of excitation, impressed harmonic force, resonance impressed force due to unbalance, motion excitation, transmissibility and isolation, performance of different type of isolators, power absorbed by viscous damping.

Learning Outcomes:

After completion of this unit, students will be able to

- Solve vibration problems with forcing function.(l4)
- Calculate transmissibility and isolation.(l4)

- Explain different types of isolators and power absorbers.(l3)

UNIT III

Two Degree Freedom Systems: Formulation of Equation of motion, Natural frequencies and modes of vibration by classical method, coupled pendulum, forced vibration, dynamic vibration absorber.

Learning Outcomes:

After completion of this unit the students will be able to

- Analyze the two degree freedom systems with and without damping.(l4)
- Solve problems on vibration absorber.(l5)

UNIT IV

Multi Degree Freedom Systems: Lagrangian method for formulation of equation of motion Influence co-efficient method, Lumped mass and distributed mass systems, Stodola method, Holzer's method, model analysis of free and forced vibrations.
Whirling of shafts: Critical speed of shafts, Rayleigh's upper bound approximation, Dunkerley's lower bound approximation, critical speed of shafts with damping.

Learning Outcomes:

After completion of this unit the student will be able to

- Analyze the multi degree freedom systems using Stodola method, Holzer"s method and Matrix iteration method.(L5)
- Calculate natural frequencies with Rayleighs method and Dunkerleys method.(L4)

UNIT V

Vibration measurement and Applications: Transducers: variable resistance transducers, Piezoelectric transducers, electrodynamic transducers and linear variable differential transformer transducer; Vibration pickups: vibrometer, accelerometer, velometer and phase distortion; Frequency-measuring instruments; Vibration exciters- Mechanical exciters and electrodynamic shaker.

Learning Outcomes:

After completion of this unit the students will be able to

- Identify various transducers.(l3)
- Use different vibration pickups.(l4)
- Explain mechanical exciters and electrodynamic shaker.(l2)

Course outcomes:

after successful completion of the course, the student will be able to

- Find natural frequency of un-damped single degree freedom systems(L4)
- Analyze the two degree freedom systems with and without damping.(L4)
- Calculate transmissibility and isolation.(L4)
- Solve problems on vibration absorber.(L5)
- Calculate natural frequencies of multi degree freedom system.(L4)
- Measure vibration parameters.(L4)
- Use mechanical exciters and electrodynamic shaker.(L5)

Text books:

1. Singrasu S. Rao, "Mechanical Vibrations", 6th edition, Pearson Education, 2018.
2. William Thomson, "Theory of Vibrations with Applications", 5th edition, Pearson, 2008

Reference books:

1. L. Meirovich, "Elements of Vibrations Analysis", Tata McGraw Hill, 1986
2. S. Graham Kelly, "Mechanical Vibrations", Tata McGraw Hill, 1996
3. William Weaver, "Timeoshenko, and Young, Vibration Problems in Engineering", 5th edition, John Wiley, 2013.
4. C. Nataraj, "Vibration of Mechanical Systems", 1st edition, Cenage Learning, 2012.
5. G.K.Groover, "Mechanical Vibrations", 1st edition, Nem Chand 1977

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0317	3	0	0	3	CIA	30 M
Course Title	:	**COMPUTATIONAL FLUID DYNAMICS**					SEE	70M

Course Objectives:

The course is intended to

- Understand the basics of computational fluid dynamics (CFD).
- Differentiate between finite difference and finite volume methods applied in CFD.
- Provide the necessary background in discretization methods, accuracy, stability and Convergence aspects of numerical solutions.
- Develop an understanding of the capabilities and limitations of various numerical and Mathematical models of fluid flow.
- Introduce some of the models required to compute turbulent and incompressible fluid Flow problems
- Apply CFD to heat transfer problems.

UNIT - I:

Introduction to Numerical Methods - Finite Difference, Finite Element and Finite Volume Methods – Classification of Partial Differential Equations – Solution of Linear Algebraic Equations – Direct and Iterative Approaches

Finite difference methods: Taylor's series – FDE formulation for 1D and 2D steady state heat transfer problems – Cartesian, cylindrical and spherical co-ordinate systems – boundary conditions – Unsteady state heat conduction – Errors associated with FDE - Explicit Method – Stability criteria – Implicit Method – Crank Nickolson method – 2D FDE formulation – ADI – ADE

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply the numerical methods to finite differential methods. (L3)
- Understand different types of finite difference methods. (L2)

UNIT-II:

Finite Volume Method: Formation of Basic rules for control volume approach using 1D Steady heat conduction equation – Interface Thermal Conductivity - Extension of General
Nodal Equation to 2D and 3D Steady heat conduction and unsteady heat conduction

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the finite volume methods. (l2)
- Apply the finite volume methods for steady state and unsteady state heat conduction. (l3)
- Analyze the interface thermal conductivity. (l4)

UNIT -III:

Finite Volume Method to Convection and Diffusion: Concept of Elliptic, Parabolic and Hyperbolic Equations applied to fluid flow – Governing Equations of Flow and Heat transfer – Steady 1D Convection Diffusion – Discretization Schemes and their assessment – Treatment of Boundary Conditions

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the governing equation for fluid flow and heat transfer. (l2)
- Solve the coupled convection and diffusion terms using fvm. (l3)
- Compare different methods of solving convection and diffusion. (l4)

UNIT - IV:

Calculation of Flow Field: Vorticity & Stream Function Method - Staggered Grid as Remedy for representation of Flow Field - Pressure and Velocity Corrections – Pressure Velocity Coupling - SIMPLE & SIMPLER (revised algorithm) Algorithm.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solve the vorticity based momentum equation. (L2)
- Apply the velocity and pressure correction terms. (L3)
- Apply the SIMPLE and SIMPLER algorithms. (L4)

UNIT - V:

Turbulent Flows: Direct Numerical Simulation, Large Eddy Simulation and RANS Models
Compressible Flows: Introduction - Pressure, Velocity and Density Coupling.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the turbulent models. (l2)
- Apply the fvm for compressible fluids. (l3)
- Couple the density, pressure and velocity components. (l4)

TEXT BOOKS:

1. S.V. Patankar, “Numerical heat transfer and fluid flow”, (Hemisphere Pub. House)
2. Muralidharan & Sundarajan , “Computational Fluid Flow and Heat Transfer”,– (Narosa Pub.)
3. H.K. Versteeg, W. Malalasekhara , “An Introduction to Computational Fluid Dynamics”, FVM Methods, (PHI)

REFERENCE BOOKS:

1. Hoffman and Chiang,”Computational Fluid Dynamics”, Engg Education System
2. Anderson, “Computational Fluid Dynamics”, (TMH)
3. Ferziger, Peric , “Computational Methods for Fluid Dynamics”, (Springer)
4. T.J. Chung, “Computational Fluid Dynamics”, Cambridge University
5. Tu, Yeoh, Liu, “Computational Fluid Dynamics”, A Practical Approach – (Elsevier)
6. Frank Chorlton, “Text Book of Fluid Dynamics”, CBS Publishers

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0320	3	0	0	3	CIA	30 M
Course Title	:	**TOTAL QUALITY MANAGEMENT**					SEE	70M

Course Objectives:

The Objectives of this course are to

- Introduce the students, the basic concepts of Total Quality Management.
- Expose with various quality issues in Inspection.
- Gain Knowledge on quality control and its applications to real time.
- Know the extent of customer satisfaction by the application of various quality concepts.
- Understand the importance of Quality standards in Production.

UNIT I **10 hrs**

Introduction: Definition of Quality, Dimensions of Quality, Definition of Total quality management, Quality Planning, Quality costs – Analysis, Techniques for Quality costs, Basic concepts of Total Quality Management.

Learning Outcomes:

At the end of this unit, the student will be able to

- Define what is quality. (l2)
- Explain the principles of quality planning. (l2)
- Explain the techniques of quality costs.(l2)
- Interpret the concepts of total quality management. (l2)
- Contrast the present quality issues with the past. (l2)

UNIT II **8 hrs**

Historical Review: Quality council, Quality statements, Strategic Planning, Deming Philosophy, Barriers of TQM Implementation, Benefits of TQM, Characteristics of successful quality leader, Contributions of Gurus of TQM, Case studies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the importance of Quality council. (L2)
- Identify the barriers of TQM Implementation. (L3)
- Discuss the benefits of TQM. (L6)

- Summarize the essential characteristics of successful quality leader. (L2)
- Outline the contributions of TQM Gurus. (L2)

UNIT III **8 hrs**

TQM Principles: Customer Satisfaction – Customer Perception of Quality, Customer Complaints, Service Quality, Customer Retention, Employee Involvement – Motivation, Empowerment teams, Continuous Process Improvement – Juran Trilogy, PDSA Cycle, Kaizen, Supplier Partnership – Partnering, sourcing, Supplier Selection, Supplier Rating, Relationship Development, Performance Measures – Basic Concepts, Strategy, Performance Measure Case studies

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the importance of customer satisfaction, Service Quality and Customer Retention. (L2)
- Apply the principles of motivation and Empowerment. (L3)
- Compare the perfection and continuous improvement. (L2)
- Measure the Process improvement using Juran Trilogy.(L5)
- Demonstrate the concepts of performance measures using a case study. (L2)

UNIT IV **8 hrs**

TQM Tools: Benchmarking – Reasons to Benchmark, Benchmarking Process, Quality Function Deployment (QFD) – House of Quality, QFD Process, Benefits, Taguchi Quality Loss Function, Total Productive Maintenance (TPM) – Concept, Improvement Needs, FMEA – Stages of FMEA, The seven tools of quality, Process capability, Concept of Six Sigma, New Seven management tools, Case studies.

Learning Outcomes:

At the end of this course, the student will be able to

- Infer the benefits of benchmarking. (L2)
- List the benefits of QFD Process. (L1)
- Identify various zones in House of Quality. (L3)
- Apply Six sigma towards quality improvement. (L3)
- List the seven tools of quality. (L1)

UNIT V **8 hrs**

Quality Systems: Need for ISO 9000 and Other Quality Systems, ISO 9000: 2000 Quality System – Elements, Implementation of Quality System, Documentation, Quality Auditing, QS 9000, ISO 14000 – Concept, Requirements and Benefits, Case Studies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the importance of ISO Standards. (L2)
- Discuss the need of ISO9000 and Other Quality systems. (L6)
- Build awareness on the services of ISO9000. (L6)
- Infer the process of documentation. (L2)
- Compare ISO 9000 and ISO 14000. (L2)

Course Outcomes:

At the end of this course, the student will be able to

- Develop an understanding on quality Management philosophies and frameworks
- Adopt TQM methodologies for continuous improvement of quality
- Measure the cost of poor quality, process effectiveness and efficiency to identify areas for improvement
- Apply benchmarking and business process reengineering to improve management processes.
- Determine the set of indications to evaluate performance excellence of an organization.

Textbooks:

1. Dale H Besterfield, “Total Quality Management”, 4th Edition, Pearson Education, 2015
2. Subburaj Ramaswamy, “Total Quality Management”, Tata Mcgraw Hill Publishing Company Ltd., 2005
3. Joel E.Ross , “Total Quality Management”, 3rd edition, CRC Press, 2017

Reference books:

1. Narayana V and Sreenivasan N.S, “Quality Management – Concepts and Tasks”, NewAge International, 1996
2. Robert L.Flood, “Beyond TQM, First Edition”, John Wiley & Sons Ltd, 1993
3. Richard S. Leavenworth & Eugene Lodewick Grant, “Statistical Quality Control, Seventh Edition”, Tata Mcgraw Hill, 2015
4. Samuel Ho , TQM, “An Integrated Approach”, Kogan Page Ltd, USA, 1995.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

			L	T	P	C		
Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0107	3	0	0	3	CIA	30 M
Course Title	:	**DISASTER MANGEMENT**					SEE	70M

Course Objectives:

The objective of this course is to:

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
- Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
- Understand the 'relief system' and the 'disaster victim.'
- Describe the three planning strategies useful in mitigation.
- Identify the regulatory controls used in hazard management.
- Describe public awareness and economic incentive possibilities.
- Understand the tools of post-disaster management.

SYLLABUS

UNIT-I:

Natural Hazards And Disaster Management: Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the natural hazards and its management
- To understand about the global warming, cyclones and tsunamis

UNIT-II:

Man Made Disaster And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism -threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the fire hazards and solid waste management
- To understand about the emerging infectious diseases and aids their management.

UNIT-III:

Risk and Vulnerability: Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the regulations of building codes and land use planning related to risk and vulnerability.
- To understand about the financial management of disaster and related losses

UNIT-IV:

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges-mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training- transformable indigenous knowledge in disaster reduction.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the technological aspects of disaster management
- To understand about the factors for disaster reduction

UNIT-V:

Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery -

Community based disaster management and social capital-Designing resilience- building community capacity for action.

Learning Outcomes:

After completing this Unit, students will be able to

- To impart the education related to risk reduction in schools and communities

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Affirm the usefulness of integrating management principles in disaster mitigation work
- Distinguish between the different approaches needed to manage pre- during and post-disaster periods
- Explain the process of risk management
- Relate to risk transfer

TEXT BOOKS

1. Rajib shah & R R Krishnamurthy "Disaster Management" – Global Challenges and Local Solutions' Universities press. (2009),
2. Tushar Bhattacharya, "Disaster Science & Management" Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Jagbir Singh "Disaster Management" – Future Challenges and Opportunities' I K International Publishing House Pvt. Ltd. (2007),

REFERENCE BOOKS

1. Harsh. K . Gupta "Disaster Management edited", Universities press, 2003.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0108	3	0	0	3	CIA	30 M
Course Title	:	**GLOBAL WARMING AND CLIMATE CHANGES**					SEE	70M

Course Objectives:

The objective of this course is to:

- To know the basics, importance of global warming.
- To know the concepts of mitigation measures against global warming
- To know the impacts of climate changes

UNIT I

EARTH'S CLIMATE SYSTEM:

Introduction to environment, Ozone, ozone layer and its functions, Ozone depletion and ozone hole, Vienna convention and Montreal protocol, Green house gases and green house effect, Hydrological cycle and Carbon cycle, Global warming and its impacts

Learning Outcomes:

After completing this Unit, students will be able to

- To identity the importance of Ozone and effect of green house gases
- To know the effect of global warming

UNIT II

ATMOSPHERE & ITS COMPONENTS: Atmosphere and its layers-Characteristics of Atmosphere - Structure of Atmosphere - Composition of Atmosphere - Atmospheric stability - Temperature profile of the atmosphere - Temperature inversion and effects of inversion on pollution dispersion.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the layers of atmosphere and their characteristics

UNIT III

IMPACTS OF CLIMATE CHANGE : Causes of Climate change - Change of Temperature in the environment - Melting of ice and sea level rise - Impacts of Climate Change on various sectors - Projected impacts for different regions, uncertainties in the projected impacts and risk of irreversible changes.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the causes of climate change and its effects on various sectors.

UNIT IV

OBSERVED CHANGES AND ITS CAUSES: Climate change and Carbon credits-Clean Development Mechanism (CDM), CDM in India - Kyoto Protocol - Intergovernmental Panel on Climate Change (IPCC) - Climate Sensitivity - Montreal Protocol - United Nations Framework Convention on Climate Change (UNFCCC) - Global change in temperature and climate and changes within India

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the causes of climate change and carbon credits, effect of change in temperature and climate on india.

UNIT V

CLIMATE CHANGE AND MITIGATION MEASURES: CDM and Carbon Trading - Clean Technology, biodiesel, compost, biodegradable plastics - Renewable energy usage as an alternative - Mitigation Technologies and Practices within India and around the world - Non- renewable energy supply to all sectors - Carbon sequestration - International and regional cooperation for waste disposalbiomedical wastes, hazardous wastes, e-wastes, industrial wastes, etc.,

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the clean technology, use of renewable energy, mitigation technologies and their practices.

Course Outcomes

Upon the successful completion of this course, the students will be able to:

- An ability to apply knowledge of mathematics, science, and engineering
- Design a system, component or process to meet desired needs with in realistic constraints such as economic ,environmental ,social ,political ,ethical ,health and safety , manufacturability and sustainability
- An ability to identify, formulate, and solve engineering problems

REFERENCE BOOKS

1. Dash Sushil Kumar, “Climate Change – An Indian Perspective”, Cambridge University Press India Private limited 2007.
2. Adaptation and mitigation of climate change-Scientific Technical Analysis. Cambridge University Press ,Cambridge,2006.
3. Atmospheric Science, J.M. Wallace and P.V. Hobbs, Elsevier / Academic Press 2006.
4. Jan C. van Dam, Impacts of “Climate Change and Climate Variability on ydrological Regimes”, Cambridge university press ,2003.
5. David Archer, Global Warming: Understanding the Forecast, 2 nd ed. (Wiley, 2011
6. John Houghton, Global Warming: The Complete Briefing, 5th Edition, 2015, Cambridge Univ. Press. Useful

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0308	3	0	0	3	CIA	30 M
Course Title	:	**ENERGY CONSERVATION AND MANAGEMENT**					SEE	70M

Course Objective:

- Familiarize present energy scenario, and energy auditing methods.
- Explain components of electrical systems, lighting systems and improvements in performance.
- Demonstrate different thermal systems, efficiency analysis, and energy conservation methods.
- Train on energy conservation in major utilities.
- Instruct principles of energy management and energy pricing.

UNIT I

Introduction: Energy – Power – Past & Present Scenario Of World; National Energy Consumption Data – Environmental Aspects Associated With Energy Utilization –Energy Auditing: Need, Types, Methodology And Barriers. Role Of Energy Managers. Instruments For Energy Auditing.

Learning Outcomes

At the end of this unit, the student will be able to

- Infer energy consumption patterns and environmental aspects of energy utilization. (l2)
- Outline energy auditing requirements, tools and methods. (l2)
- Identify the function of energy manager. (l3)

UNIT II

Electrical Systems: Components Of EB Billing – HT And LT Supply, Transformers, Cable Sizing, Concept Of Capacitors, Power Factor Improvement, Harmonics, Electric Motors – Motor Efficiency Computation, Energy Efficient Motors, Illumination – Lux, Lumens, Types Of Lighting, Efficacy, LED Lighting And Scope Of Economy In Illumination.

Learning Outcomes

At the end of this unit, the student will be able to

- Outline components of electricity billing, transmission and distribution. (l2)
- Analyze performance characteristics of transformers, capacitors, and electric motors. (l4)
- Examine power factor improvements, and electric motor efficiency. (l4)
- Evaluate lighting systems. (L4)

UNIT III

Thermal Systems: Stoichiometry, Boilers, Furnaces and Thermic Fluid Heaters – Efficiency Computation and Encon Measures. Steam: Distribution & Usage: Steam Traps, Condensate Recovery, Flash Steam Utilization, Insulators & Refractories.

Learning Outcomes

At the end of this unit, the student will be able to

- Determine efficiency of boilers, furnaces and other thermal systems. (l5)
- Recommend energy conservation measures in thermal systems. (l5)
- Justify steam systems in energy conservation. (l4)

UNIT IV

Energy Conservation In Major Utilities: Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration And Air Conditioning Systems – Cooling Towers – D.G. Sets.

Learning Outcomes

At the end of this unit, the student will be able to

- Explain energy conservation measures in major utilities. (l2)
- Apply performance test criteria for fans, pumps, compressors, hvac systems. (l3)
- Assess energy conservation in cooling towers and d.g. sets. (l5)

UNIT V

Energy Management: Principles of Energy Management, Energy demand estimation, Organising and Managing Energy Management Programs, Energy pricing.

Learning Outcomes

At the end of this unit, the student will be able to

- Describe principles of energy management. (l2)
- Assess energy demand and forecast. (l5)
- Organize energy management programs. (l6)
- Design elements of energy pricing. (l6)

Course Outcomes:

At the end of this course, the student will be able to:

- Explain energy utilization and energy auditing methods.(l2)
- Analyze electrical systems performance of electric motors and lighting systems.(l4)
- Examine energy conservation methods in thermal systems.(l4)

- Estimate efficiency of major utilities such as fans, pumps, compressed air systems, hvac and d.g. Sets. (l4)
- Elaborate principles of energy management, programs, energy demand and energy pricing. (l6)

TEXT BOOKS:

1. Energy Manager Training Manual (4 Volumes) Available At www.energymanagertraining.com, A Website Administered By Bureau Of Energy Efficiency (BEE), A Statutory Body Under Ministry Of Power, Government Of India, 2004.

REFERENCES:

1. Witte. L.C., P.S. Schmidt, D.R. Brown, "Industrial Energy Management and Utilisation" Hemisphere Publ, Washington, 1988.
2. Callaghn, P.W. "Design And Management For Energy Conservation", Pergamon Press, Oxford, 1981.
3. Dryden. I.G.C., "The Efficient Use Of Energy" Butterworths, London, 1982
4. Murphy. W.R. And G. Mc KAY, "Energy Management", Butterworths, London 1987.
5. Turner, W. C., Doty, S. and Truner, W. C., "Energy Management Hand book", 7th edition, Fairmont Press, 2009.
6. De, B. K., "Energy Management audit & Conservation", 2nd Edition, Vrinda Publication, 2010.
7. Smith, C. B., "Energy Management Principles", Pergamon Press, 2007.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0309	3	0	0	3	CIA	30 M
Course Title	:	**NON-DESTRUCTIVE TESTING**					SEE	70M

Course Objectives

Introduce basic concepts of non destructive testing.

- Familiarize with characteristics of ultrasonic test, transducers, rejection and effectiveness.
- Describe concept of liquid Penetrant, eddy current and magnetic particle tests, its applications and limitations.
- Explain the principles of infrared and thermal testing, applications and honey comb and sandwich structures case studies.
- Impart NDE and its applications in pressure vessels, casting and welded constructions.

UNIT I

Introduction to non-destructive testing: Radiographic test**,** Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography.

Learning outcomes:

At the end of this unit, the student will be able to

- Explain non destructive testing techniques (L2)
- Summarize the basic concepts of Radiographic test (L2)
- Outline the concepts of sources of X and Gamma Rays (L2)
- Explain the radiographic techniques (L2)
- Discuss the safety aspects of industrial radiography. (L4)

UNIT II

Ultrasonic test: Principle of Wave Propagation, Reflection, Refraction, Diffraction, Mode Conversion and Attenuation, Sound Field, Piezo-electric Effect , Ultrasonic Transducers and their Characteristics, Ultrasonic Equipment and Variables Affecting Ultrasonic Test, Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection - Effectiveness and Limitations of Ultrasonic Testing.

Learning outcomes:

At the end of this unit, the student will be able to

- Explain the principle of ultrasonic test. (l2)
- Analyze the performance of wave propagation, reflection, refraction, diffraction and sound field in ultrasonic test. (l4)
- Discuss the characteristics of ultrasonic transducers. (l4)
- Outline the limitations of ultrasonic testing. (l2)

UNIT III

Liquid Penetrant Test: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing**.**

Eddy Current Test: Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current-Testing Effectiveness of Eddy Current Testing.

Magnetic Particle Test: Magnetic Materials, Magnetization of Materials, Demagnetization of Materials, Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate the procedure of Liquid Penetrant, eddy current and magnetic particle tests.(L2)
- Outline the limitations of Penetrant, eddy current and magnetic particle tests. (L2)
- Explain the effectiveness of Penetrant, eddy current and magnetic particle tests. (L2)
- Apply the applications of Magnetic particle test. (L3)

UNIT IV

Infrared And Thermal Testing: Introduction and fundamentals to infrared and thermal testing– Heat transfer –Active and passive techniques –Lock in and pulse thermography–Contact and non contact thermal inspection methods–Heat sensitive paints –Heat sensitive papers –-thermally quenched phosphors liquid crystals –techniques for applying liquid crystals –other temperature sensitive coatings –Inspection methods –Infrared radiation and infrared detectors–thermo mechanical behavior of materials–IR imaging in aerospace applications, electronic components, Honey comb and sandwich structures–Case studies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss the fundamentals of thermal testing. (l6)
- Explain the techniques of liquid crystals, active and passive. (l2)
- Illustrate thermal inspection methods. (l2)
- Outline the limitations of thermal testing. (l2)

- Explain the applications of honey comb and sandwich structures. (l2)

UNIT V

Industrial Applications of NDE: Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate applications of NDE. (L2)
- Explain the applications of Railways, Nuclear and chemical industries. (L2)
- Outline the limitations and disadvantages of NDE. (L2)
- Explain the applications of NDA of pressure vessels, casting and welding constructions (L2)

Course Outcomes

At the end of the course, student will be able to

- Explain various methods of non-destructive testing. (l3)
- Apply relevant non-destructive testing method different applications. (l3)
- Explain the applications of railways, nuclear and chemical industries. (l2)
- Outline the limitations and disadvantages of nde. (l2)
- Explain the applications of nda of pressure vessels, casting and welding constructions(l2)

TEXT BOOKS:

1. J Prasad, GCK Nair , "Non destructive test and evaluation of Materials", Tata mcgraw- Hill Education Publishers, 2008.
2. Josef Krautkrämer, Herbert Krautkrämer, "Ultrasonic testing of materials", 3rd edition, Springer-Verlag, 1983.
3. X. P. V. Maldague, "Non destructive evaluation of materials by infrared thermography", 1st edition, Springer-Verlag, 1993.

REFERENCES:

1. Gary L. Workman, Patrick O. Moore, Doron Kishoni, "Non-destructive, Hand Book, Ultrasonic Testing", 3rd edition, Amer Society for Nondestructive, 2007.
2. ASTM Standards, Vol 3.01, Metals and alloys

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0414	3	0	0	3	CIA	30 M
Course Title	:	**INTRODUCTION TO IMAGE PROCESSING**					SEE	70M

Course Objectives:

- To interpret fundamental concepts of digital image processing.
- To exemplify image enhancement.
- To interpret fundamental concepts of color image processing.
- To assess image compression techniques for digital images.
- To summarize segmentation for digital images.

UNIT-I:

INTRODUCTION TO DIGITAL IMAGE PROCESSING

Introduction: Digital image representation, Fundamental steps in image processing, Elements of digital image processing, Elements of visual perception, Simple image model, Sampling and Quantization, Basic relationships between pixels, Image transformations.
Applications: Medical imaging, Robot vision, Character recognition, Remote sensing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the fundamental concepts of image processing, Sampling process and basis relationships between pixels (L1)
- Explain the elements of Digital Image Processing (L2)

UNIT–II:

IMAGE ENHANCEMENT

Need for image enhancement, Point processing, Histogram processing, Spatial filtering- Smoothing and Sharpening.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for enhancement process (L1)

- Explain the terminology involved in enhancement process (L2)

UNIT-III:

COLOR IMAGE PROCESSING

Colour fundamentals, Colour models, Color transformations, Pseudo colour image processing, Full colour image processing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for enhancement process (L1)
- Explain the terminology involved in enhancement process (L2)

UNIT–IV:

IMAGE COMPRESSION

Redundancies, Fidelity criteria, Image compression model, Lossless compression: Huffman coding, Arithmetic coding. Lossy compression: Lossy Predictive Coding, JPEG Compression Standard.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for image compression (L1)
- Explain the image compression and various types of compression techniques (L2)

UNIT–V:

IMAGE SEGMENTATION

Detection of discontinuities: point, line and edge detection, Edge linking and Boundary detections: Local Processing, Global processing via Hough transform, Thresholding, Region oriented segmentation: Region growing, Region splitting and merging.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the principle of image segmentation and its importance (L1)
- Explain the image compression and various types of compression techniques (L2)
- Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. (L3)

Course Outcomes:

- Interpret fundamental concepts of digital and color image processing.
- Exemplify image enhancement.
- Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. Assess image compression techniques for digital images.
- Summarize segmentation techniques for digital images.

TEXT BOOKS:

1. Rafael C. Gonzalez and Richard E. Woods, "Digital Image Processing", 3rd Edition, Pearson Education, 2011.

REFERENCE BOOKS:

1. S Jayaraman, S Esakkirajan and T Veerakumar, "Digital Image Processing", TMH, 2011.
2. S. Sridhar, "Digital Image Processing", 2nd Edition, Oxford Publishers, 2016.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0414	3	0	0	3	CIA	30 M
Course Title	:	**INTRODUCTION TO IMAGE PROCESSING**					SEE	70M

Course Objectives:

- To understand the concepts and operation of cellular systems.
- To apply the concepts of cellular systems to solve engineering problems.
- To analyse cellular systems for meaningful conclusions.
- To evaluate suitability of a cellular system in real time applications.
- To design cellular patterns based on frequency reuse factor.

UNIT-I:

Introduction to Cellular Mobile Systems

Why cellular mobile communication systems? A basic cellular system, Evolution of mobile radio communications, Performance criteria, Characteristics of mobile radio environment, Operation of cellular systems. Examples for analog and digital cellular systems.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the conceptsand operation of cellular systems (L1).
- Analyze the characteristics of mobile radio environment (L3).

UNIT-II:

Cellular Radio System Design

General description of the problem, Concept of frequency reuse channels, Cochannel interference reduction, Desired C/I ratio, Cell splitting and sectoring.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of frequency reuse and cochannel interference in cellular systems (L1).
- Apply the concept of cellular systems to solve engineering problems (L2).

- Analyze the design problems of cellular systems (L3).
- Design of cellular patterns based frequency reuse factor (L5).

UNIT-III:

Handoffs and Dropped Calls

Why handoffs and types of handoffs, Initiation of handoff, Delaying a handoff, Forced handoffs, Queuing of handoffs, Power-difference handoffs, Mobile assisted handoff and soft handoff, Cell- site handoff, Intersystem handoff. Introduction to dropped call rate.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand why handoff is required (L1).
- Apply handoff techniques to solve engineering problems (L2).
- Compare various types of handoffs (L3).

UNIT-IV:

Multiple Access Techniques for Wireless Communications

Introduction, Frequency Division Multiple Access, Time Division Multiple Access, Code Division Multiple Accessand Space Division Multiple Access.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand various types of multiple access techniques (L1).
- Apply the concept of multiple access to solve engineering problems (L2).
- Compare various types of multiple access techniques (L3).

UNIT-V:

Digital Cellular Systems

Global System for Mobile Systems, Time Division Multiple Access Systems, Code Division Multiple Access Systems. Examples for 2G, 3G and 4G systems. Introduction to 5G system.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand operation of various types of digital cellular systems (L1).
- Compare various types of digital cellular systems (L3).
- Evaluate suitability of a cellular system in real time applications (L4).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

Course Outcomes:

At the end of the course, the student should be able to

- Understand the concepts and operation of cellular systems (L1)
- Apply the concepts of cellular systems to solve engineering problems (L2).
- Analyse cellular systems for meaningful conclusions, Evaluate suitability of a cellular system in real time applications (L3).
- Design cellular patterns based on frequency reuse factor (L4).

TEXT BOOKS:

1 William C. Y. Lee, "Mobile Cellular Telecommunications", 2nd Edition, McGraw-Hill International, 1995.
2 Theodore S. Rappaport, "Wireless Communications – Principles and Practice", 2nd Edition, PHI, 2004.

REFERENCES:

3. Aditya K. Jagannatham "Principles of Modern Wireless Communications Systems – Theory and Practice", McGraw-Hill International, 2015.

Blooms' Learning levels:

L1: Remembering and Understanding L2: Applying
L3: Analyzing, Evaluating L4: Designing, Creating

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0416	3	0	0	3	CIA	30 M
Course Title	:	**PRINCIPLES OF CELLULAR AND MOBILE COMMUNICATIONS**					SEE	70M

Course Objectives:

- To understand the concepts and operation of cellular systems.
- To apply the concepts of cellular systems to solve engineering problems.
- To analyse cellular systems for meaningful conclusions.
- To evaluate suitability of a cellular system in real time applications.
- To design cellular patterns based on frequency reuse factor.

UNIT-I:

Introduction to Cellular Mobile Systems

Why cellular mobile communication systems? A basic cellular system, Evolution of mobile radio communications, Performance criteria, Characteristics of mobile radio environment, Operation of cellular systems. Examples for analog and digital cellular systems.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the conceptsand operation of cellular systems (L1).
- Analyze the characteristics of mobile radio environment (L3).

UNIT-II:

Cellular Radio System Design

General description of the problem, Concept of frequency reuse channels, Cochannel interference reduction, Desired C/I ratio, Cell splitting and sectoring.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of frequency reuse and cochannel interference in cellular systems (L1).

- Apply the concept of cellular systems to solve engineering problems (L2).
- Analyze the design problems of cellular systems (L3).
- Design of cellular patterns based frequency reuse factor (L5).

UNIT-III:

Handoffs and Dropped Calls

Why handoffs and types of handoffs, Initiation of handoff, Delaying a handoff, Forced handoffs, Queuing of handoffs, Power-difference handoffs, Mobile assisted handoff and soft handoff, Cell- site handoff, Intersystem handoff. Introduction to dropped call rate.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand why handoff is required (L1).
- Apply handoff techniques to solve engineering problems (L2).
- Compare various types of handoffs (L3).

UNIT-IV:

Multiple Access Techniques for Wireless Communications

Introduction, Frequency Division Multiple Access, Time Division Multiple Access, Code Division Multiple Accessand Space Division Multiple Access.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand various types of multiple access techniques (L1).
- Apply the concept of multiple access to solve engineering problems (L2).
- Compare various types of multiple access techniques (L3).

UNIT-V:

Digital Cellular Systems

Global System for Mobile Systems, Time Division Multiple Access Systems, Code Division Multiple Access Systems. Examples for 2G, 3G and 4G systems. Introduction to 5G system.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand operation of various types of digital cellular systems (L1).

- Compare various types of digital cellular systems (L3).
- Evaluate suitability of a cellular system in real time applications (L4).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

Course Outcomes:

At the end of the course, the student should be able to

- Understand the concepts and operation of cellular systems (L1)
- Apply the concepts of cellular systems to solve engineering problems (L2).
- Analyse cellular systems for meaningful conclusions, Evaluate suitability of a cellular system in real time applications (L3).
- Design cellular patterns based on frequency reuse factor (L4).

TEXT BOOKS:

3 William C. Y. Lee, “Mobile Cellular Telecommunications”, 2nd Edition, McGraw-Hill International, 1995.

4 Theodore S. Rappaport, “Wireless Communications – Principles and Practice”, 2nd Edition, PHI, 2004.

REFERENCES:

3. Aditya K. Jagannatham “Principles of Modern Wireless Communications Systems – Theory and Practice”, McGraw-Hill International, 2015.

Blooms’ Learning levels:

L1: Remembering and Understanding L2: Applying
L3: Analyzing, Evaluating
L4: Designing, Creating

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0406	3	0	0	3	CIA	30 M
Course Title	:	**INDUSTRIAL ELECTRONICS**					SEE	70M

Course Objectives:

This course will enable students to:

- Describe semi-conductor devices (such as PN junction diode & Transistor) and their switching characteristics.
- Understand the characteristics of AC to DC converters.
- Understand about the practical applications Electronics in industries
- Describe the Ultrasonic's and its application.

UNIT I

Scope of industrial Electronics, Semiconductors, Merits of semiconductors, crystalline structure, Intrinsic semiconductors, Extrinsic semiconductors, current flow in semiconductor, Open- circuited p-n junction, Diode resistance, Zener diode, Photoconductors and junction photo diodes, Photo voltaic effect, Light emitting diodes(LED).

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the importance of Electronics and semiconductor devices in industry, operation of semiconductor devices (L1)
- Describe the working of semiconductor diodes (L1)

UNIT II

Introduction, The junction transistor, Conventions for polarities of voltages and currents, Open circuited transistor, Transistor biased in the active region, Current components in transistors, Currents in a transistor, Emitter efficiency, Transport factor and transistor-α, Dynamic emitter resistance, Transistor as an amplifier, Transistor construction, Letter symbols for semiconductor Devices, Characteristic curves of junction transistor in common configuration, static characteristic curves of PNP junction transistor in common emitter configuration, The transistor in common collector Configuration.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the working of Transistor and its different configurations (L1)
- Describe the working of CE, CC, CB configurations (L1)

UNIT III

AC to DC converters- Introduction, Classification of Rectifiers, Half wave Rectifiers, Fullwave Rectifiers, Comparison of Half wave and full wave rectifiers, Bridge Rectifiers,Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LC Filter,Metal Rectifiers, Regulated Power Supplies, Classification of Voltage Regulators, Shortperiod Accuracy of Regulators, Long period .Accuracy of Voltage Regulator, Principle ofautomatic voltage Regulator, Simple D.C. Voltage stabilizer using Zener diode, D.C.Voltage Regulators, Series Voltage Regulators, Complete series voltage regulatorcircuit, Simple series voltage regulator.

UNIT IV

Resistance welding controls: Introduction, Resistance welding process, Basic Circuit for A.C. resistance welding, Types of Resistance welding, Electronic welding control used in Resistance welding, Energy storage welding. **Induction heating:** Principle of induction heating, Theory of Induction heating merits of induction heating, Application of induction heating, High frequency power source of induction heating. **Dielectric heating**: Principle of dielectric heating, theory of dielectric heating, dielectric properties of typical materials, electrodes used in dielectric heating, method of coupling of electrodes to the R.F. generator, Thermal losses in Dielectric heating, Applications.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the principle of operation of Resistance welding, Induction heating and Dielectric heating (L1)
- Apply the process of Resistance welding, Induction heating and Dielectric heating in the industry (L2)

UNIT V:

Ultrasonics: Introduction, Generation of Ultrasonic waves, Application of Ultrasonic waves, Ultrasonic stroboscope, ultrasonic as means of communication, ultrasonic flaw detection, Optical image on non-homogeneities, ultrasonic study of structure of matter, Dispersive study of structure of matter, Dispersive and colloidal effect of Ultrasonic, Coagulating action of Ultrasonic, separation of mixtures by ultrasoni8c waves, cutting and machining of hard materials by ultrasonic vibrations, Degassing of liquids by ultrasonic waves, Physio-chemical effects of ultrasonics, chemical effects of ultrasonics, Thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the principle of operation of Ultrasonics and its applications (L1)
- Analyze the thermal effects of Ultrasonics, soldering and welding by ultrasonics, Ultrasonic Drying in the industry (L3)

Course Outcome:

- Understand the semi-conductor devices and their switching characteristics.
- Apply the Ultrasonic waves with different applications
- Analyze the thermal effects of Ultrasonics, soldering and welding by ultrasonics,Ultrasonic Drying in the industry, Interpret the characteristics of AC to DC converters,
- Develop the practical applications Electronics in industries.

TEXT BOOKS:

1. G. K. Mithal, “Industrial Electronics”, Khanna Publishers, Delhi, 2000.
2. J.Gnanavadivel, R.Dhanasekaran, P.Maruthupandi, “Industrial Electronics”,Anuradha Publications, 2011.

REFERENCE BOOKS:

1. F. D. Petruzulla, “Industrial Electronics”, McGraw Hill, Singapore, 1996.
2. M. H. Rashid, “power Electronics Circuits, Devices and Application”, PHI, 3rdedition, 2004.
3. G. M. Chute and R. D. Chute, “Electronics in Industry”, McGraw Hill Ltd,Tokyo, 1995.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0412	3	0	0	3	CIA	30 M
Course Title	:	**ELECTRONIC INSTRUMENTATION**					SEE	70M

Course Objectives:
This course will enable students to:

- To introduce various measuring instruments and their functionality
- To teach various measurement metrics for performance analysis
- To explain principles of operation and working of different electronic instruments
- To familiarize the characteristics, operations, calibrations and applications of the different oscilloscopes and signal generators.
- To provide exposure to different types of transducers

UNIT – I

Measurement and Error: Definitions, Accuracy, Precision, Resolution and Significant Figures, Types of Errors, Measurement error combinations. (Text 2)
Ammeters: DC Ammeter, Multi-range Ammeter, The Ayrton Shunt or Universal Shunt, Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of Thermocouple. (Text 1)
Voltmeters and Multi-meters: Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multi range Voltmeter, Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers. True RMS Voltmeter, Multi-meter. (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the importance of measurement system (L1)
- Examine the characteristics of different Instruments (L2)
- Illustrate different types of errors that may occur in instruments during measurements (L2)

UNIT – II

Digital Voltmeters: Introduction, RAMP technique, Dual Slope Integrating Type DVM, Integrating Type DVM, Most Commonly used principles of ADC, Successive Approximations, - Digit, Resolution and Sensitivity of Digital Meters, General Specifications of DVM, (Text 1)
Digital Instruments: Introduction, Digital Multi-meters, Digital Frequency Meter, Digital Measurement of Time, Universal Counter, Digital Tachometer, Digital pH Meter, Digital Phase Meter, Digital Capacitance Meter, (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain working of digital measuring Instruments (L2)
- Compare the various measuring techniques for measuring voltage (L4)

UNIT – III

Oscilloscopes: Introduction, Basic principles, CRT features, Block diagram of Oscilloscope, Simple CRO, Vertical Amplifier, Horizontal Deflecting System, Sweep or Time Base Generator, Measurement of Frequency by Lissajous Method, Digital Storage Oscilloscope. (Text 1)

Signal Generators: Introduction, Fixed and Variable AF Oscillator, Standard Signal Generator, Laboratory Type Signal Generator, AF sine and Square Wave Generator, Function Generator, (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe functions of basic building of CRO (L1)
- Measure parameters viz. Amplitude, frequency and time period using CRO (L2)
- Classify signal generators and describe its characteristics (L2)

UNIT – IV

Measuring Instruments: Field Strength Meter, Stroboscope, Phase Meter, Q Meter, Megger. (Text 1)

Bridges: Introduction, Wheat stone's bridge, Kelvin's Bridge; AC bridges, Capacitance Comparison Bridge, Inductance Comparison Bridge, Maxwell's bridge, Wien's bridge. (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe function of various measuring Instruments. (L1)
- Describe how unknown capacitance and inductance can be measured using bridges (L1)
- Select appropriate bridge for measuring R, L and C parameters (L2)

UNIT – V

Transducers: Introduction, Electrical transducers, Selecting a transducer, Resistive transducer, Resistive position transducer, Strain gauges, Resistance thermometer, Thermistor, Inductive transducer, LVDT, Piezoelectric transducer, Photo cell, Photo voltaic cell, Semiconductor photo diode and transistor. (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the importance of transducer (L1)
- Illustrate different measuring techniques in transducers to measure physical quantities.(L2)
- Select the appropriate transducer for the measurement of physical parameters (L2)

Course outcomes:

- Learn different types of errors in measurement, calibration process and standards, various methods for measurement of non-electrical quantities, Understand the different methods for measurement of various electrical quantities.
- Familiarize the dynamics of instrument systems, various passive and active transducers
- Compare the various measuring techniques for measuring voltage (L4)

TEXT BOOKS:

1. H. S. Kalsi, "Electronic Instrumentation", McGraw Hill, 3rd Edition, 2012, ISBN:9780070702066.
2. A. D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and Measuring Techniques", Pearson, 1st Edition, 2015, ISBN: 9789332556065.

REFERENCE BOOKS:

1.David A. Bell, "Electronic Instrumentation & Measurements", Oxford University Press PHI 2nd Edition, 2006 ISBN 81-203-2360-2.
2. A. K. Sawhney, "Electronics and Electrical Measurements", Dhanpat Rai &Sons. ISBN - 81-7700-016-0

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

			L	T	P	C		
Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0512	3	0	0	3	CIA	30 M
Course Title	:	**BLOCKCHAIN TECHNOLOGY AND APPLICATIONS**					SEE	70M

Course Objectives:
This course is designed to:

- Understand the philosophy of Block chain and the cutting edge technology behind its functions
- Illustrate how to setup Ethereum tools
- Explain the key vocabulary and concepts used in Block chain for Business

UNIT-I
Block chain concepts: Block chain, Block chain application example: Escrow, Block chain stack, from web 2.0 to the next generation decentralized web, domain specific Block chain application, Block chain benefits and challenges.

Block chain application templates: Block chain application components, design methodology for Block chain applications, Block chain applications templates

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the benefits and challenges of Block chain(L2)
- Design the Block chain applications(L6)

UNIT-II

Setting up Ethereum development tools: Ethereum clients, Ethereum languages, TestRPC, Mist Ethereumwalle, meta mask, web3 JavaScript API, truffle.

Ethereum Accounts: Ethereum Accounts, key pairs, working with EOA Accounts, working with contract accounts.

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the use of Ethereum development tools(L2)
- Create Ethereum accounts and work with them (L6)

UNIT-III
Smart contracts: Smart contract, structure of a contract, setting up and interacting with a contract using

Geth client, setting up and interacting with a contract using Mist Wallet

Learning Outcomes:

After completing this Unit, students will be able to

- Make use of of smart contracts(L3)
- Distinguish setting up and interacting with a contract using Geth client and Mist Wallet.(L4)

UNIT-IV

Smart contracts (continued): Smart contract examples, Smart contract patterns.
Decentralized Applications: implementing Dapps, case studies,
Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the Smart contract examples and patterns(L2)
- Develop Decentralized applications.(L6)

UNIT-V
Mining: Concensus on Block chain network, mining, Block validation, state storage in Ethereum.

Learning Outcomes:

After completing this Unit, students will be able to

- Define Concensus on Block chain network(L1)
- Demonstrate State Storage in Ethereum(L2)

Course outcomes:

Upon completion of the course, the students should be able to:

- Create customized block chain solutions (L6)
- Make use of the specific mechanics of Ethereum(L3)
- Experiment with Smart contracts (L3)
- Develop Enterprise applications using Block chain(L6)

Text book:

1. Arshadeepbahga, Vijay madisetti, "Block chain Applications A hands-on approach", VPT 2017.
2. Chandramouli Subramanian, Asha A George, Abhilash K A and MeenaKarthikeyan, "Blockchain Technology", Universty Press, 2021

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0514	3	0	0	3	CIA	30 M
Course Title	:	**MEAN STACK TECHNOLOGIES**					SEE	70M

Course Objectives:

This course is designed to:

- Translate user requirements into the overall architecture
- Implement new systems and manage the projects
- Write optimized front end code using HTML and JavaScript
- Monitor the performance of web applications & its infrastructure
- Design and implement Robust and Scalable Front End Applications

UNIT I

Introduction to Web: Internet and World Wide Web, Domain name service, Protocols: HTTP, FTP, SMTP. Html5 concepts, CSS3, Anatomy of a web page. XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

Learning Outcomes:

After completing this Unit, students will be able to

- Summarize the protocols related to Internet & WWW(L2)
- Compare and contrast XML and HTML(L5)

UNIT II

JavaScript: The Basic of JavaScript: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions. Angular Java Script Angular JS Expressions: ARRAY, Objects, $eval, Strings, Angular JS Form Validation & Form Submission, Single Page Application development using Angular JS.

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the importance of JavaScript(L2)
- Develop applications using Angular JS(L6)

UNIT III

Node.js: Introduction, Advantages, Node.js Process Model, Node JS Modules.
Express.js: Introduction to Express Framework, Introduction to Nodejs , What is Nodejs, Getting Started with Express, Your first Express App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling , API Handling , Debugging, Developing Template Engines, Using Process Managers, Security & Deployment.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the Node JS modules(L2)
- Make use of MVC in Express(L3)

UNIT IV

RESTful Web Services: Using the Uniform Interface, Designing URIs,
Web Linking, Conditional Requests. React Js: Welcome to React, Obstacles and Roadblocks, React's Future, Keeping Up with the Changes, Working with the Files, Pure React, Page Setup, The Virtual DOM, React Elements, ReactDOM, Children, Constructing Elements with Data, React Components, DOM Rendering, Factories.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the RESTful Web Services(L2)
- Assess the future of React Js(L5)

UNIT V

Mongo DB: Introduction, Architecture, Features, Examples, Database Creation & Collection in Mongo DB. Deploying Applications: Web hosting & Domains, Deployment Using Cloud Platforms.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the features and architecture of Mongo DB (L2)
- Create and collect Database in MongDB(L6)

Course Outcomes
After the completion of the course, student will be able to

- List the Basic Concepts of Web & Markup Languages(L1)
- Develop web Applications using Scripting Languages & Frameworks(L6)
- Make use of Express JS and Node JS frameworks(L3)

- Illustrate the uses of web services concepts like restful, react js (L2)
- Deploying applications using Cloud Platforms (L6)

Text Books:

1) Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2) Web Technologies, Uttam K Roy, Oxford
3) Pro Mean Stack Development, ELadElrom, Apress
4) Restful Web Services Cookbook, Subbu Allamraju, O'Reilly
5) JavaScript & jQuery the missing manual, David sawyer mcfarland, O'Reilly
6) Web Hosting for Dummies, Peter Pollock, John Wiley Brand

Reference Books:

1) Ruby on Rails up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006).
2) Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012).
3) Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4) An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.
5) Express.JS Guide,The Comprehensive Book on Express.js, Azat Mardan, Lean Publishing.

e-Resources:

1) http://www.upriss.org.uk/perl/PerlCourse.html

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Mechanical Engineering)

Course Category	:	OPEN ELECTIVE	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0515	3	0	0	3	CIA	30 M
Course Title	:	**MATHEMATICAL MODELING & SIMULATION**					SEE	70M

Course Objective:

This course focuses on what is needed to build simulation software environments, and not just building simulations using preexisting packages.

UNIT-I:

Simulation Basics-Handling Stepped and Event-based Time in Simulations-Discrete versus Continuous Modeling-Numerical Techniques-Sources and Propagation of Error

Learning Outcomes:

Students will be able to

- Understand computer simulation technologies and techniques.

UNIT-II

Dynamical, Finite State, and Complex Model Simulations-Graph or Network Transitions Based Simulations-Actor Based Simulations-Mesh Based Simulations-Hybrid Simulations

Learning Outcomes:

Students will be able to

- implement and test a variety of simulation and data analysis.

UNIT-III

Converting to Parallel and Distributed Simulations-Partitioning the Data-Partitioning the Algorithms-Handling Inter-partition Dependencies

Learning Outcomes:

Students will be able to

- Understand concepts of modeling layers of society's critical infrastructure networks.
- Understand partitioning the data.

UNIT-IV

Probability and Statistics for Simulations and Analysis-Introduction to Queues and Random Noise-Random Variates Generation-Sensitivity Analysis

Learning Outcomes:

Students will be able to

- Understand Queues and Random noise.
- Understand sensitivity analysis.

UNIT-V

Simulations Results Analysis and Viewing Tools-Display Forms: Tables, Graphs, and Multidimensional Visualization-Terminals, X and MS Windows, and Web Interfaces-Validation of Model Results

Learning Outcomes:

Students will be able to

- Build tools to view and control simulations and their results.

Course Outcomes:

After the completion of course, student will be able to

- Understand basic Model Forms.
- Understand basic Simulation Approaches.
- Evaluate handling Stepped and Event-based Time in Simulations.
- Distinguish Discrete versus Continuous Modeling.
- Apply Numerical Techniques.
- Calculate Sources and Propagation of Error.

TEXT BOOKS:

1. JN Kapur, “Mathematical modelling”, Newage publishers
2. Kai Velten, “Mathematical Modeling and Simulation: Introduction for Scientists and Engineers” Wiley Publishers.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

Course Structure for Four Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2019-20 onwards)

CIVIL ENGINEERING

INDUCTION PROGRAM (3 weeks duration)
❖ Physical activity ❖ Creative Arts ❖ Universal Human Values ❖ Literary ❖ Proficiency Modules ❖ Lectures by Eminent People ❖ Visits to local Areas ❖ Familiarization to Dept./Branch & Innovations

B. Tech – I Semester (Theory – 4, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
			THEORY							
1	BS	19ABS9901	Mathematics – I	3	1	0	4	30	70	100
2	BS	19ABS9902	Engineering Physics	3	0	0	3	30	70	100
3	ES	19AES0201	Basic Electrical and Electronics Engineering	3	0	0	3	30	70	100
4	MC	19AMC9902	Environmental Sciences	3	0	0	0	30	-	30
			PRACTICAL							
5	ES	19AES0301	Engineering Drawing Lab	1	0	4	3	30	70	100
6	BS	19ABS9903	Engineering Physics Lab	0	0	3	1.5	30	70	100
7	LC	19ALC0301	Engineering & IT Workshop Lab	0	0	3	1.5	30	70	100
8	ES	19AES0202	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5	30	70	100
			TOTAL:	**13**	**01**	**13**	**17.5**	**240**	**490**	**730**

B. Tech – II Semester (Theory – 5, Lab – 3)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
			THEORY							
1	BS	19ABS9906	Mathematics – II	3	1	0	4	30	70	100
2	BS	19ABS9904	Engineering Chemistry	3	0	0	3	30	70	100
3	ES	19AES0501	CProgramming	3	1	0	4	30	70	100
4	HS	19AHS9901	Communicative English	2	0	0	2	30	70	100
5	MC	19AMC9901	Human Values & Professional Ethics	3	0	0	0	30	-	30
			PRACTICAL							
6	BS	19ABS9905	Engineering Chemistry Lab	0	0	3	1.5	30	70	100
7	ES	19AES0502	CProgramming Lab	0	0	3	1.5	30	70	100
8	HS	19AHS9902	Communicative English Lab	0	0	3	1.5	30	70	100
			TOTAL:	**14**	**02**	**09**	**17.5**	**240**	**490**	**730**

B. Tech – III Semester (Theory – 7, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9907	Complex Variables &Transforms	2	1	0	3	30	70	100
2	ES	19AES0503T	Data Structures	2	1	0	3	30	70	100
3	PC	19APC0101T	Strength of Materials-I	2	1	0	3	30	70	100
4	PC	19APC0102T	Fluid Mechanics	2	1	0	3	30	70	100
5	PC	19APC0103T	Surveying	2	1	0	3	30	70	100
6	PC	19APC0104	Building Materials and Construction	3	0	0	3	30	70	100
7	MC	19AMC9903	Biology For Engineers	3	0	0	0	30	0	30
PRACTICAL										
8	ES	19AES0503P	Data Structures Lab	0	0	3	1.5	30	70	100
9	PC	19APC0101P	Strength of Materials Lab	0	0	3	1.5	30	70	100
10	PC	19APC0102P	Fluid Mechanics Lab	0	0	3	1.5	30	70	100
11	PC	19APC0103P	Surveying Lab	0	0	3	1.5	30	70	100
			TOTAL:	**16**	**05**	**12**	**24**	**330**	**700**	**1030**

B. Tech – IV Semester (Theory – 7, Lab – 3)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9908	Numerical Methods & Probability Theory	3	0	0	3	30	70	100
2	ES	19AES0505T	Python Programming for Engineers	2	1	0	3	30	70	100
3	PC	19APC0105	Strength of Materials-II	2	1	0	3	30	70	100
4	PC	19APC0106T	Hydraulics and Hydraulic Machinery	2	1	0	3	30	70	100
5	PC	19APC0107	Structural Analysis-I	2	1	0	3	30	70	100
6	PC	19APC0108	Concrete Technology	3	0	0	3	30	70	100
7	PC	19APC0109T	Transportation Engineering	3	0	0	3	30	70	100
PRACTICAL										
8	PC	19APC0106P	Hydraulic Machinery Lab	0	0	3	1.5	30	70	100
9	PC	19APC0109P	Transportation Engineering Lab	0	0	3	1.5	30	70	100
10	ES	19AES0505P	Python Programmingfor Engineers Lab	0	0	2	1	30	70	100
			TOTAL:	**16**	**05**	**08**	**25**	**300**	**700**	**1000**

Note: Environmental Engineering course is removed from IV semester and added in V Semester.

B. Tech – V Semester (Theory – 6, Lab – 3)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC		Design of Reinforced Concrete Structures	2	1	0	3	30	70	100
2	PC		Environmental Engineering	3	0	0	3	30	70	100
3	PC		Engineering Geology	2	0	0	2	30	70	100
4	PC		Structural Analysis-II	2	1	0	3	30	70	100
5	PE		Professional Elective-I Building Construction Practice. Subsurface Investigation and Instrumentation.Environmental Pollution and Control.Advanced Surveying Urban Hydrology.	3	0	0	3	30	70	100
6	OE		Open Elective-I Experimental stress analysis. Building Technology.Electrical Engineering Materials. Introduction to Hybrid and Electric Vehicles.Rapid Prototyping.Analog Electronics.Digital Electronics.Free and Open Sources Systems. Computer Graphics and Multimedia Animation. Brewing Technology.Computer Applications in Food Technology.Optimization Techniques.Technical Communication and Presentation Skills.	3	0	0	3	30	70	100
PRACTICAL										
7	PC		Computer Aided Civil Engineering Drawing	0	0	3	1.5	30	70	100
8	PC		Environmental Engineering Lab	0	0	3	1.5	30	70	100
9	PC		Engineering Geology Lab	0	0	2	1.0	30	70	100
10	PR		Socially Relevant Project	0	0	0	0.5	50	0	50
11	MC		Mandatory course: Constitution of India	3	0	0	0	30	0	50
			TOTAL:	**18**	**02**	**08**	**21.5**	**370**	**630**	**1000**

Note: Water Resource Engineering Course from V semester was replaced with Environmental Engineering course.

Areas for Socially Relevant Project in 5th Semester

a) Water quality analysis in a village /town
b) Survey camp
c) Road safety Audit
d) Environmental impact Audit

B. Tech – VI Semester (Theory – 6, Lab – 2)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC		Geotechnical Engineering -I	2	1	0	3	30	70	100
2	PC		Design of Steel Structures	2	1	0	3	30	70	100
3	PC		Water Resources Engineering	3	0	0	3	30	70	100
4	PE		Professional Elective-II Repair and Rehabilitation of Structures. Ground Improvement Techniques. Air Pollution Engineering. Railway Engineering. Hydropower Development.	3	0	0	3	30	70	100
5	OE		Open Elective-II Industrial waste and waste-water management. Building Services & Maintenance. Industrial Automation. System Reliability Concepts. Introduction to Mechatronics. Optimization techniques through MATLAB. Basics of VLSI. Principles of Communication Systems. Fundamentals of VR/AR/MR. Data Science. Food Toxicology. Food Plant Equipment Design. Wavelet Transforms & its applications. Soft Skills.	3	0	0	3	30	70	100
6	HE		Humanities Elective-I Entrepreneurship & Incubation. Managerial Economics And Financial Analysis. Business Ethics And Corporate Governance. Enterprise Resource Planning. Supply Chain Management	3	0	0	3	30	70	100
PRACTICAL										
7	PC		Geotechnical Engineering lab	0	0	3	1.5	30	70	100
8	HS		English Language Skills Lab	0	0	3	1.5	30	70	100
9	PR		Socially Relevant Project	0	0	0	0.5	50	0	50
10	MC		Mandatory Course: Research Methodology	3	0	0	0	30	0	50
			TOTAL:	**16**	**02**	**06**	**21.5**	**340**	**560**	**900**

Note: English Language Skills Course from VI semester was removed and replaced with Water Resource Engineering course.

Areas for Socially Relevant Project in 6th Semester

a) Structural condition assessment of school buildings
b) Water resources management -Audit
c)Survey of waste management systems-Swachh Bharat
d)Survey of modern building materials & properties
e) Survey on Implementation of Government welfare schemes

B. Tech – VII Semester (Theory – 5, Lab – 2 & Project – 1)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC		Geotechnical Engineering-II	2	1	0	3	30	70	100
2	PC		Estimation & costing	2	1	0	3	30	70	100
3	PE		Professional Elective-III Bridge Engineering.Prestressed concrete.Expansive soils.Rock Mechanics.Industrial Waste & Waste-Water Engineering.Remote Sensing and GIS.Traffic Engineering.Urban Transportation Planning. Water Resources System Analysis OR River Basin Management.	3	0	0	3	30	70	100
4	OE		Open Elective-III Air pollution and control. Basics of civil Engineering. Renewable Energy Systems. Electric Vehicle Engineering. Finite element methods. Product Marketing. Introduction to Microcontrollers & Applications. Principles of Digital Signal Processing. Fundamentals of Game Development. Cyber Security. Corporate Governance in Food Industries. Process Technology for Convenience & RTE Foods. Numerical Methods for Engineers (ECE, CSE, IT &CE)	3	0	0	3	30	70	100
5	HE		Humanities Elective-II Organizational Behavior.Management Science. Business Environment. Strategic Management E-Business.	3	0	0	3	30	70	100
PRACTICAL										
6	PC		Concrete technology Lab	0	0	3	1.5	30	70	100
7	PC		Computer Aided Design Lab	0	0	3	1.5	30	70	100
8	PR		Project*	0	0	0	2	50	0	50
9	PR		Industrial Training/Skill Development/Research Project*	0	0	0	1.5	50	0	50
			TOTAL:	**13**	**02**	**06**	**21.5**	**370**	**630**	**1000**

B. Tech – VIII Semester (Theory – 2, Project – 1)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PE		Professional Elective-IV Finite Element Methods.Advanced R.C.C Structural Design. Advanced steel structures. Advanced Foundation Engineering. Soil structure interaction. Environmental Impact Assessment. Environmental Economics.Docks and Harbor Engineering. Traffic Analysis.Design and Drawing of Irrigation Structures. Water Shed Management. Sustainable Water Resources Development.	3	0	0	3	30	70	100
2	OE		Open Elective-IV Disaster Management. Global Warming and climate changes. IoT Applications in Electrical Engineering. Smart Electric Grid. Energy conservation and management. Non destructive testing. Introduction to Image Processing. Principles of Cellular and Mobile Communications. Industrial Electronics. Electronic Instrumentation. Block Chain Technology and Applications. MEAN Stack Technology. Food Plants Utilities & Services. Nutraceuticals & Functional Foods. Mathematical Modeling & Simulation.	3	0	0	3	30	70	100
PRACTICAL										
3	PR	19APC0106P	Project	0	0	0	7	60	140	200
			TOTAL:	**06**	**00**	**08**	**13**	**120**	**280**	**400**

DETAILED SYLLABUS

B.TECH - I SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE, ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9901	3	1	0	4	CIA	30 M
Course Title	:	MATHEMATICS – I					SEE	70 M

COURSE OBJECTIVES:

1. To enlighten the learners in the concept of differential equations, matrices and multivariable calculus.
2. To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

COURSE OUTCOMES:

After the completion of this course, the students will be able to:

1. Understand the effective mathematical tools for the solutions of differential equations that model physical processes.
2. Identify the essential characteristics of linear differential equations with constant coefficients and solve the linear differential equations with constant coefficients by appropriate method.
3. Solving systems of linear equations, using technology to facilitate row reduction determine the rank, Eigen values and Eigen vectors, diagonal form and different factorizations of a matrix.
4. Translate the given function as series of Taylor's and McLaren's with remainders and analyze the behavior of functions by using mean value theorems.
5. Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies and acquire the Knowledge maxima and minima of functions of several variables.

Unit I

Ordinary Differential Equations of First Order: Formation of the ordinary differential equations (ODEs) – Solution of an ordinary differential equation – Equations of the First Order and First Degree – Linear Differential Equation – Bernoulli's Equation – Exact Differential Equations – Equations Reducible to exact equations-Orthogonal Trajectories.

Ordinary Differential Equations of First Order but not First Degree: Equations solvable for p – Equations solvable for x – Equations solvable for y – Equations do not contain x(or y) – Clairaut's Equations.

Unit II

Ordinary Differential Equations of Higher Orders: Solutions of Linear Ordinary Differential Equations With Constant Coefficients – Rules for finding the Complimentary Functions – Rules for finding the particular integral – Method of variation of parameters – Cauchy's linear equation – Legendre's Linear Equation.

Unit III

Matrices: Inverse and rank of a matrix – System of linear equations; Symmetric, skew – symmetric and orthogonal matrices – Eigen values and Eigen vectors and their properties, Cayley – Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley – Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Unit IV

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), indeterminate forms and L'Hospital's rule; Maxima and minima.

Unit V

Multivariable Calculus: Limit, continuity and partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons.

Reference Books:

1. R. K. Jain and S. R. K. Lyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd.
2. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
3. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9902	3	0	0	3	CIA	30 M
Course Title	:	ENGINEERING PHYSICS					SEE	70 M

COURSE OBJECTIVES:

1. To disseminate knowledge in basic concepts of mechanics and to understand the basic ideas of damping and resonance.
2. To interpret the significant concepts of magnetic materials which leads to potential applications and basics of electromagnetic waves.
3. To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
4. To teach the concepts related to laser, fiber optics and superconductivity which lead to their fascinating applications.
5. To familiarize the concept of Quantum mechanics and semiconductors relevant to engineering branches.

UNIT I

MECHANICS AND OSCILLATIONS: Basic laws of vectors and scalars – rotational frames – conservative forces; F = – grad V, torque and angular momentum – Newton's laws in inertial and linear accelerating non-inertial frames of reference.

Simple Harmonic motion – Characteristics of SHM; Damped harmonic motion – over – damped, critically damped and lightly damped oscillators; Forced oscillations and resonance.

UNIT II

ELECTROMAGNETISM AND MAGNETIC PROPERTIES OF MATERIALS: Divergence of Electric and Magnetic Fields – Gauss theorem for divergence – Curl of Electric and Magnetic Fields – Stokes theorem for curl – Maxwell's Equations – Electromagnetic wave propagation (conducting and non – conducting media) – Poynting's Theorem.

Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Classification of Magnetic materials – Domain Concepts of ferromagnetism – Hysteresis – soft and hard magnetic materials – Magnetic device applications.

UNIT III

WAVE OPTICS: Interference: Principle of superposition – Young's Experiment – Coherence – Interference in thin films, Wedge shaped film, Newton's Rings – Determination of wavelength.

Diffraction: Diffraction, differences between interference and diffraction, Fraunhofer diffraction due to Single slit

Polarization: Polarization by double refraction – Plane polarized light by Nicol's Prism – Half wave and Quarter wave plate – Engineering applications of Polarization.

UNIT IV

LASERS AND FIBER OPTICS: Introduction, spontaneous and stimulated emissions, population inversions, pumping, Ruby laser, Gas laser (He – Ne Laser), Semiconductor laser, Applications of lasers.

Optical Fiber and Total Internal Reflection, Acceptance Angle and cone of a fiber, Numerical aperture, Fiber optics in communications, Types of Optical Fibers, Applications of optical fibers.

SUPERCONDUCTIVITY: Super conductivity, Meissner Effect, Basics of BSC theory, Types of Superconductors and Applications of Superconductors.

UNIT V

QUANTUM MECHANICS: Introduction, Photoelectric Effect, de – Broglie's hypothesis, Wave – particle duality Heisenberg's Uncertainty principle, Schrodinger's time independent wave equation, Particle in one dimensional box.

SEMICONDUCTOR PHYSICS: Energy bands in solids, Types of electronic materials: metals, semiconductors, and insulators**.** Intrinsic and Extrinsic semiconductors, Direct and Indirect band gap semiconductors Hall effect – Applications of Hall effect – Drift and Diffusion currents – Continuity equation– Applications of Semiconductors.

COURSE OUTCOMES:

After the completion of this course, the student will be able to:

1. Extend Newton's second law for inertial and non-inertial frame of reference and analyze the concept of resonance.
2. Apply the Gauss' theorem for divergence and Stokes' theorem for curl and Classify the magnetic materials based on susceptibility
3. Interpret the differences between interference and diffraction, illustrate the concept of polarization of light and its applications and classify ordinary polarized light and extraordinary polarized light.
4. Apply electromagnetic wave propagation in different Optical Fibers; the lasers concepts in various application sand explain Meissner's effect, BCS theory.
5. Interpret the direct and indirect band gap in semiconductors and identify the type of semiconductor using Hall Effect.
   Analyze the behavior of particles at very microscopic level by using wave nature of particles.

TEXT BOOKS:

1. Gaur R.K. and Gupta S.L., "Engineering Physics"-Dhanpat Rai publishers, 2012
2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Krshisagar - S. Chand publications, 11th Edition 2019.
3. Fundamentals of Physics by David Halliday and Robert Resnick – Part I and Part II - Wiley.
4. H.K. Malik & A.K. Singh "Engineering Physics" - McGraw Hill Publishing Company Ltd.
5. "Engineering Physics", K.Thyagarajan - McGraw Hill Publishing Company Ltd., 2015.
6. D. Kleppner and Robert Kolenkow "An introduction to Mechanics"- II - Cambridge University Press, 2015

REFERENCE TEXT BOOKS:

1. M K Varma "Introduction to Mechanics"-Universities Press-2015.
2. I. G. Main, "Vibrations and waves in physics", 3rd Edn., Cambridge University Press
3. D.K. Bhattacharya and A. Bhaskaran, "Engineering Physics"- Oxford Publications-2015
4. David J. Griffiths, "Introduction to Electrodynamics"- 4/e, Pearson Education, 2014
5. P.K. Palaniswamy, "Engineering Physics" Scitech Publications
6. Shatendra Sharma, Jyotsna Sharma, "Engineering Physics" Pearson Education, 2018
7. D. Kleppner and Robert Kolenkow "An introduction to Mechanics" – II – Cambridge University Press, 2015.

(Common to I Semester CE, ME and ECE & II Semester CSE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0201	3	0	0	3	CIA	30 M
Course Title	:	BASIC ELECTRICAL AND ELECTRONICS ENGG.					SEE	70 M

COURSE OBJECTIVES:-

1. To introduce basics of simple electric circuits.
2. To impart knowledge on measuring devices for voltages and currents.
3. To provide comprehensive idea about working principle, operation and applications of PN junction diode & knowledge about semiconductors
4. To teach applications of electronic principles which are used in Engineering
5. To give knowledge about Special purpose diodes and applications

COURSE OUTCOMES:-

1. Able to recall Simple electrical connections.
2. Knowledge about the Measuring Instruments
3. Learning operation and properties of semiconductors
4. Useful knowledge on PN diode and simple applications.
5. Working and construction of Analog Electronic devices.

UNIT I

ELECTRICAL CIRCUITS: Basic Electrical Circuit elements – (R-L-C) – Ohms Law – Kirchoffs Law – Introduction to AC Circuits – and DC Circuits – Series connection – parallel connections, Analysis of single – phase ac circuits consisting of RL – RC – RLC series circuits – Nodal Analysis-Mesh Analysis.

UNIT II

MEASURING INSTRUMENTS: Moving coil and moving iron instruments (Ammeter and voltmeter) – Cathode ray oscilloscope – cathode ray tube - Regulated power supply – Digital Multi Meter (DMM) – Megger instrument – Introduction to Electric and magnetic fields – Thermistor – Linear Mode power supply.

UNIT III

SEMICONDUCTORS: Classification of semiconductors – Intrinsic semiconductors – Extrinsic semiconductors – conductivity of Intrinsic and Extrinsic semiconductors – P-type semiconductor – N-type semiconductor – Qualitative theory of P-N junction – V-I characteristics of PN junction diode – and simple applications – Ligiht Emitting Diode(LED).

UNIT IV

RECTIFIERS AND FILTERS: Introduction to Rectifiers – Half Wave Rectifiers – Full Wave Rectifiers – Bridge rectifier – Advantages of Bridge rectifier – Comparision of Rectifiers – Harmonic components in a Rectifier circuit – Introduction to Filters – Inductor Filter – capacitor Filter – LC or L-section Filter – Types of Voltage regulators – series voltage regulator – shunt voltage regulator – Clippers and Clampers.

UNIT V

ANALOG ELECTRONICS: Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, Breakdown mechanism – Avalanche zener Breakdown – special purpose diodes: Schottky diode, tunnel diode, varactor diode, photodiode, phototransistor ,Introduction to Bipolar Juntion Transistor – BJT construction, operation, configurations – CB, CE, CC. – Introduction to Basic Logic Gates.

Text Books:-

1. D.P. Kothari, I.J.Nagrath, Basic Electrical and Electronics Engineering, 2nd Edition, McGraw Hill Education (India) Private Limited.

2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2nd edition, Pearson India Private Limited.

Reference Books:-

1. Principles of Electrical Engineering and Electronics, V.K. Mehta & Rohit Mehta, S.Chand publications.
2. Electronic Devices and Circuit Theory by Robert L.Boylestad and Louis Nashelsky., pearson.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs

Course Code	:	19AMC9902	3	0	0	0	CIA	30 M
Course Title	:	ENVIRONMENTAL SCIENCES					SEE	--

COURSE OBJECTIVES:-

1. Creating basic awareness on environment
2. Understanding the importance of ecological balance for sustainable development.
3. Creating awareness on biodiversity and its conservation
4. Understanding the impacts of developmental activities and mitigation measures.
5. Understanding the environmental policies and regulations.

COURSE OUTCOMES:

Based on this course, the Engineering graduate will understand / evaluate / develop technologies on the basis of ecological principles and environmental regulations which in – turn helps in sustainable development.

UNIT I

Ecosystems: Definition, Scope and Importance ecosystem. Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Energy flow in the ecosystem, Biogeochemical cycles, Bioaccumulation, ecosystem value, derives and carrying capacity, Field visits.

UNIT II

Natural Resources: Classification of Resources: Living and Non – Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problem, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable energy source, and case studies.

UNIT III

Biodiversity and its Conservation: Introduction – Definition: genetic, species and ecosystem diversity. Bio – geographical classification of India – Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega diversity nation – Hot - sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man – wildlife conflicts; Conservation of biodiversity: In-situ and Ex-situ conservation. National Biodiversity Act.

UNIT IV

Environmental Pollution and Control Technologies: Environmental Pollution & Control: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and industrial pollution, Ambient air quality standards. Water pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid Waste management composition and characteristics of e - Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, Secondary Tertiary.

Overview of air pollution control technology, Concept of bioremediation. Global Environmental Problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montreal Protocol.

UNIT V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act – 1981, Water Act, Forest Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio - economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy

Consumerism, Environmental Education, Urban Sprawl Human Health, Environmental Ethics, Concept of Green Building, Ecological foot print, Life Cycle Assessment(LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCES:

1. Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.
2. Enviromental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela . 2008 PHI Learning Pvt Ltd.
4. Environmental Science by Daniel B. Botkin & Edwards A. Keller, Wiley INDIA edition.
5. Enviromental Studies by Anubha Kaushik, 4th Edition, New age international publishers.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs

Course Code	:	19AES0301	1	0	4	3	CIA	30 M
Course Title	:	ENGINEERING DRAWING LAB					SEE	70 M

COURSE OBJECTIVES:

1. To gain and understanding of the basics of geometrical constructions of various planes and solids, understanding system of graphical representation of various objects and various views to draft and read the products to be designed and eventually for manufacturing applications.
2. To learn about various projections, to understand complete dimensions and details of object.
3. Ultimately student must get imaginary skill to put an idea of object, circuit, assembly of parts in black & white, to design a product and to understand the composition, which can be understood universally.

COURSE OUTCOMES:

1. Drawing 2D and 3D diagrams of various objects.
2. Learning conventions of Drawing, which is an Universal Language of Engineers.
3. Drafting projections of points, planes and solids.

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance – Conventions in Drawing – Lettering – BIS Conventions. **Curves used in Engineering Practice:** (a) Conic Sections including the Rectangular Hyperbola – General method only, (b) Cycloid, Epicycloid and Hypocycloid, (c) Involutes.

UNIT II

Scales: Plain, Diagonal and Vernier. **Projection of Points**: Principles of orthographic projection – Convention – First angle projections, projections of points.

UNIT III

Projections of Lines: Lines inclined to one or both planes, Problems on projections, Finding True lengths. **Projections of Planes**: Projections of regular plane surfaces- plane surfaces inclined to both planes.

UNIT IV

Projections of Solids: Projections of Regular Solids with axis inclined to both planes. **Developments of Solids**: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid, Cone.

UNIT V

Isometric and Orthographic Projections: Principles of isometric projection- Isometric Scale – Isometric Views- Conventions – Isometric Views of lines, Planes, Simple solids (cube, cylinder and cone). Isometric projections of spherical parts. Conversion of isometric Views to Orthographic Views.

Text Books:

1. Engineering Drawing, N. D. Bhatt, Charotar Publishers
2. Engineering Drawing, K.L. Narayana & P. Kannaih, Scitech Publishers, Chennai

References:

1. Engineering Drawing, Johle, Tata McGraw - Hill Publishers
2. Engineering Drawing, Shah and Rana, 2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal /New age Publishers
4. Engineering Graphics, K.C. John, PHI, 2013
5. Engineering Drawing, B.V.R. Guptha, J.K. Publishers

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs

Course Code	:	19ABS9903	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING PHYSICS LAB					SEE	70 M

COURSE OBJECTIVES:

1. To understand the phenomenon of interference and diffraction using Travelling Microscope and spectrometer.
2. To analyze the interaction of electromagnetic fields.
3. To understand the concept of polarization and classify polarized and unpolarized lights.
4. To realize the laws of resistance by using Carey Foster's bridge.
5. To analyze the frequencies of electrically maintained tuning fork by Melde's apparatus.

COURSE OUTCOMES:

After completion of this course, the students will be able to:

1. Apply the knowledge of optics to calculate geometrical parameters of thickness of thin object and radius of curvature of a lens.
2. Plot the intensity of the magnetic field of circular coil carrying current with varying distance.
3. Evaluate the Planck's constant value practically and analyze the characteristics of photo electric cell and Cauchy's constants.
4. Determine coefficient of thermal Conductivity of a Bad Conductor.

LIST OF EXPERIMENTS:

1. Determination of Radius of Curvature of a given Convex Lens By forming Newton's Rings.
2. Determination of Wavelength of Spectral Lines in the Mercury Spectrum by Normal Incidence method.
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying Circular Coil.
4. Determination of Cauchy's Constants of a Given Material of the Prism using Spectrometer.
5. Determination of Refractive Index of Ordinary ray μ_o and extraordinary μ_e ray.
6. Determination of Thickness Given Paper Strip by Wedge shape Method.
7. Calibration of Low Range Voltmeter.
8. Calibration of Low Range Ammeter.
9. Determination of Magnetic Moment and Horizontal Component of Earth's Magnetic Field.
10. Lees Method - Coefficient of thermal Conductivity of a Bad Conductor.
11. Carey Foster's Bridge – Verification of laws of Resistance and Determination of Specific Resistance.
12. Melde's Apparatus – Frequency of electrically maintained Tuning Fork.
13. Photoelectric cell – Characteristics.
14. Planks Constants.
15. Determination of Wavelength of Mono chromatic source using LASER diffraction

Reference Books:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S.Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Laboratory Course	L	T	P	C	Exam	3 Hrs

Course Code	:	19ALC0301	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING & IT WORKSHOP LAB					SEE	70 M

ENGINEERING WORKSHOP LAB

COURSE OBJECTIVES:

The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labor involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

COURSE OUTCOMES:

1. Acquires basic knowledge of various tools and their uses in different sections of manufacturing.
2. Apply wood working skills in real world applications.
3. Design and model various basic prototypes in the trade of fitting.
4. Able to perform various basic House Wiring techniques.

TRADES FOR EXERCISES:

(a) Carpentry: Bench Work, tools used in carpentry.

Jobs for Class work: (i) Half lap joint (ii) Mortise and Tenon joint (iii) Bridle joint (iv) Corner dovetail joint

(b) Fitting: Tools used in fitting work, Different files, chisels, hammers and bench vice.

Jobs for class work: (i) Vee Fit (ii) Square Fit (iii) Dovetail fit (iv) Half Round Fit

(c) House Wiring: Tools used in house wiring work.

Jobs for class work: (i) Series / Parallel Connection with three bulbs (ii) Tube Light Connections (iii) Stair Case Connections (iv) Measurement of Earth Resistance / Godown Wiring

Note: At least two exercises to be done from each trade.

TRADES FOR DEMONSTRATION:

a) Plumbing
b) Machine Shop

REFERENCE BOOKS:

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
2. Work shop Manual / P. Kannaiah/ K. L. Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, Saravana Pandian, 4/e Vikas.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

IT WORKSHOP LAB

COURSE OBJECTIVES:

1) Understand the basic components and peripherals of a computer.
2) To become familiar in configuring a system.
3) Learn the usage of productivity tools.
4) Acquire knowledge about the netiquette and cyber hygiene.
5) Get hands on experience in trouble shooting a system

COURSE OUTCOMES:

At the end of the course the students can able to

1) Assemble and disassemble the systems
2) Use the Microsoft Office Tools
3) Install various software
4) Know about various search engines
5) Trouble shoots various Hardware and Software problems.

LIST OF EXERCISES

1. System Assembling, Disassembling and identification of Parts / Peripherals
2. Operating System Installation - Install Operating Systems like Windows, Linux along with necessary Device Drivers. The system should be configured as dual boot with both windows and Linux.
3. MS-Office / Open Office
   a) Word – All Toolbars, Page Setup, Page Background, Font, Para Graph, Page Borders, Headers & Footers, Mail Merge, Tables, Symbols, Equations, Saving, and Reviewing.
   b) Excel / Spread Sheet – All Toolbars, Cell Formatting, Grid Lines, Font, Page Setup, Organize data, Functions, Formulae, Headers & Footers, Tables, Graphs and Charts.
   c) Power Point Presentation – Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets, Numbering, Slide Show, Animations, Hyperlinks, Inserting – Images, Clip Art, Shapes, Objects, Tables and Charts, Audio, and Video files.
   d) Access – creation of database, validate data.
4. Network Configuration & Software Installation – Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.
5. Internet and World Wide Web Search Engines, Types of search engines, netiquette, cyber hygiene.
6. Trouble Shooting – Hardware trouble shooting, Software trouble shooting.

Reference Books:

1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K. L. James, Eastern Economy Edition.
2. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition By Gary B. Shelly, Misty E. Vermaat and Thomas J. Cashman (2007, Paperback).
3. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, Rudra Prathap, Oxford University Press, 2002.
4. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
5. The Complete Computer upgrade and repair book, 3/e, Cheryl A Schmidt, Dreamtech.
6. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
7. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs

Course Code	:	19AES0202	0	0	3	1.5	CIA	30 M
Course Title	:	BASIC ELECTRICAL & ELECTRONICS ENGG. LAB					SEE	70 M

COURSE OBJECTIVES:

1. Get exposure to common electronic components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand usage of common electrical measuring instruments.
4. Determine performance characteristics of PN Junction diodes and applications.
5. Understanding simple Network connections Like series circuits

COURSE OUTCOMES:

1. To learn about the simple Logic gates functions.
2. Understanding the simple configurations of the Transistor.
3. Useful for the simple applications of PN diode.
4. To give knowledge about PN diode characteristics.
5. Knowledge about simple Network Analysis

BASIC ELECTRICAL ENGINEERING LAB

List of Experiments:

2. Verification of Ohms Law
3. Verification of KCL and KVL Laws
4. MESH analysis
5. NODAL analysis
6. Verification of RC and RL Parallel Resonance
7. Verification of R-L-C Series Resonance

BASIC ELECTRONICS ENGINEERING LAB

List of Experiments:

1. V-I Characteristics of PN DIODE
2. Half Wave Rectifier
3. Full Wave Rectifier
4. BJT Configuration of CB, CE, CC
5. ZENER Diode Characteristics
6. Basic LOGIC gates

B.TECH – II SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to II Semester CSE, ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9906	3	1	0	4	CIA	30 M
Course Title	:	MATHEMATICS – II					SEE	70 M

COURSE OBJECTIVES:

1. To familiarize the prospective engineers with techniques in multivariate integration and partial differential equations.
2. To equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

COURSE OUTCOMES:

After the completion of this course, the students will be able to:

1. Understand beta and gamma functions and its relations and conclude the use of special function in evaluating definite integrals.
2. Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and apply double integration techniques in evaluating areas bounded by region.
3. Apply Del to Scalar and vector point functions and illustrate the physical interpretation of Gradient, Divergence and Curl.
4. Find the work done in moving a particle along the path over a force field and evaluate the rates of fluid flow along and across curves.
5. Apply a range of techniques to find solutions of standard PDEs and outline the basic properties of standard PDEs.

Unit I

Sequences and Series: Convergence of sequence and series, tests for convergence;

Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit II

Special Functions: Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions, evaluation of improper integrals.

Unit III

Multiple Integrals: Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves, Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co – ordinates.

Unit IV

Vector Calculus: Scalar and vector point functions, vector operator del, del applies to scalar point functions Gradient, del applied to vector point functions – Divergence and Curl, vector identities.

Line integral – circulation-work done, surface integral – flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Unit V

Partial Differential Equations: First order partial differential equations, solutions of first order linear and non – linear PDEs. Solutions to homogenous and non – homogenous higher order linear partial differential equations.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd.
2. B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.
3. H. k Das, Er. Rajnish Verma, Higher Engineering Mathematics, S. Chand.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9904	3	0	0	3	CIA	30 M
Course Title	:	ENGINEERING CHEMISTRY					SEE	70 M

COURSE OBJECTIVES:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.

COURSE OUTCOMES:
At the end of the course the students will be able to:

1. To impart the concept of soft and hard waters, softening methods of hard water.
2. Explain the importance of polymers in our daily life and mechanism of conduction in the conducting polymers.
3. To analyze the fuel and methods for preparation of synthetic fuels.
4. To understand the basics of electrochemistry, conductometry and batteries.
5. To familiarizes the Engineering materials.

Unit I **(10 hrs)**
Water Technology: Sources of Water, Impurities and their Influence on Living Systems, Soft Water and Hardness of Water, Estimation of Hardness by EDTA Method, Boiler Troubles – Scale and Sludge, Industrial Water Treatment Internal Treatment Methods(Phosphate Conditioning, Calgon Conditioning), Water softening Methods (Zeolite and Ion – Exchange Processes), Specifications for Drinking Water, Bureau of Indian Standards (BIS) and World Health Organization(WHO), Municipal Water Treatment, Desalination of Brackish Water, Reverse Osmosis (RO) and Electro dialysis.

Unit II **(10 hrs)**
Polymer Chemistry: Introduction to Polymers, Types of Polymerisation (Addition & Condensation), Mechanism of Addition Polymerisation (Ionic and Radical).

Plastics: Thermoplastics and Thermo settings. Preparation, Properties and Applications of Bakelite, Nylon – 66.

Elastomers: Buna – S, Buna – N – Preparation, Properties and Applications.

Conducting Polymers: Polyacetylene, Polyaniline, Mechanism of Conduction and Applications.

Unit III **(10 hrs)**
Fuel Technology: Fuels – Classification of fuels.

Solid Fuels: Wood and Coal, Ranking of Coal-Analysis (Proximate and Ultimate), Coke Manufacture Otto Hoffman Process.

Liquid Fuels: Petroleum Origin, Extraction, and Refining. Motor Fuels Petrol, Diesel Oil, Knocking Octane Number and Cetane Number; Synthetic petrol – Fischer – Tropsch's & Bergius process.
Gaseous Fuels: Composition and Uses of Natural Gas, LPG, and CNG. Flue gas analysis and its significance.

Unit IV **(10 hrs)**

Electrochemistry: Introduction to Electrochemistry (Conductors, Semi-Conductors, Insulators, Conductance). Electrodes, Reference Electrodes, Electrochemical Cell, Nernst Equation, Cell Potential and its Calculations, Numerical Problems. Principle and Applications of Potentiometry, Conductometry.

Batteries: Primary Batteries – Zinc – Air Battery.
Secondary Batteries – Lithium Ion Batteries – Working of the Batteries including Cell Reactions.
Fuel Cell – Hydrogen – Oxygen.

Unit V **(10 hrs)**
Materials of Engineering Chemistry:
Building materials: Portland Cement, Constituents, Phases and Reactivity of Clinker, Setting and Hardening of Cement.
Refractories: Classification, Properties, Factors affecting the Refractory Materials and Applications.
Lubricants: Classification of Lubricants with examples. Definition and Significance of the following Characteristics of a Good Lubricating Oil – Viscosity, Viscosity Index, Flash & Fire Point, Acid Number, Saponifaction Value, Pour Point and Cloud Point.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Shashi Chawla, A Reading of Engineering Chemistry, 3rd Edition, Dhanpat Rai and Co., New Delhi, 2011,3rd edition.
3. Puri, Sharma and Pathania "Principles of Physical Chemistry". Vishal Publishing Co.,Jalandhar.1991, 31st edition
4. Gowariker *et al*., Polymer Science and Technology, Prentice Hall of India Pvt. Ltd., New Delhi, 2004, 10th reprint.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0501	3	1	0	4	CIA	30 M
Course Title	:	C PROGRAMMING					SEE	70 M

COURSE OBJECTIVES:

1. Introduce the internal parts of a computer, and peripherals.
2. Introduce the Concept of Algorithm and use it to solve computational problems
3. Identify the computational and non – computational problems
4. Teach the syntax and semantics of a C Programming language
5. Demonstrate the use of Control structures of C Programming language

COURSE OUTCOMES:

1. Illustrate the working of a computer and apply algorithmic approach for solving a problem.
2. Recognize the importance of programming language independent constructs
3. Select the control structure to solve computational problems
4. Design and implement programs to analyze the array applications.
5. Structure the individual data elements to simplify the solutions.

Unit I

Introduction to Computer Programming Languages: Evolution of Computer Programming languages – Machine, Symbolic and high-level languages. Fundamentals of Algorithms (Pseudo Codes) and Flowcharts, Compiler, Interpreter, Loader, and Linker.

Creating and Running Programs: Writing, Editing, Compiling, Linking and Executing.

Program Control Structures: Sequence, Selection and Iteration. Software Development Method.

Unit II

Introduction to C Language: Background, Basic Structure of a C Program – Steps to execute a C Program – Character Set of C Language – Basic I/O Statements – Basic Data Types and Sizes – C – Tokens: Identifiers, Keywords, Constants, and Variables. Sample Programs.

Input and output: standard input and output, formatted output – printf, formatted input – scanf.

Unit III

Operators: Arithmetic, Relational, Logical, Increment and decrement, Conditional, Assignment, Bitwise – Operator Precedence – Expressions – Type Conversions, Conditional Expressions – Precedence and Order of Evaluation. Sample Programs.

Control Flow / Control Statements: Selection & Making Decisions – Logical Data and Operators – Two-way Selection, Multi-way selection – Standard Statements and blocks – Non-iterative Statements: (if, if – else, null else, nested if – else, if – else ladder, else – if, switch) – Repetitive / Iterative Statements: Concept of loop – Pre-test and post-test loops – While loop, do-while loop, and for loops, initialization and updating, event and counter controlled loops. Branching: break, continue, and Goto. – Sample programs on applications.

Unit IV

Arrays in C language: Concept – Definition – Declaration – Types of arrays – One Dimensional, two dimensional, multidimensional – initialization of arrays – Storing and assessing elements – Array applications.

Strings: Definition, Declaration, Initialization – Basic operations – String manipulations – String handling functions – Arrays using strings -

Unit V

Pointers and arrays: Concept – Definition, Declaration, Initialization, pointer to pointer, functions and pointers, arrays and pointers, pointer as function arguments (call – by – reference), pointers and strings.

Functions: Concept – Definition, Declaration, Types of functions – parameter passing – passing arrays to functions, passing pointers to functions, Recursion – returning non-integers, external variables, scope variables, header variables, register variables, block structure. User defined functions – Standard Library Functions.

Structures: Definition – Declaration – Initialization – Accessing the structure elements – arrays of structures, Array with in structures, pointers to structures, Passing Structure to functions – nested structures, self – referential structures, unions, typedef.

Text Books:

1. Pradip Dey, and Manas Ghosh, “Programming in C”, 2018, Oxford University Press.
2. R.G. Dromey, “How to Solve it by Computer”. 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, “The C Programming Language”, 2^{nd}Edition, Pearson.

Reference Books:

1. RS Bichkar “Programming with C”, 2012, Universities Press.
2. Pelin Aksoy, and Laura Denardis, “Information Technology in Theory”, 2017, Cengage Learning.
3. Byron Gottfried and Jitender Kumar Chhabra, “Programming with C”, 4th Edition, 2019, McGraw Hill Education.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9901	2	0	0	2	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH					SEE	70 M

COURSE OBJECTIVES:

Reading Skills
- Addressing explicit and implicit meanings of a text on current topics.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

Writing Skills
- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, emails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

Interactive Skills
- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

Life Skills
- Examining self-attributes and identifying areas that require improvement: self-diagnosis and self-motivation.
- Adapting to a given situation and developing a functional approach to finding solutions: adaptability and problem solving.
- Understanding the importance of helping others: community services and enthusiasm.

COURSE OUTCOMES:
1. The student will acquire basic proficiency in English using all LSRW skills.
2. Read and explore for enrichment of works from various genres (Poems, essays etc.)
3. Make correct usage of grammar and Vocabulary in writing and speaking.
4. To make them develop Linguistic competence.
5. To make them understand the concept of redundancies in writing skills.

UNIT I

Reading	:	*On the conduct of life:* William Hazlitt
Grammar	:	Prepositions
Vocabulary	:	Word Formation I: Introduction to Word Formation
Writing	:	Clauses and Sentences
Life skills	:	**Values and Ethics**
		If: Rudyard Kipling

UNIT II

Reading	:	*The Brook:* Alfred Tennyson
Grammar	:	Articles
Vocabulary	:	Word Formation II: Root Words from other Languages
Writing	:	Punctuation
Life skills	:	**Self-Improvement**
		How I Became a Public Speaker: George Bernard Shaw

UNIT III

Reading	:	*The Death Trap*: Saki
Grammar	:	Noun-Pronoun Agreement
		Subject- Verb Agreement
Vocabulary	:	Word Formation III: Prefixes and Suffixes
Writing	:	Principles of Good Writing
Life skills	:	**Time Management**
		On saving Time: Seneca

UNIT IV

Reading	:	*Chindu Yellama*

Grammar	**:**	Misplaced Modifiers
Vocabulary	**:**	Synonyms; Antonyms
Writing	**:**	Essay Writing
Life skills	**:**	**Innovation**
		Muhammad Yunus

UNIT V

Reading	**:**	*Politics and the English Language*: George Orwell
Grammar	**:**	Clichés; Redundancies
Vocabulary	**:**	Common Abbreviations
Writing	**:**	Writing a Summary
Life skills	**:**	**Motivation**
		The Dancer with a White Parasol: Ranjana Dave

Prescribed Textbook: *Language and Life: A Skills Approach* Board of Editors, Orient Black Swan Publishers, India. 2018.

Suggested Readings

- Practical English Usage. Michael Swan. OUP. 1995.
- Remedial English Grammar. F.T. Wood. Macmillan.2007
- On Writing Well. William Zinsser. Harper Resource Book. 2001
- Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
- Communication Skills. Sanjay Kumar and Pushp Lata. Oxford University Press. 2011.
- Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9901	3	0	0	0	CIA	30 M
Course Title	:	HUMAN VALUES AND PROFESSIONAL ETHICS					SEE	--

COURSE OBJECTIVES:- This introductory course input is intended.

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

UNIT I

Course Introduction – Need, basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self Exploration – what is it? – its content and process; 'Natural Acceptance' and Experiential Validation – as the mechanism for self exploration. Continuous Happiness and Prosperity – A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities – the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly – A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT II

Understanding Harmony in the Human Being – Harmony in Myself! : Understanding human being as a co – existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' – Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT III

Understanding Harmony in the Family and Society – Harmony in Human – Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human – human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay – tripti;

Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah – astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society – Undivided Society (Akhand Samaj), Universal Order (Sarvabhaum Vyawastha) – from family to world family!

UNIT IV

Understanding Harmony in the nature and Existence – Whole existence as Co- existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature – recyclability and self-regulation in nature. Understanding Existence as Co – existence (Sah – astiva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order,
b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order.

a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b. At the level of society: as mutually enriching institutions and organizations.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. Subba Raju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

REFERENCE BOOKS:

1. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. Subhas Palekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
9. E G Seebauer & Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajan, S Natrajan & V. S Senthil kumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9905	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING CHEMISTRY LAB					SEE	70 M

COURSE OBJECTIVES:

1. To Verify the fundamental concepts with experiments

COURSE OUTCOMES: At the end of the course, the students will be able to

1. **Prepare** of various Solutions
2. **Determine** the hardness of water
3. **Analysis** of water
4. **Calculate** the cell constant and conductance of solutions
5. **Determine** the physical properties like viscosity, acid number, saponification number
6. **Estimate** the Iron and Calcium in cement

LIST OF EXPERIMENTS:

1. Preparation of Primary Standard (sodium carbonate) Solution.
2. Estimation of Hardness of Water by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method.
4. Estimation of Available Chlorine in Bleaching Powder.
5. Estimation of Ferrous ion in the given Mohr Salt by using KMnO4 Solution
6. Determination of Strength of an Acid in Pb-Acid Battery.
7. Preparation of Polymer (Bakelite).
8. Determination of Cell Constant and Conductance of Solutions
9. Determination of Strength of Acid by Conductometric Titrations.
10. Estimation of Calcium in Port land Cement.
11. Determination of Iron in Cement Sample by Colorimeter.
12. Determination of Viscosity of Lubricating Oil using Ostwald Viscometer.
13. Determination of Average Molecular Mass of given Polymer (Polyvinyl Alcohol) by Using Ostwald Viscometer.
14. Determination of acid number of given lubricating oil.
15. Determination of Saponification number of given lubricating oil.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0502	0	0	3	1.5	CIA	30 M
Course Title	:	C PROGRAMMING LAB					SEE	70 M

COURSE OBJECTIVES:

1. To learn about the computer systems, computing environments, developing a computer program and structure of C.
2. To gain Knowledge of the operators, control statements in C.

3. To learn about the design concepts of arrays, strings and their usage.
4. To assimilate about pointers and dynamic memory allocation.

COURSE OUTCOMES:

1. Acquire skills to write, compile and debug programs in c language.
2. Be able to use different operators, data types and write programs
3. Acquire knowledge to select the best loop construct for a given problem.
4. Design and implement programs to analyze the array applications.
5. Design and implement C programs with Functions.

Exercise: 1

a) Write a C program to print a given statement.
b) Write a C program for exchanging (interchanging) values of two variables.
c) Write a C program to find the reverses of a given Number.

Exercise: 2

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program to find the second maximum number among the given list of numbers.
c) Write a C program to find the kth smallest number among the given list of numbers.

Exercise: 3

a) Write a C program to demonstrate various operators (Arithmetic operator, increment & decrement operator, Relational operator, and Assignment operator).
b) Write a C Program, to counts number of positive and negative numbers separately and also compute the sum of them.

Exercise: 4

a) Write a C program to generate the first ‘n’ terms in the sequence of Fibonacci series.

Exercise: 5

a) Write a C program to generate all the prime numbers between 1 and n, where ‘n’ is the value given by the user.
b) Write a program which Prints the following patterns.

```
ABCDEFGFEDCBA          0
ABCDEF FEDCBA         111
ABCDE   EDCBA        22222
ABCD     DCBA       3333333
ABC       CBA      444444444
AB         BA
A           A
```

c) Write a C program to generate Pascal’s triangle.
d) Write a C program to construct a pyramid of numbers.

Exercise: 6

a) Write a C program, for the arithmetic operators using switch case (which takes two integer operands and one operator from the user, performs the specified operation and then prints the result. (Consider the operators +,- ,*, /, % and use Switch Statement)
b) Write a program to find G.C.D (Greatest Common Divisor) of two numbers using recursion and non-recursion.
c) Write a program to find factorial of a number using recursion and non-recursion.

Exercise: 7

a) Write a C program to calculate distance between two points.
b) Write a program to find Roots of quadratic equation.

Exercise: 8

a) Write a C program to perform Matrix Addition
b) Write a C program to perform Matrix Multiplication
c) Write a C program to perform inverse of a Matrix.
d) Write a C program to find the transpose of a given matrix.

Exercise: 9

a) Write a C program for any numerical method.
b) Write a C program to make a simple calculator.

Exercise: 10

a) Write a C program to solve Towers of Hanoi problem by using recursive function.
b) Write a C program to know if the given string is a palindrome or non-palindrome.
c) Write a C program to find whether the given year is a leap year or not.

Exercise: 11

a) Write a C program to insert a sub-string in to the given main string.
b) Write a C program to demonstrate the parameter passing mechanism using: call-by-value, call-by-reference.

Exercise: 12

a) Implement the sorting algorithm: Insertion sort and Selection sort.
b) Write a C program to access elements of an array using pointers
c) Write a C program to find the sum of numbers with arrays and pointers.

Exercise: 13

a) Implementation of string using operations.
   i) Copy
   ii) Concatenate
   iii) Length
   iv) Compare

Exercise: 14

a) Write a C program to find the position of a substring.
b) Write a C program to represent complex numbers using structure.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9902	0	0	3	1.5	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH LAB					SEE	70 M

COURSE OBJECTIVES:

1. Students will be exposed to a variety of self instructional, learner friendly modes of language learning

2. Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like GRE, TOEFL, and GMAT etc.
3. Students will learn better pronunciation through stress, intonation and rhythm
4. Students will be trained to use language effectively to face interviews, group discussions, public speaking
5. Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

COURSE OUTCOMES:

1. Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills.
2. Apply communication skills through various language learning activities.
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professional settings.
5. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

Unit I

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

Learning Outcomes: At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general idea of a text and locate specific information
- learn different professional registers and specific vocabulary to describe different persons, places and objects

Unit II

1. JAM
2. Small talks on general topics
3. Debates

Learning Outcomes: At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discourse markers

Unit III

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

Learning Outcomes: At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to a talk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs to reduce errors in speech and writing

Unit IV

1. Asking for Information and Giving Directions
2. Information Transfer

3. Non-verbal Communication – Dumb Charade

Learning Outcomes: At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

Unit V

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

Learning Outcomes: At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors.

B.TECH - III SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester CE, ECE & ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9907	2	1	0	3	CIA	30 M
Course Title	:	COMPLEX VARIABLES AND TRANSFORMS					SEE	70 M

COURSE OBJECTIVES:-

- This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables. The student develops the idea of using continuous/discrete transforms.

Unit I: Complex Variable – Differentiation
Introduction to functions of complex variable – concept of Limit & continuity – Differentiation, Cauchy – Riemann equations, analytic functions (exponential, trigonometric, logarithm), harmonic functions, finding harmonic conjugate – construction of analytic function by Milne Thomson method – Conformal mappings-standard and special transformations (sin z, e^z, cos z, z^2) Mobius transformations (bilinear) and their properties.

Learning Outcomes: Students will be able to:
- Understand functions of Complex variable and its properties.
- Find derivatives of complex functions.
- Understand the analyticity of complex functions.
- Understand the conformal mappings of complex functions.

Unit II: Complex Variable – Integration
Line integral – Contour integration, Cauchy's integral theorem, Cauchy Integral formula, Liouville's theorem (without proof) and Maximum – Modulus theorem (without proof); power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi circle with f(z) not having poles on real axis).

Learning Outcomes: Students will be able to
- Understand the integration of complex functions.
- Apply Cauchy's integral theorem and Cauchy's integral formula.
- Understand singularities of complex functions.
- Evaluate improper integrals of complex functions using Residue theorem.

Unit III: Laplace Transforms
Definition – Laplace transform of standard functions – existence of Laplace Transform – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

Learning Outcomes: Students will be able to
- Understand the concept of Laplace transforms and find the Laplace transforms of elementary functions.
- Find the Laplace transforms of general functions using its properties.
- understand Laplace transforms of special functions(Unit step function, Unit Impulse & Periodic).
- Apply Laplace transforms to solve Differential Equations.

Unit IV: Fourier series
Determination of Fourier coefficients (Euler's) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity-Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions – typical wave forms – Parseval's formula – Complex form of Fourier series.

Learning Outcomes: Students will be able to
- Understand finding Fourier series expression of the given function.
- Determine Fourier coefficients (Euler's) and identify existence of fourier series of the given function.
- Expand the given function in Fourier series given in Half range interval.
- Apply Fourier series to establish Identities among Euler coefficients.
- Find Fourier series of wave forms.

Unit V: Fourier transforms& Z Transforms:

Fourier integral theorem (without proof) – Fourier sine and cosine integrals – complex form of Fourier integral. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem.
Z – transform – Inverse z – transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z – transforms.

Learning Outcomes: Students will be able to
- Find Fourier Sine and cosine integrals.
- Understand Fourier transforms.
- Apply properties of Fourier transforms.
- Understand Z transforms.
- Apply properties of Z transforms.
- Apply Z transforms to solve difference equations.

TEXT BOOKS:
1. Higher Engineering Mathematics, B. S. Grewal, Khanna publishers.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.
3. Advanced Engineering Mathematics, by R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd. Pangboume England.

REFERENCE BOOKS:
1. Higher Engineering Mathematics, by B. V. Ramana, McGraw Hill publishers.
2. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

COURSE OUTCOMES:
After the completion of course, students will be able to
1. Understand the analyticity of complex functions and conformal mappings.
2. Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.
3. Understand the usage of Laplace Transforms, Fourier Transforms and Z transforms.
4. Evaluate the Fourier series expansion of periodic functions.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester CE, CSE & ME)

(For III Semester ECE weekly 02 hrs with 02 Credits only)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0503T	3	0	0	3	CIA	30 M
Course Title	:	DATA STRUCTURES					SEE	70 M

COURSE OBJECTIVES:-

- To teach the representation of solution to the problem using algorithm
- To explain the approach to algorithm analysis
- To introduce different data structures for solving the problems
- To demonstrate modeling of the given problem as a graph
- To elucidate the existing hashing techniques

Unit I: Introduction
Algorithm Specification, Performance analysis, Performance Measurement. Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions. Sorting: Motivation, Insertion sort, Quick sort, How fast can we sort, Merge sort, Heap sort.

Learning Outcomes: After successful completion of this unit, the students will be able to
- Analyze the given algorithm to find the time and space complexities.(L4)
- Select appropriate sorting algorithm (L4)
- Design a sorting algorithm (L6)

Unit II: Stack, Queue and Linked lists
Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

Learning Outcomes: After successful completion of this unit, the students will be able to
- Evaluate expressions (L5)
- Develop the applications using stacks and queues (L3)
- Construct the linked lists for various applications (L6)

Unit III: Trees
Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, Counting Binary Trees, Optimal Binary search Trees, AVL Trees. B-Trees: B-Trees, B + Trees.

Learning Outcomes: After successful completion of this unit, the students will be able to
- Explain the concept of a tree (L2)
- Compare different tree structures (L4)
- Apply trees for indexing (L3)

Unit IV: Graphs and Hashing
The Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure.
Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.

Learning Outcomes: After successful completion of this unit, the students will be able to
- Recognize the importance of Graphs in solving real world problems (L2)
- Apply various graph traversal methods to applications (L3)
- Design a minimum cost solution for a problem using spanning trees (L6)

- Select the appropriate hashing technique for a given application (L5)
- Design a hashing technique (L6)

Unit V: Files and Advanced sorting

File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization.

Advanced sorting: Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.

Learning Outcomes: Students will be able to

- Organize files (L3)
- Design the algorithms which sort the elements which doesn't fit in main memory (L6)

TEXT BOOKS:

1. Ellis Horowitz and Sartaj Sahni, "Fundamentals of Data Structures in C", 2nd Edition, Galgotia Book Source, Pvt. Ltd., 2004.
2. ALAN L.THARP, "File Organization and Processing", Wiley and Sons, 1988.

REFERENCE BOOKS:

1. D. Samanta, "Classic Data Structures", 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
2. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016
3. Richard F.Gilberg, Behrouz A.Forouzan,"Data Structures A Pseudo code Approach with C", Second Edition, Cengage Learning 2005.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Select Appropriate Data Structure for solving a real world problem. (L4)
2. Select appropriate file organization technique depending on the processing to be done. (L4)
3. Construct Indexes for Databases. (L6)
4. Analyse the Algorithms.(L4).
5. Develop Algorithm for Sorting large files of data.(L3).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0101T	2	1	0	3	CIA	30 M
Course Title	:	STRENGTH OF MATERIALS - I					SEE	70 M

COURSE OBJECTIVES:-

- To make the student understand how to resolve forces and moments in a given system
- To demonstrate the student to determine the centroid and second moment of area

- To impart procedure for drawing shear force and bending moment diagrams for beams.
- To make the student able to analyze flexural stresses in beams due to different loads.
- To enable the student to apply the concepts of strength of materials in engineering applications and design problems.

Unit I:
Introduction to Mechanics: Basic Concepts, system of Forces Coplanar Concurrent Forces – Components in Space Resultant – Moment of Forces and its Application – Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial systems – **Center of Gravity and moment of inertia**: Introduction – Centroids of rectangular, circular, I, L and T sections – Centroids of built up sections. **Area moment of Inertia**: Introduction – Definition of Moment of Inertia of rectangular, circular, I, L and T sections – Radius of gyration. Moments of Inertia of Composite sections.

Learning Outcomes: Students will be able to
- Explain the basic concepts of forces
- Draw Free body Diagrams for forces
- Determine the centroid and moment of inertia for different cross section areas

Unit II: Simple Stresses and Strains:
Types of stresses and strains – Hooke‘s law – Stress – strain diagram for mild steel – working stress – Factor of safety – lateral strain, Poisson‘s ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of Varying section – Composite bars – Temperature stresses. Strain energy – Resilience – Gradual, Sudden, impact and shock loadings – simple applications.

Learning Outcomes: Students will be able to
- List out the concepts of stresses, strains, elastic moduli and strain energy.
- Evaluate relations between different moduli
- Explain different type’s loadings

Unit III: Shear Force and Bending Moment:
Definition of beam – types of beams – Concept of Shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and over changing beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – point of contra flexure – Relation between S.F, B.M and rate of loading at section of a beam.

Learning Outcomes: Students will be able to
- Draw the shear force and bending moment diagrams for cantilevers, simply supported beams and Overhanging beams with different loads
- Explain the relationship between shear force and bending moments

Unit IV: Flexural Stresses
Theory of simple bending – Assumptions – Derivation of bending equation – Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hallow), I, T, Angle and Channel Sections – Design of simple beam sections.

Learning Outcomes: Students will be able to
- Derive bending equations
- Compute the flexural stresses for different cross sections.
- Design beam sections for flexure

Unit V: Shear Stresses
Derivation of formula-Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections. Combined bending and shear.
Analysis of trusses by Method of Joints & Sections.

Learning Outcomes: Students will be able to
- Determine shear stresses for different shapes.
- Evaluate effect of combined bending and shear on sections

TEXT BOOKS:
1. S. Timoshenko, D.H. Young and J.V. Rao, “Engineering Mechanics”, Tata McGraw-Hill Company, 2017
2. Sadhu Singh, “Strength of Materials”, 11th edition 2015, Khanna Publishers.

REFERENCE BOOKS:
1. S. S. Bhavikatti, “Strength of materials”, Vikas publishing house Pvt. Ltd., 4/e,2013
2. R. Subramanian, “Strength of Materials”, Oxford University Press, 2016.
3. R. K. Bansal, “Strength of Materials”, Lakshmi Publications House Pvt. Ltd., 2018.
4. R.S. Khurmi and N. Khurmi, A text book of “Strength of Materials” “(Mechanics of Solids)”, S Chand and Company Limited, Ramnagar, New Delhi-110 055, 2018

COURSE OUTCOMES:
After the completion of course, students will be able to
1. Explain the different types of couples and force systems
2. Determine the centroid and moment of inertia for different cross-sections
3. List out the concepts of stress, strain, generalized Hooke’s law, elastic moduli and strain energy.
4. Develop shear force and bending moment diagrams for different load cases.
5. Compute the flexural stresses and shear stresses for different loading cases and different cross-sections.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0102T	2	1	0	3	CIA	30 M
Course Title	:	FLUID MECHANICS					SEE	70 M

COURSE OBJECTIVES:-
To explain concepts of fluid mechanics used in Civil Engineering.

- To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
- To impart ability to solve engineering problems in fluid mechanics
- To enable the students measure quantities of fluid flowing in pipes, tanks and channels
- To teach integral forms of fundamental laws of fluid mechanics to predict relevant pressures, velocities and forces.
- To strengthen the students with fundamentals useful in application-intensive courses dealing with hydraulics, hydraulic machinery and hydrology in future courses.

Unit I: Basic concepts and definitions

Distinction between a fluid and a solid; Density, Specific weight, Specific gravity, Kinematic and dynamic viscosity; variation of viscosity with temperature, Newton law of viscosity; vapor pressure, boiling point, surface tension, capillarity, Bulk modulus of elasticity, compressibility.

Learning Outcomes:

Students will be able to

- List out the basic characteristics of fluids
- Explain the Newton's Law of Viscosity

Unit II: Fluid statics

Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U – Tube Manometer, Single Column Manometer, U Tube Differential Manometer. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

Learning Outcomes:

Students will be able to

- Explain the concepts of fluid statics.
- List out the different equipment and their applications.
- Demonstrate stability of floating bodies

Unit III: Fluid kinematics

Classification of fluid flow : steady and unsteady flow; uniform and non-uniform flow; laminar and turbulent flow; rotational and irrotational flow; compressible and incompressible flow; ideal and real fluid flow; one, two and three dimensional flows; Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three – dimensional continuity equations in Cartesian coordinates.

Learning Outcomes:

Students will be able to

- Explain the fundamentals of fluid kinematics
- List out the different types of fluid flows
- Derivation of Continuity equations of using Cartesian coordinates

Unit IV: Fluid Dynamics

Surface and body forces; Equations of motion – Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation : Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number;

Learning Outcomes:

Students will be able to

- Demonstrate applications of Bernoulli's equations

- Experiment with different equipments under fluid flow
- Apply principles of fluid dynamics along with governing equations.

Unit V: Shear Stresses

Analysis Of Pipe Flow: Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length – Pipes in Parallel and Series.

Learning Outcomes:

Students will be able to

- Estimate Energy losses in pipelines
- Determine flow characteristics through Pipes.

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, "Hydraulics and Fluid Mechanics", Standard Book House, 2019
2. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, "Fluid Mechanics and Machinery", Oxford University Press, 2010.

REFERENCE BOOKS:

1. S. C. Gupta, "Fluid Mechanics and Hydraulic Machines", Pearson publication, 2006.
2. R. K. Bansal, A text of "Fluid Mechanics and Hydraulic Machines", Laxmi Publications (P) Ltd., New Delhi, 2015.
3. K. Subrahmanya, "Theory and Applications of Fluid Mechanics", Tata McGraw Hill,1993
4. N. Narayana Pillai, Principles of "Fluid Mechanics and Fluid Machines", Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.

COURSE OUTCOMES:

After the completion of course, students will be able to:

1. Explain the principles of fluid statics, kinematics and dynamics.
2. Familiarize basic terms used in fluid mechanics.
3. List out the flow characteristics and classify the flows.
4. Apply the continuity, momentum and energy principles.
5. Estimate various losses in flow through channels.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0103T	2	1	0	3	CIA	30 M
Course Title	:	SURVEYING					SEE	70 M

COURSE OBJECTIVES:-

- To make the student to get well conversant with the fundamentals of various basic methods and instruments of surveying.
- To introduce to the students in identifying reduced level of the ground and its profile for finding areas and volumes of embankments and cuttings.

- To make the student to use angular measuring instruments for horizontal and vertical control.
- To enable the student to set simple horizontal curves.
- To introduce the knowledge construction surveys and usage of modern instrument such as total station.

Unit I:
Introduction and Basic Concepts: Introduction, Objectives, classification and principles of surveying, Scales, Shrinkage of Map, Conventional symbols and Code of Signals, Surveying accessories, phases of surveying. Measurement of Distances and Directions, Linear distances – Approximate methods, Direct Methods – Chains – Tapes, ranging, Tape corrections, indirect methods – optical methods – E.D.M. method.

Prismatic Compass - Bearings, included angles, Local Attraction, Magnetic Declination, and dip.

Plane table surveying: Introduction, accessories, setting up of plane table, techniques, testing, adjustments, errors, advantages and disadvantages.

Learning Outcomes: Students will be able to
- To impart basic concepts of surveying.
- To introduce the usage and applications of linear and angular measurements through chain, tape, compass and plane table.

Unit II:
Levelling – Basics definitions, types of levels and levelling staves, temporary adjustments, methods of levelling, booking and Determination of levels – HI Method – Rise and Fall method, Effect of Curvature of Earth and Refraction.

Contouring – Characteristics and uses of Contours, Direct & Indirect methods of contour surveying, interpolation and sketching of Contours.

Computation of Areas and Volumes: Areas – Determination of areas consisting of irregular boundary and regular boundary, Planimeter. Volumes – Computation of areas for level section and two level sections with and without transverse slopes, determination of volume of earth work in cutting and embankments, volume of borrow pits, capacity of reservoirs.

Learning Outcomes: Students will be able to
- To impart basic principles in levelling and contouring.
- To calculate the areas of irregular boundaries and volumes of earth work quantities.

Unit III:
Theodolite Surveying: Types of Theodolites, Fundamental Lines, temporary adjustments, measurement of horizontal angle by repetition method and reiteration method, measurement of vertical Angle, Trigonometrical levelling when base is accessible and inaccessible.

Traversing: Methods of traversing, traverse computations and adjustments, Gale’s traverse table, Omitted measurements.

Learning Outcomes: Students will be able to
- To impart basic principles in Trigonometric levelling.
- To inculcate the knowledge of traversing.

Unit IV:
Tacheometric Surveying: Principles of Tacheometry, stadia and tangential methods of Tacheometry.

Curves: Types of curves and their necessity, elements of simple circular curve, setting out of simple horizontal circular curves.

Learning Outcomes: Students will be able to

- To impart basic principles in Tacheometric surveying.
- To inculcate the knowledge of simple horizontal circular curve setting.

Unit V:

Construction surveys: Introduction – staking out buildings - pipelines and sewers – highways – culverts. Bridge surveys – determining the length of a bridge – locating centers of piers – surface surveys and tunnel alignment – underground surveys-connection of surface and underground surveys – levelling in tunnels.

Total station Surveying: Basic principles, applications, comparison with conventional surveying. Electromagnetic wave theory – electromagnetic distance measuring system – principle of working and EDM instruments.

Learning Outcomes: Students will be able to

- To induce the knowledge of construction surveying.
- To inculcate the knowledge of advanced surveying instrument such as total station.

TEXT BOOKS:

1. S.S Bhavikatti, "Surveying theory and Practice", 2nd edition, Dreamtech press, Wiley distributors, 2019.
2. C.Venkatramaiah, "Text book of surveying", 2nd edition, Universities press, 2018

REFERENCE BOOKS:

1. Arora K R "Surveying" Vol 1, 2 & 3, Standard Book House, Delhi, 2004.
2. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Surveying" (Vol – 1, 2 & 3), - Laxmi Publications (P) ltd., New Delhi, 2016.
3. S K Duggal, "Surveying" (Vol – 1 & 2), Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
4. R. Subramanian, "Surveying and leveling" Oxford university press, New Delhi, 2007

COURSE OUTCOMES: After the completion of course, students will be able to:

1. Calculate angles, distances and levels
2. Identify data collection methods and prepare field notes
3. Explain the working principles of survey instruments
4. Estimate the volumes of earth work
5. Able to use modern survey instruments.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0104	2	1	0	3	CIA	30 M
Course Title	:	BUILDING MATERIALS AND CONSTRUCTION					SEE	70 M

COURSE OBJECTIVES:-

- To impart knowledge on basic building materials such as stone and clay products.
- To teach properties of binding materials such as gypsum, lime and cement.
- To disseminate knowledge on ferrous and non ferrous materials and its applications.
- To explain basic concepts of building components such as stair case and masonry.
- To describe the properties and applications of plumbing, electrical and sanitary fittings.

- To explain the methodology of surface finishes such as pointing, distempering and painting.

Unit I: Basic Building materials
Properties and characteristics of Basic building materials – Stone – characteristics of good building stone – types of stone masonry – bricks – characteristics of good quality bricks – manufacturing of bricks – types of bonds in brick work – Cavity wall & hollow block construction – tiles-types of tiles – sand –sources of sand – properties of sand – Wood and Timber.

Learning Outcomes: Students will be able to
- Explain the properties of stones,.
- List out the properties of Bricks.
- Differentiate the properties of Tiles and sand.
- Describe the properties of Wood and Timber

Unit II: Binding Materials
Properties and characteristics of Binding materials – **Gypsum:** properties of gypsum plaster, building products made of gypsum and their uses. **Lime:** Manufacture of lime, classifications of limes, properties of lime – putty – characteristics and usage **Cement:** Raw materials used, Process of Manufacturing, Chemical composition, Bouge`s Compounds – Types of cement, Tests on cement – Uses of cement.

Learning Outcomes: Students will be able to
- Explain the properties of Gypsum.
- Describe the properties of Lime.
- To conduct test on Cement.

Unit III: Ferrous & Non – Ferrous Materials
Steel – characteristics of reinforcing steel – Hardness, Tensile, Compression, Impact, wear, and corrosion testing, Micro hardness and indentation fracture toughness, Creep and stress rupture tests, fatigue testing – steel fibers and its applications – **Plastics**: classification, advantages of plastics, Mechanical properties and use of plastic in construction – polypropylene fibers and its applications – **Glass**: Ingredients, properties, types and use in construction – Glass fibers and its applications

Learning Outcomes: Students will be able to
- To conduct various tests for determining the characteristics of steel
- Explain the properties of Plastics as building material
- Describe the properties of glass as building material.

Unit IV: Basics of Building Components
Components of building, area considerations, Construction Principle and Methods for layout, Damp proofing, anti termite treatment in buildings, Vertical circulation means: stair cases and their types. Different types of floors, and flooring materials.

Learning Outcomes: Students will be able to
- Explain the construction procedure of staircase.
- Describe the construction procedure of various types of floorings

Unit V: Internal and External Fittings of a Building
Doors and Windows: Construction details, types of doors and windows and their relative advantages & disadvantages. Types of roof – Lintels and Chajjas, Water Supply and Sanitary fittings (Plumbing), Electric Fittings, Mechanical Lifts and Escalators, Fire Fighting and Fire Protection of Buildings. Plastering and its types, pointing, Distempering, Colour washing, Painting.

Learning Outcomes: Students will be able to

- List out the components of doors and windows
- To gain knowledge on plumbing and electrical fittings in building construction
- Explain the procedures for surface finishes such as Plastering, Pointing and Painting

TEXT BOOKS:

1. S K Duggal, "Building Materials" New Age International, 2017.
2. BC Punmia, "Building Construction" Laxmi Publication, 2005

REFERENCE BOOKS:

1. PC Varghese, "Building Materials" PHI, 2015.
2. Mehta, "Building Construction Principles, Materials & Systems" 2/e, Pearson Education Noida, 2013.
3. Sandeep Mantri, "Practical building Construction and its Management" Satya Publisher, New Delhi, 2017.
4. Adams, "Adams' Building Construction Adams" CRC Press Taylor & Francis Group, 2011.

COURSE OUTCOMES: After the completion of course, students will be able to:

1. List out the characteristics of various building materials such as stone and clay product.
2. To evaluate the properties of the binding materials for their suitability in building construction.
3. To apply the ferrous and non-ferrous materials in building construction.
4. Explain the construction procedure of various building components such as stair cases, masonry and flooring.
5. Describe the installation of electrical, sanitary and plumbing fittings in buildings.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester CE & ME and IV Semester CSE & ECE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9903	3	0	0	0	CIA	30 M
Course Title	:	BIOLOGY FOR ENGINEERS					SEE	--

COURSE OBJECTIVES:-

- To provide basic understanding about life and life Process. Animal an plant systems. To understand what bimolecules, are, their structures are functions. Application of certain bimolecules in Industry.
- Brief introduction about human physiology and bioengineering.
- To understand hereditary units, i.e. DNA (genes) and RNA and their synthesis in living

organism.

- How biology Principles can be applied in our daily life using different technologies.
- Brief introduction to the production of transgenic microbes, Plants and animals.

Unit I: Introduction to Basic Biology
Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification.

Learning Outcomes: After completing this unit, the student will be able to

- Summarize the basis of life. (L1)
- Understand the difference between lower organisms (prokaryotes) from higher organisms (eukaryotes). (L2)
- Understand how organisms are classified. (L3)

Unit II: Introduction to Biomolecules
Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Learning Outcomes: After completing this unit, the student will be able to

- Understand what are biomolecules? Their role in living cells, their structure, function and how they are produced. (L1)
- Interpret the relationship between the structure and function of nucleic acids. (L2)
- Summarize the applications of enzymes in industry. (L3)
- Understand what is fermentation and its applications of fermentation in industry. (L4)

Unit III: Human Physiology
Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

Learning Outcomes: After completing this unit, the student will be able to

- Understand what nutrients are (L1)
- Understand the mechanism and process of important human functions (L2 & L3)

Unit IV: Introduction to Molecular Biology and recombinant DNA Technology
Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. rDNA technology. Introduction to gene cloning.

Learning Outcomes: After completing this unit, the student will be able to

- Understand and explain about gene structure and replication in prokaryotes and Eukaryotes (L1)
- How genetic material is replicated and also understands how RNA and proteins are synthesized. (L2)
- Understand about recombinant DNA technology and its application in different fields.(L3)
- Explain what is cloning. (L4)

Unit V: Application of Biology
Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

Learning Outcomes: After completing this unit, the student will be able to Understand.

- How biology is applied for production of useful products for mankind.(L1)
- What are biosensors, biochips etc. (L2)
- Understand transgenic plants and animals and their production (L3)

TEXT BOOKS:

1. P. K. Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications –
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

REFERENCE BOOKS:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, “Biology: A Global Approach”, Pearson Education Ltd, 2018.
2. T Johnson, Biology for Engineers, CRC press, 2011
3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed.. Panima Publications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology – 2014

COURSE OUTCOMES: After successful completion of the course, the students will be able to:

1. Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
2. Explain about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.
3. Briefly about human physiology.
4. Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
5. Know about application of biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes, plants and animals.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester CE, CSE & ME)

(For III Semester ECE weekly 02 hrs with 01 Credits only)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0503P	0	0	3	1.5	CIA	30 M
Course Title	:	DATA STRUCTURES LAB					SEE	70 M

COURSE OBJECTIVES:-

- To introduce to the different data structures
- To elucidate how the data structure selection influences the algorithm complexity
- To explain the different operations that can be performed on different data structures
- To introduce the different search and sorting algorithms.

LIST OF EXPERIMENTS:

1. String operations using array of pointers
2. Searching Algorithms (With the Number of Key Comparisons) Sequential, Binary and Fibonacci Search Algorithms.
3. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort. Using the system clock, compute the time taken for sorting of elements. The time for other operations like I/O etc should not be considered while computing time.
4. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List
5. Stack implementation using arrays
6. Stack implementation using linked lists
7. Queue implementation using arrays. Implement different forms of queue. While implementing you should be able to store elements equal to the size of the queue. No positions should be left blank.
8. Queue implementation using linked lists
9. Creation of binary search tree, performing operations insertion, deletion, and traversal.
10. Breadth first search
11. Depth first search
12. Travelling sales man problem
13. File operations
14. Indexing of a file

OPTIONAL:

1. Reversing the links (not just displaying) of a linked list.
2. Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using ‘Ladies first’ principle. You may create new linked lists if necessary.
3. An expression can be represented in three ways: infix, prefix and postfix. All the forms are necessary in different contexts. Write modules to convert from one form to another form.
4. A table can be defined as a collection of rows and columns. Each row and column may have a label. Different values are stored in the cells of the table. The values can be of different data types. Numerical operations like summation, average etc can be performed on rows/columns which contain numerical data. Such operations are to be prevented on data which is not numeric. User may like to insert row/columns in the already existing table. User may like to remove row/column. Create table data type and support different operations on it.

COURSE OUTCOMES: After successful completion of this Lab, the students will be able to:

1. Select the data structure appropriate for solving the problem (L5)
2. Implement searching and sorting algorithms (L3)
3. Design new data types (L6)
4. Illustrate the working of stack and queue (L4)
5. Organize the data in the form of files (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0101P	0	0	3	1.5	CIA	30 M
Course Title	:	STRENGTH OF MATERIALS LAB					SEE	70 M

COURSE OBJECTIVES:-

- By performing this laboratory, the student will be able to know the structural behavior of various materials.

LIST OF EXPERIMENTS:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.

3. Bending test on simply supported beam.
4. Torsion test.
5. Hardness test.
6. Compression test on Open coiled springs
7. Compression test on Closely coiled springs
8. Compression test on wood/ concrete
9. Izod / Charpy Impact test on metals
10. Shear test on metals
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

COURSE OUTCOMES:
By performing the various tests in this laboratory the student will be able to know the structural behavior various structural elements when subjected to external loads

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0102P	0	0	3	1.5	CIA	30 M
Course Title	:	FLUID MECHANICS LAB					SEE	70 M

COURSE OBJECTIVES:-
By performing this laboratory, the student will be able to know the fluid flow measurements by considering different types flow measurement devices.

LIST OF EXPERIMENTS:

1. Verification of Bernoulli's equation.

2. Calibration of Venturimeter.
3. Calibration of Orifice meter
4. Determination of Coefficient of discharge for a small orifice by constant head method.
5. Determination of Coefficient of discharge for a small orifice by variable head method.
6. Determination of Coefficient of discharge for an external mouth piece by Constant head method.
7. Determination of Coefficient of discharge for an external mouth piece by variable head method.
8. Calibration of contracted Rectangular Notch.
9. Calibration of contracted Triangular Notch.
10. Determination of friction factor
11. Determination of loss of head in a sudden contraction.
12. Determination of loss of head in a sudden Expansion.

COURSE OUTCOMES:
By performing the various tests in this laboratory the student will be able to know the principles of discharge measuring devices and head loss due to sudden contraction and expansion in pipes.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0103P	0	0	3	1.5	CIA	30 M
Course Title	:	SURVEYING LAB					SEE	70 M

COURSE OBJECTIVES:-

- By performing this laboratory, the student will be able to know the usage of various surveying equipments and their practical applicability.

LIST OF EXPERIMENTS:

1. Setting up of Right angles using cross staff
2. Plane table survey; finding the area of a given boundary
3. Two Point Problem by the plane table survey.
4. Fly levelling: Height of the instrument method and rise and fall method.

5. Fly levelling; Longitudinal Section and Cross sections of a given road profile.
6. Theodolite Survey: Determining the Horizontal and Vertical Angles
7. Finding the distance between two inaccessible points using Theodolite
8. Tachometric survey: Heights and distance problems using tachometric principles.
9. One Exercise on Curve setting.
10. Total Station Determination of area using total station. Traversing and Contouring
11. Total Station: Determination of Remote height.
12. Developing a Contour map

COURSE OUTCOMES:

By performing the various tests in this laboratory the student will be able to know the principles of surveying in chain surveying, compass surveying, plane table surveying, levelling, theodolite surveying and total station

B.TECH - IV SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to IV Semester CE & ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9908	3	0	0	3	CIA	30 M
Course Title	:	NUMERICAL METHODS AND PROBABILITY THEORY					SEE	70 M

COURSE OBJECTIVES:-

This course aims at providing the student with the knowledge on

1. Various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations.
2. The theory of Probability and random variables.

Unit I: Solution of Algebraic & Transcendental Equations

Introduction – Bisection method – Iterative method – Regulafalsi method – Newton Raphson method System of Algebraic equations: Gauss Jordan method – Gauss Siedal method.

Learning Outcomes: After successful completion of this unit, the students will be able to:

1. Calculate the roots of equation using Bisection method and Iterative method.
2. Calculate the roots of equation using Regulafalsi method and Newton Raphson method.
3. Solve the system of algebraic equations using Gauss Jordan method and Gauss Siedal method.

Unit II: Interpolation

Finite differences – Newton's forward and backward interpolation formulae – Lagrange's formulae. Gauss forward and backward formula, Stirling's formula, Bessel's formula.

Learning Outcomes: After successful completion of this unit, the students will be able to:

1. Understand the concept of interpolation.
2. Derive interpolating polynomial using Newton's forward and backward formulae.
3. Derive interpolating polynomial using Lagrange's formulae.
4. Derive interpolating polynomial using Gauss forward and backward formulae.

Unit III: Numerical Integration& Solution of Initial value problems to Ordinary differential equations

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule

Numerical solution of Ordinary Differential equations: Solution by Taylor's series – Picard's Method of successive Approximations-Modified Euler's Method – Runge – Kutta Methods.

Learning Outcomes: After successful completion of this unit, the students will be able to:

1. Solve integral equations using Simpson's 1/3 and Simpson's 3/8 rule.
2. Solve integral equations using Trapezoidal rule.
3. Solve initial value problems to ordinary differential equations using Taylor's method.
4. Solve initial value problems to ordinary differential equations using Euler's method and Runge Kutta methods.

Unit IV: Probability theory

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

Learning Outcomes: After successful completion of this unit, the students will be able to:

1. Understand the concept of Probability.
2. Solve problems on probability using addition law and multiplication law.
3. Understand Random variables and probability mass and density functions.
4. Understand statistical constants of random variables.

Unit V: Random variables & Distributions

Probability distribution – Binomial, Poisson approximation to the binomial distribution and normal distribution – their properties.

Learning Outcomes: After successful completion of this unit, the students will be able to:

1. Understand Probability distribution function.
2. Solve problems on Binomial distribution.
3. Solve problems on Poisson distribution.
4. Solve problems on Normal distribution.

TEXT BOOKS:

1. Higher Engineering Mathematics, B. S. Grewal, Khanna publishers.
2. Probability and Statistics for Engineers and Scientists, Ronald E. Walpole, PNIE.

3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

REFERENCE BOOKS:

1. Higher Engineering Mathematics, by B. V. Ramana, McGraw Hill publishers.
2. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

COURSE OUTCOMES:

After the completion of course, students will be able to

1. Apply numerical methods to solve algebraic and transcendental equations
2. Derive interpolating polynomials using interpolation formulae
3. Solve differential and integral equations numerically
4. Apply Probability theory to find the chances of happening of events.
5. Understand various probability distributions and calculate their statistical constants.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester ME & IV Semester CE and ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0505T	3	0	0	3	CIA	30 M
Course Title	:	PYTHON PROGRAMMING FOR ENGINEERS					SEE	70 M

COURSE OBJECTIVES:-

- To teach the fundamentals of Python
- To elucidate problem – solving using a Python programming language
- To introduce a function – oriented programming paradigm through python
- To develop the skill of designing Graphical user Interfaces in Python
- To learn how to use lists, tuples, and dictionaries in Python programs.

Unit I:

Introduction: What is a program, running python, Arithmetic operators, Value and Types?

Variables, Assignments and Statements: Assignment statements, Script mode, Order of operations, string operations, comments.

Functions: Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.

Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.

Learning Outcomes: After successful completion of this unit, the students will be able to

- List the basic constructs of Python (L1)
- Solve the problems by applying modularity principle (L3)

Unit II:

Conditionals and Recursion: Floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.

Fruitful Functions: Return values, Incremental development, Composition, Boolean functions, more recursion, Leap of Faith, Checking types

Iteration: Reassignment, Updating variables, the while statement, Break, Square roots, Algorithms.

Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, the in operator, String comparison.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Apply the conditional execution of the program (L3)
- Apply the principle of recursion to solve the problems (L3)

Unit III:

Case Study: Reading word lists, Search, Looping with indices.

Lists: List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.

Tuples: Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable – length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Use the data structures Lists, Dictionaries, and Tuples (L3)
- Design programs for manipulating strings (L6)

Unit IV:

Files: Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.

Classes and Objects: Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.

Classes and Functions: Time, Pure functions, Modifiers, Prototyping versus Planning

Classes and Methods: Object oriented features, Printing objects, The init method, The __str__method, Operator overloading, Type – based Dispatch, Polymorphism, Interface and Implementation

Inheritance: Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Apply object orientation concepts (L3)
- Organize data in the form of files (L6)

Unit V: Overview of Packages for Scientific and Data Processing

Introduction to Machine Learning – History and Evolution, Artificial intelligence Evolution, Different Forms, Machine learning categories, Machine learning Python packages, Data Analysis packages, Machine learning core libraries.

Learning Outcomes: Students will be able to

- Understand Machine learning fundamentals (L2)
- Apply python packages for solving machine learning and data analysis problems (L3)

TEXT BOOKS:

1. Allen B. Downey, “Think Python”, 2nd edition, SPD/O’Reilly, 2016.
2. Manohar Swamynathan, “Mastering Machine learning with Python in Six steps”, Apress.

REFERENCE BOOKS:

1. Martin C. Brown, “The Complete Reference: Python”, McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, “Fundamentals of Python”, CENGAGE, 2015.
3. R. Nageswara Rao, “Core Python Programming”, 2nd edition, Dreamtech Press, 2019

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Explain the features of Python language (L2)
2. Select appropriate data structure of Python for solving a problem (L4)
3. Design object oriented programs for solving real-world problems (L6)
4. Use Python packages (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0105	2	1	0	3	CIA	30 M
Course Title	:	STRENGTH OF MATERIALS – II					SEE	70 M

COURSE OBJECTIVES:-

- To teach the student with basic concepts for determination of principal stresses and strains in various structural elements.
- To demonstrate analytical methods for determining strength & stiffness and assess stability of structural members.
- To make the student analyze circular shafts subjected to torsion
- To make the student determine critical loads for columns with different end conditions.

Unit I: Compound Stresses and Strains

Two dimensional system, stress at a point on a plane, principal stresses and principal planes, Mohr circle of stress, and its applications. Two dimensional stress – strain system, principal strains and principal axis of strain, circle of strain.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Identify critical planes in two dimensional stress systems
- Estimate principals stresses
- Assess safety of structural elements under principal stresses

Unit II: Deflection of Beams

Uniform bending – slope, deflection and radius of curvature – Differential equation for elastic line of a beam – Double integration and Macaulay's methods. Determination of slope and deflection for cantilever and simply supported beams under point loads, U.D.L. uniformly varying load – Mohr's theorems – Moment area method – application to simply supported and overhanging beams – analysis of propped cantilever beams under UDL and point loads.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain types of loads acting on beams
- Compute slopes and deflections of beams with different boundary conditions
- Evaluate effect of different loads on propped cantilever beams

Unit III: Torsion

Theory of pure torsion – Assumptions and Derivation of Torsion formula for circular shaft – Torsional moment of resistance – Polar section modulus – power transmission through shafts – Combined bending and torsion –. Springs – Types of springs – deflection of close coiled helical springs under axial pull and axial couple – Carriage or leaf springs.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Analyze members subjected to torsion, combined torsion and bending moment
- Calculate power transmission through shafts
- Estimate energy absorption in springs.

Unit IV: Direct and Bending stresses

Introduction – eccentric loading – columns with eccentric loading – symmetrical columns with eccentric loading about one axis – about two axes – Unsymmetrical columns with eccentric loading – limit of eccentricity.

Theories of failure:

Maximum Principal stress theory – Maximum shear stress theory – Maximum strain theory – Maximum strain energy theory – Maximum distortion energy theory.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain the effect of eccentricity effect in columns
- List out the various theories of failures.

Unit V: Columns and Struts

Introduction – classification of columns – Axially loaded compression members – Euler's crippling load theory – derivation of Euler's critical load formulae for various end conditions – Equivalent length – Slenderness ratio – Euler's critical stress – Limitations of Euler's theory – Rankine – Gordon formula – eccentric loading and Secant formula – Prof. Perry's formula.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Classify columns
- Explain Euler's theory on columns and assess crippling loads

- Analyze compression members using different theories
- Assess load carrying capacity using different formulae

TEXT BOOKS:

1. R. S. Khurmi and N. Khurmi, "Strength of Materials (Mechanics of Solids)", S Chand And Company Limited, Ramnagar, New Delhi-110 055, 2019.
2. R. K. Bansal, "Strength of Materials", Laxmi Publications (P) Ltd., New Delhi, 2018.

REFERENCE BOOKS:

1. B. C. Punmia Strength of Materials, Laxmi publications, 2017.
2. D. S. Prakasa Rao Strength of Materials, Universities Press Pvt Ltd, Hyderabad.
3. Schaum's outline series - Strength of Materials, Mc Graw Hill International Editions, 6th edition, 2013.
4. L.S. Srinath, Strength of Materials, Macmillan India Ltd., New Delhi, 2001.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

1. Explain principal stresses and principal planes.
2. Determine deflection at any point on a beam under simple and combined loads
3. Analyze members under torsion, deformation in springs,
4. Know the effect of eccentricity of load in columns; apply failure criteria to implement in design of structural members.
5. Know the crippling load for the columns.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0106T	2	1	0	3	CIA	30 M
Course Title	:	HYDRAULICS AND HYDRAULIC MACHINERY					SEE	70 M

COURSE OBJECTIVES:-

- To Introduce concepts of laminar and turbulent flows
- To teach principles of uniform and non – uniform flows through open channel.
- To impart knowledge on design of turbines.
- To impart knowledge on design of pumps.

Unit I: Laminar & Turbulent flow in pipes

Laminar Flow – Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes – Moody's diagram – Introduction to boundary layer theory.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain Laminar Flow through plates
- Describe Turbulent flow and transition
- Apply energy and momentum principles to fluid flow situations
- Solve problems for forces in static and moving fluids

Unit II: Uniform flow in Open Channels

Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Uniform Flow - Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Computation of Uniform flow.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Differentiate open and closed channel flows
- Explain different formulae on open channel flow
- Design open - channel flow systems.

Unit III: Non-Uniform flow in Open Channels

Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Broad Crested Weir. Gradually Varied Flow – Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification – Elements and characteristics - Energy dissipation.

Learning Outcomes: After successful completion of this unit, the students will be able to

- List out the concepts of varying flow in pipes
- Measure discharge and velocity
- Explain gradually varied flow
- Solve introductory problems of forces and dynamics

Unit IV:

Impact of Jets: Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - velocity triangles at inlet and outlet - Work done and efficiency.

Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design - efficiency - Draft tube: theory - characteristic curves of hydraulic turbines. Cavitation: causes and effects.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain hydrodynamic force of jets different vanes
- Calculate efficiency of jets
- Differentiate and design Pelton wheel, Francis and Kaplan turbine

Unit V: Pumps

Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies – Introduction to Reciprocating Pump.

Learning Outcomes: After successful completion of this unit, the students will be able to

- List out the principles of centrifugal pumps
- Calculate losses and efficiencies of centrifugal pumps
- Design centrifugal pumps including multi stage pumps.

TEXT BOOKS:

1. P. M. Modi and S. M. Seth, "Hydraulics and Fluid Mechanics", Standard Book House, 22nd edition, 2019.
2. R. K. Bansal, A text of "Fluid Mechanics and Hydraulic Machines", Laxmi Publications (P) Ltd., New Delhi, 2015.

REFERENCE BOOKS:

1. Rajput, "Fluid Mechanics and Fluid Machines", S. Chand & Co, 2016.
2. D. S. Kumar, "Fluid Mechanics & Fluid Power Engineering", Kataria & Sons, 9th edition, 2018.
3. K. Subramanya, Open channel Flow, Tata McGraw Hill, 2009.
4. S. C. Gupta, "Fluid Mechanics and Hydraulic Machines", Pearson publications, 1st edition, 2006.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

1. Explain the characteristics of laminar and turbulent flows.
2. Analyze characteristics for uniform and non-uniform flows in open channels.
3. Design different types of turbines
4. Design centrifugal and multi stage pumps.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0107	2	1	0	3	CIA	30 M
Course Title	:	STRUCTURAL ANALYSIS-I					SEE	70 M

COURSE OBJECTIVES:-

- To impart knowledge on energy theorems.
- To enable the student analyze indeterminate trusses
- To make the student to understand the analysis procedures for analyzing fixed and
- Continuous beams.
- To enable the student to undergo analysis procedure using slope deflection method.
- To illustrate analysis procedure using moment distribution method.

- To demonstrate various methods of analysis of structural members such as indeterminate beams, frames, etc. which enables the student to solve for forces in various complex structural systems.

Unit I:

Introduction: Determinate and In-determinate Structures – Determination of static and kinematic indeterminacies.

Energy Theorems: Introduction-Strain energy in linear elastic system, expression of strain energy due to axial load, bending moment and shear force – Castigliano's first theorem – Deflections of simple beams and pin jointed trusses.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain Energy concepts
- Develop expression for strain energy
- Calculate deflections in simple beams and pin jointed trusses
- Analyze simple structural elements using energy principles.

Unit II: Analysis of Indeterminate Structures Solution of trusses up to two degrees of internal and external indeterminacy – Castigliano's second theorem.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Differentiate determinate and indeterminate structures
- Explain static and kinematic indeterminacies
- Solve truss problems

Unit III: Fixed Beams & Continuous Beams

Introduction to statically indeterminate beams – theorem of three moments-uniformly distributed load, central point load, eccentric point load, number of point loads, uniformly varying load, couple and combination of loads – Shear force and Bending moment diagrams – effect of sinking of support, effect of rotation of a support.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Categorize fixed and continuous beams and their performance
- Explain different loads on beams with different boundary conditions.
- Analyze the beams subjected to loads
- Study effect of sinking of supports of performance

Unit IV: Slope – Deflection Method

Introduction – derivation of slope deflection equation – application to continuous beams with and without settlement of supports – Analysis of single bay, single storey, portal frame including side sway.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Develop slope deflection expressions
- Analyze structures with and without support sinking
- Analyze 2D frames using slope-deflection method.

Unit V: Moment Distribution Method

Introduction to moment distribution method – application to continuous beams with and without settlement of supports. Analysis of single storey portal frames – including Sway.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Develop moment distribution expressions
- Analyze structures with and without support sinking
- Analyze single storey portal frames

TEXT BOOKS:

1. S. S. Bhavikatti, “Structural Analysis”, Volume 1 and 2, Vikas Publishing House, Pvt. Ltd., 4th edition, 2013.
2. S. Ramamurtham, “Theory of Structures”, Dhanpat Rai Publishing Company (p) Ltd, 2009

REFERENCE BOOKS:

1. Timoshenko & Young, “Theory of Structures”, Tata McGraw Hill, 1945
2. S. B. Junarkar, “Structural Mechanics” Vol I & II, Charotar Publishers. 32 edition, 2016.
3. C. K. Wang, “Intermediate Structural Analysis”, McGraw Hill, 2014.
4. C. S. Reddy, “Basic Structural Analysis”, Tata McGraw Hill, 1994.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

1. Apply energy theorems for analysis of indeterminate structures
2. Analyze indeterminate structures with yielding of supports
3. Analyze beams using slope deflection and moment distribution methods
4. Analyze portal frames using slope deflection and moment distribution methods

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0108	3	0	0	3	CIA	30 M
Course Title	:	CONCRETE TECHNOLOGY					SEE	70 M

COURSE OBJECTIVES:-

- To explain the functional role of ingredients of concrete and apply this knowledge to mix design philosophy
- To develop fundamental knowledge in the fresh and hardened properties of concrete
- To inculcate the testing methodology to evaluate the properties of concrete during fresh and hardened stage
- To impart the knowledge on the behavior of concrete with response to stresses developed.

- To impart the knowledge on the special concretes And design a concrete mix which fulfils the required properties for fresh and hardened concrete

Unit I: Ingredients of concrete

Cement – Chemical composition – hydration process – Bogue's compound – Tests on properties of cement – Types of cement – IS Specifications. Aggregates- classification of aggregate – tests on properties of aggregates – characteristics of aggregate – I.S. Specifications. Water – quality of water – characteristics of water – IS Specifications. Admixtures – classification of chemical admixtures – properties and limitations – Classification of mineral admixtures – properties and limitations – IS Specifications.

Learning Outcomes: After successful completion of this unit, the students will be able to

- List out different ingredients of concrete
- Conduct tests on materials
- Explain characteristics of water
- Describe conformity to IS Codes

Unit II: Concrete Mix Design

Proportioning of Concrete Mixes – factors influencing – IS Code Methods – IS 456 provisions on Durability – Quality Control and Statistical Methods – Mix Design of High Strength concrete (using IS and ACI method).

Learning Outcomes: After successful completion of this unit, the students will be able to

- Study properties of concrete mixes
- Design concrete mixes using different methods
- Estimate quantities for target strength of concretes

Unit III: Properties of concrete

Fresh concrete: Mixing of concrete – workability – factors influencing workability – measurement of workability for conventional concrete (Slump Cone, Compaction Factor and Vee – Bee test) & SCC (V-Funnel, L – Box, U – Box, Slump Flow and J – Ring). **Hardened concrete**: Water/Cement Ratio(Abram's Law) – Gel Space Ratio - tests on hardened concrete – Destructive Tests (Compression, Split Tensile and Flexural) – Semi Destructive Tests (Core Cutter and Pull out test) and Non Destructive Tests (Rebound Hammer – UPV – Radiological methods) .

Learning Outcomes: After successful completion of this unit, the students will be able to

- List various properties of fresh concrete
- Conduct experiments for determination of fresh concrete properties
- List various properties of hardened concrete
- Conduct experiments for determination of hardened concrete properties
- Carryout Non Destructive tests on Concrete

Unit IV: Elasticity, Shrinkage and Creep

Curing of concrete – methods of curing – effects of improper curing – self curing – Modulus of Elasticity – Poisson's Ratio – Dynamic Modulus of Elasticity – Shrinkage and various types – Factors Affecting Shrinkage – Moisture Movement – Creep of Concrete – Factors Influencing Creep.
Durability – Permeability – Corrosion studies.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain curing methods and its importance
- Differentiate phenomenon of shrinkage and creep of concrete.
- Evaluate factors influencing creep and concrete

Unit V: Special Concretes

Light Weight Concrete – Cellular Concrete – No Fines Concrete – High Density Concrete – Fiber Reinforced Concrete – Polymer Concrete – Self Compacting Concrete.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Label different types of special concretes with the objectives
- Explain properties of special concretes.

TEXT BOOKS:

1. A. M. Neville, "Properties of Concrete", Pearson Publication – 5th Edition, 2012.
2. M. S. Shetty, A. K. Jain, "Concrete Technology Theory and Practice", S. Chand and Company Limited, New Delhi, 8th edition, 2019.

REFERENCE BOOKS:

1. M. L. Gambhir, "Concrete Technology", Tata Mc. Graw Hill Publishers, New Delhi, 2008.
2. N. Krishna Raju, "Design of Concrete Mixes", CBS Publishers, 4th edition, 2002.
3. P. K. Mehta And J. M. Monteiro, "Concrete: Micro Structure, Properties and Materials" Mc-Graw Hill Publishers, 2005.
4. J. Prasad, C.G.K. Nair, "Non-Destructive Test and Evaluation of Materials", Tata Mcgraw Hill Publishers, New Delhi, 2008.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

1. Explain various ingredients of concrete and their role.
2. Examine knowledge on the fresh and hardened properties of concrete.
3. Design concrete mixes using various methods.
4. Perceive special concretes for accomplishing performance levels.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0109T	3	0	0	3	CIA	30 M
Course Title	:	TRANSPORTATION ENGINEERING					SEE	70 M

COURSE OBJECTIVES:-

- To impart knowledge on highway development.
- To teach concepts of Geometric design and alignment.
- To throw light on different traffic surveys.
- To teach design of highway intersections
- To impart knowledge on highway materials and design of pavements.

Unit I: Highway development and planning

Highway development in India – Necessity for Highway Planning- Road Development Plans – Classification of Roads – Road Network Patterns – Highway Alignment and Influencing Factors – Engineering Surveys.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain the importance of highway development
- Classify highways based on hierarchy.

Unit II: Highway Geometric Design

Geometric Design – Design Criteria – Cross Section Elements – Sight Distances – Stopping Sight Distance, Overtaking Sight Distance and Intermediate Sight Distance – Design of Horizontal Alignment – Design of Super elevation and Extra widening – Design of Transition Curves – Design of Vertical alignment – Gradients – Vertical curves.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain different aspects governing highway geometric design.
- Design vertical and horizontal alignment of highways.

Unit III: Traffic Engineering and Regulation

Basic Parameters – Traffic Volume Studies – Data Collection and Presentation – Speed Studies – Data Collection and Presentation – Parking Studies and Characteristics – Road Accidents – Causes and Preventive Measures – Accident Data Recording – Condition Diagram and Collision Diagrams – Road Traffic Signs – Road markings.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Identify need and methods of Traffic Surveys.
- Understand importance of parking and related surveys.
- Understand the role of engineering in road safety.

Unit IV: Intersection design

Conflicts at Intersections – Types of Intersections – Channelization – Traffic Islands and Design At – grade intersections and Grade separated intersections – Rotary Intersection and Design elements.

Learning Outcomes: After successful completion of this unit, the students will be able to

- List out the objectives of channelization.
- Explain the types of intersections and their design features.

Unit V: Highway materials and Pavement design

Highway materials – Road aggregates – desirable properties – tests on road aggregates. Bituminous materials – tests on bituminous materials. Flexible and Rigid Pavements – Components and Functions – design of Flexible pavement (G.I method and CBR Method as per IRC 37) – Design of Rigid pavements – Westergaard's stress equations – CC pavements design – stresses in pavements.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain the suitability of highway materials and tests on them
- List out the types of pavements and their structural properties.
- Design of rigid and flexible pavements.

TEXT BOOKS:

1. S. K. Khanna and C. E. G. Justo, "Highway Engineering", Nemchand & Bros., 7th edition (2000).

2. C. Venkataramaiah, "Transportation Engineering" (Vol – I), Universities Press Pvt Ltd, Hyderabad.

REFERENCE BOOKS:

1. L. R. Kadiyali and Lal, "Principles and Practice of Highway Engineering Design", Khanna Publications, 7th edition, 2013.
2. R. Srinivasa Kumar, "Highway Engineering", Universities Press Pvt Ltd, Hyderabad. 2011.
3. S K Sharma, "Highway Engineering", S. Chand and Company Limited, New Delhi, 3rd edition, 2018.
4. *S P Chandola, "Transportation Engineering",* S. Chand and Company Limited, New Delhi, 2016.

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

1. Explain the importance of highways in economic development of nation.
2. Describe the history of road development in India and various road development plans.
3. Identify the highway materials and tests related to them.
4. Design horizontal and vertical alignment aspects.
5. Explain the surveys required for highway planning and design.
6. Differentiate between types of pavements and their design features.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0106P	0	0	3	1.5	CIA	30 M
Course Title	:	HYDRAULIC MACHINERY LAB					SEE	70 M

COURSE OBJECTIVES:-

The object of the course is to make the students understand the working principles of vanes under impact of water jets, various turbines and pumps.

List of Experiments:

1. Impact of jet on vanes
2. Study of Hydraulic jump.
3. Performance test on Pelton wheel turbine
4. Performance test on Francis turbine.
5. Efficiency test on centrifugal pump.

6. Efficiency test on reciprocating pump.
7. Efficiency test on multi stage centrifugal pump.
8. Head loss due to bend
9. Experiment on turbine flow meter (water meter)
10. Partial flume experiment.
11. Flow transitions – flow over hump above ground in open channel.
12. Flow transitions – flow over hump below (Depression) ground in open channel.

COURSE OUTCOMES:
By performing the various tests in this laboratory the student will be able to know the performance of various hydraulic machinery and flow characteristics.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0109P	0	0	3	1.5	CIA	30 M
Course Title	:	TRANSPORTATION ENGINEERING LAB					SEE	70 M

COURSE OBJECTIVES:-

- The object of the course is to enable the students to identify the physical characteristics of aggregates and bitumen.

List of Experiments:

I. Road Aggregates

1. Aggregate Crushing value Test.
2. Aggregate Impact Test.
3. Los Angeles Abrasion Test.
4. Shape tests

5. Specific gravity and Water absorption test

II. Bituminous Materials

6. Penetration Test.
7. Ductility Test.
8. Softening Point Test.
9. Flash and fire point tests

III. Traffic Studies

10. Volume Studies
11. Speed studies
12. Parking studies

COURSE OUTCOMES:

By performing the various tests in this laboratory the student will be able to know the physical characteristics of aggregates, bitumen and traffic studies.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to IV Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0505T	3	0	0	3	CIA	30 M
Course Title	:	PYTHON PROGRAMMING FOR ENGINEERS LAB					SEE	70 M

COURSE OBJECTIVES:-

- To train the students in solving computational problems
- To elucidate solving mathematical problems using Python programming language
- To understand the fundamentals of Python programming concepts and its applications.

LIST OF TOPICS:

1. Write a program to demonstrate a) Different numeric data types and b) To perform different Arithmetic Operations on numbers in Python.
2. Write a program to create, append, and remove lists in Python.

3. Write a program to demonstrate working with tuples in Python.
4. Write a program to demonstrate working with dictionaries in Python.
5. Write a program to demonstrate a) arrays b) array indexing such as slicing, integer array indexing and Boolean array indexing along with their basic operations in NumPy.
6. Write a program that accepts a string from the user and display the same string after removing vowels from it.
7. Write a program to strip a set of characters from a string.
8. Write a function that prompts the user for the average temperature for each day of the week and returns a dictionary containing the required information.
9. Write a program that has the dictionary of your friend's names as keys and phone numbers as its values. Print the dictionary in a sorted order. Prompt the user to enter the name and check if it is present in the dictionary. If the name is not present, then enter the details in the dictionary.
10. Write a program to store the latitude and longitude of your house as a tuple and display it.
11. Write a program to do the following operations on files
    a) Count the occurrence of each letter
    b) Read the last n lines
    c) Remove new line characters from the file
    d) Read random line from a file
    e) Read and write the contents from one csv file to another.
12. Write a program to add two polynomials using classes.
13. Create a class called library with data attributes accno, publisher, title and author. The methods of the class should include
    a) read() accno, title, author
    b) compute() – to accept the number of days late, calculate an display the fine charged at the rate of Rs. 10 per day.
    c) display the data.
14. Create a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.
15. Programs on Python packages Numpy, Pandas, Matplotlib

TEXT BOOKS:

1. Francois Chollet, Deep Learning with Python, 1/e, Manning Publications Company, 2017
2. Manohar Swamynathan, "Mastering Machine learning with Python in Six steps", Apress.
3. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, "How to Think Like a Computer Scientist: Learning with Python 3", 3rd edition, Available at http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
4. Paul Barry, "Head First Python a Brain Friendly Guide" 2nd Edition, O'Reilly, 2016
5. Dainel Y.Chen "Pandas for Everyone Python Data Analysis" Pearson Education, 2019

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Illustrate the use of various data structures. (L3)
2. Analyze and manipulate Data using Pandas (L4)
3. Design solutions to real-world problems using Python (L6)

B.TECH - V SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:		2	1	0	3	CIA	30 M
Course Title	:	DESIGN OF REINFORCED CONCRETE STRUCTURES					SEE	70 M

COURSE OBJECTIVES: -

- To teach concepts of working stress and limit state methods.
- To impart design procedure of RC elements in flexure, shear and torsion.
- To teach design procedure for short and long RC columns.
- To explain design procedure of RC footings
- To demonstrate design of RC slab

UNIT- I:Introduction

Concepts of Reinforced concrete Design – Introduction to Working Stress Method - Limit State method – Material Stress- Strain Curves – Safety factors – Characteristic values. Stress Block parameters – IS – 456:2000.

Beams: Limit state analysis and design of singly reinforced, doubly reinforced, T and L beam sections

Learning Outcomes:

At the end of this unit, the student will be able to

- Familiarize with working stress and limit stress method of design.
- Understand stress block parameters in methods of analysis
- Design of beams of varying cross sections adopting IS Code

UNIT -II:Shear and torsion

Limit state analysis and design of section for shear and torsion – concept of bond, anchorage and development length, I.S. code provisions. Design examples in simply supported and continuous beams, detailing;

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand behavior of beams under shear and torsion
- Visualize importance of bond and anchorage
- Design and Detail RC beams under due to shear and torsion adopting IS Code.

UNIT -III:Columns

Short and Long columns – under axial loads, uniaxial bending and biaxial bending – I S Code provisions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand behavior of columns with different slenderness characteristics
- Contrast behavior of columns axial. And under uniaxial biaxial eccentricities
- Design and detail RC columns under different loads adopting IS Code.

UNIT -IV:**Footings**

Different types of footings – Design of isolated, square, rectangular, circular footings and combined footings.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify footings based on shape and utility
- Examine the field conditions and suggest appropriate footings
- Design reinforced concrete footings.

UNIT- V:**Slabs &Stair Case**

Design of one way slab, Two-way slabs and continuous slab using I.S. Coefficients Limit state design for serviceability for deflection, cracking and codal provision. Design of doglegged staircase.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify understand performance of slabs based on dimensions
- Design reinforced concrete slabs &Stair cases as per IS codal provisions.

Codes/Tables: IS 456-2000 and relevant sheets (Pertaining to columns) of SP 16 Code books to be permitted into the examinations Hall.

TEXT BOOKS:

1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, “Limit State Design”, Laxmi, Publications Pvt. Ltd., New Delhi
2. P. C. Varghese, Limit state “designed of reinforced concrete”, Prentice Hall of India, New Delhi

REFERENCE BOOKS:

1. N. Krishna Raju, “Structural Design and Drawing”, Universities Press Pvt Ltd, Hyderabad. 4rd edition 2020.
2. N. C. Sinha and S. K Roy, “Fundamentals of reinforced concrete” , S. Chand publishers
3. N.Subramanian, “Design of Reinforced concrete structures”, Oxford university press.

IS CODE OF PRACTICE: IS 456- 2000 Code of practice for Reinforced Concrete Structures.

NOTE: Assignment on preparation of drawing sheets showing detailing of various RC Elements

All the designs to be taught in Limit State Method

Following plates should be prepared by the students.

- Reinforcement particulars of T-beams and L-beams.
- Reinforcement detailing of continuous beams.
- Reinforcement particulars of columns and footings.
- Detailing of One way, Two way and continuous slabs

COURSE OUTCOMES:

After successful completion of this course, the students will be able to

- Understand the basic concepts of working stress and limit state design methods
- Design various RC elements like beams, columns, footings and slabs.
- Apply design concepts to complex structural systems in advanced courses.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	ENVIRONMENTAL ENGINEERING					SEE	70 M

COURSE OBJECTIVES:
- To teach requirements of water and its treatment.
- To impart knowledge on sewage treatment methodologies.
- To provide facts on Air pollution and control.
- To enable with design concepts of wastewater treatment units
- To throw light on importance of plumbing.

UNIT I:**Water quality and treatment:**
Water quality: Sources of Water and quality issues, water quality requirement for different beneficial uses, Water quality standards, water quality indices, water safety plans, Water Supply systems, Need for planned water supply schemes, Water demand industrial and agricultural water requirements, Components of water supply system; Transmission of water, Distribution system, Various valves used in W/S systems, service reservoirs and design.
Water Treatment: aeration, sedimentation, coagulation flocculation, filtration, disinfection, advanced treatments like adsorption, ion exchange, membrane processes

Learning Outcomes:
- Understand importance of water quality
- Explain water quality standards
- Plan water supply systems in terms of transmission and distribution
- Categorize different water treatment procedures

UNIT II:**Sewage and Treatment**
Domestic and Storm water, Quantity of Sewage, Sewage flow variations. Conveyance of sewage- Sewers, shapes design parameters, operation and maintenance of sewers, Sewage pumping; Sewerage, Sewer appurtenances, Design of sewerage systems. Small bore systems, Storm Water- Quantification and design of Storm water; Sewage and Sullage, Pollution due to improper disposal of sewage, National River cleaning plans, Wastewater treatment – COD &BOD- aerobic and anaerobic treatment systems, suspended and attached growth systems, recycling of sewage – quality requirements for various purposes.

Learning Outcomes:
- Distinguish characteristics of domestic and storm water
- Plan Sewage treatment and disposal methodologies
- Assess quality of waste water parameters
- Design waste water treatment systems leading to cleaning of rivers

UNIT III:Air Pollution
Composition and properties of air, Quantification of air pollutants, Monitoring of air pollutants, Air pollution- Occupational hazards, Urban air pollution automobile pollution, Chemistry of combustion, Automobile engines, quality of fuel, operating conditions and interrelationship. Air quality standards, Control measures for Air pollution, construction and limitations.

Learning Outcomes:

- Identify causes and types of air pollution
- Understand occupational hazards due to different pollutions
- Assess air quality parameters
- Design methodologies to control air pollution

UNIT IV:Solid Waste Management

Municipal solid waste-Composition - chemical and physical parameters - Collection, transport, treatment and disposal. waste from commercial establishments and other urban zones-construction activities - biomedical wastes, Effects of solid waste on environment. Disposal of solid waste- Disposal methods-Integrated solid waste management.

Learning Outcomes:

- Segregate different types of municipal wastes
- Understand stages of handling municipals solid wastes
- Sewage treatment and disposal methodologies
- Design solid waste disposal leading to integrated solid waste management

UNIT V:Domestic Plumbing

Types of home plumbing systems for water supply and waste water disposal, high rise building plumbing-Pressure reducing valves, Break pressure tanks, Storage tanks, Building drainage for high rise buildings, various kinds of fixtures and fittings. Role of Government authorities in water supply, sewerage disposal.

Learning Outcomes:

- Understand the importance of plumbing.
- Explain different plumbing techniques

TEXT BOOKS:

- G. S. Birdi, “Water supply and sanitary Engineering”, Dhanpat Rai & Sons Publishers.
- Peavy, H.S, Rowe, D. R. Tchobanoglous, “Environmental Engineering”, Mc-Graw – Hill International Editions, New York 1985.

REFERENCES:

- B.C. Punmia, Ashok Jain & Arun Jain, “Water Supply Engineering”, Vol. 1, Waste water Engineering, Vol. II, Laxmi Publications Pvt. Ltd, New Delhi.
- MetCalf and Eddy, “Wastewater Engineering”, Treatment, Disposal and Reuse, Tata McGraw- Hill, New Delhi.
- S. M. Patil, “Plumbing Engineering Theory, Design and Practice”,1999.
- K. N. Duggal, ”Elements of Environmental Engineering”, S. Chand Publishers.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Understand about quality of water and purification process
- Select appropriate technique for treatment of waste water.
- Assess the impact of air pollution
- Understand consequences of solid waste and its management.
- Design domestic plumbing systems.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:		2	0	0	2	CIA	30 M
Course Title	:	ENGINEERING GEOLOGY					SEE	70 M

COURSE OBJECTIVES:
- To understand weathering process and mass movement
- To distinguish geological formations
- To identify geological structures and process of rock mass quality.
- To identify subsurface information and groundwater potential sites through geophysical
- investigations
- To apply geological principles of mitigation of natural hazards and select sites for dams and tunnels

UNIT -I: Introduction
Application of Earth Science in Civil Engineering Practices, Understanding the earth, internal structure and composition. Weathering, erosion and denudations process on earth material and natural agencies, Geological work of wind, river underground water and glaciers Mineralogy: Mineral properties, composition and their use in the manufacture of construction materials – Quartz Group; Feldspar Group; Kaolin; Asbestos; Carbonate Group ; Gypsum; Mica Group; Ore minerals - Iron ores; pyrite; Chlorite

Learning Outcomes:
At the end of this unit, the student will be able to
- Explain the formation of earth and its internal structure
- Understand weathering and formation of natural minerals
- Explain composition of minerals and their utilization in construction industry.

UNIT- II: Petrology & Structural Geology
Definition of rock - Rock forming processes - Geological classification of rocks - Dykes and sills, common structures and textures - Megascopic study, Chemical and Mineralogical Composition of rock (Granite, Gabbro, Dolerite, Basalt, Pegmatite, Laterite, Conglomerate, Sand Stone, Shale, Limestone, Tuff, Felsite, Gneiss, Schist, Quartzite, Breccia, Marble, Porphyries, Charnockite and Slate).

Learning Outcomes:
At the end of this unit, the student will be able to
- Understand classification of rocks
- Demonstrate chemical composition
- Identify mineral composition of rock

UNIT -III: Structural Geology
Out crop, strike and dip study of common geological structures associating with the rocks such as folds, faults unconformities, and joints – their important types. Their importance insitu and drift soils, common types of soils, their origin and occurrence in India

Learning Outcomes:
At the end of this unit, the student will be able to
- Explain formation of folds strike and dip of geological structures
- Assess importance of soils and
- Locate origin of different types of rocks and soils and their origin India

UNIT –IV: Geomorphology, hydrogeology and seismology

Ground water, Water table - ground water exploration. site selection for dams and tunnels – analysis of failures in dams and tunnels - Seismic zones of India - Earth quakes, their causes and effects. Seismic waves, Richter scale. Landslides - causes and effects; Tsunami –causes and effects.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand geomorphology
- Identify procedures for site selection of important structures
- Contrast seismic Zonation of India in stages
- Understand seismic scales and effects of major earthquakes earth quakes, landslides and Tsunami.

UNIT -V: Geophysical Studies

Importance - Branches and necessity of Geophysical investigations - Gravity methods. Magnetic methods, Electrical methods. Seismic methods, Radio metric methods and Geothermal method. Electrical resistivity methods, and seismic refraction methods.

Learning Outcomes

At the end of this unit, the student will be able to

- Understand importance of Geophysical investigations
- Carryout geo physical investigations using various methods.

TEXT BOOKS:

1. D.Venkata Reddy, "Engineering Geology, Second edition", Vikas Publishing house, Pvt, Ltd.
2. N. ChennaKesavulu, "Text Book of Engineering Geology", 2nd Edition (2009), Macmillan Publishers India.
3. Vasudev Kanithi, "Engineering Geology", Universities Press Pvt Ltd, Hyderabad. 2012.

REFERENCES:

1. Parbin Singh, "Engineering and General Geology", 8th Edition (2010), S K Kataria& Sons.
2. J. C. Harvey, "Geology for Geotechnical Engineers", Cambridge University Press (1982).
3. Richard E. Goodman, "Engineering Geology, Rock in Engineering Construction", John Wiley & Sons, Inc. 1993.
4. Billings, M. P., "Structural Geology", Prentice-Hall India, 1974, New Delhi
5. S.K.Duggal, H.K Pandey, N.Rawal, "Engineering Geology", Mc.Graw Hill Education(India) Pvt. Ltd.

COURSE OUTCOMES:

At the end of the course student will be able to

- Gain basic knowledge on characteristics of rocks and minerals.
- Identify and differentiate rocks using geological classification.
- Carry out geo physical investigations for infrastructural projects.
- Apply concepts of structural geology for civil engineering structures.
- Understand the seismic zones of India.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:		2	1	0	3	CIA	30 M
Course Title	:	STRUCTURAL ANALYSIS - II					SEE	70 M

COURSE OBJECTIVES:

- To impart knowledge of rotation contribution method of analysis.
- To enable the student to analyze the two hinged and three hinged arches
- To impart the student the knowledge of rolling loads and influence lines.
- To enable the student to undergo the analysis of matrix methods.
- To inculcate the knowledge of plastic analysis to the student.

UNIT – I: Arches
Introduction- hinges-transfer of load to arches-linear arch-hinges in the arch-arch action-Horizontal force – three hinged arches – circular arches – springs at different level-Two hinged arches- two hinged circular arches – fixed arches (only theory) - Temperature stresses in arches.

Learning Outcomes:
At the end of this unit, the student will be able to

- To Differentiate between two hinged and three arches.
- To analyze the arches by finding axial thrust and radial shear.
- To know the temperature effect in arches.

UNIT – II: Rolling loads and influence line diagrams for determinate structures
Introduction-simply supported beams – single concentrated load- UDL longer than the beam span – UDL shorter than the beam span- two wheel axles separated by a distance- multiple wheel axles (train of loads)-influence line diagram for shear force and bending moments – influence line diagrams for three hinged arches.

Learning Outcomes:
At the end of this unit, the student will be able to

- Know the effect of rolling loads on bridges
- Draw the influence lines of variable for a given moving load on bridges.

UNIT – III: Matrix method of structural analysis-flexibility method
Introduction- Different approaches to matrix method- degree of static and kinematic indeterminacy-generalized coordinate system-flexibility matrix- application to beams.

Learning Outcomes:
At the end of this unit, the student will be able to

- Introduce matrix methods in structural analysis.
- Develop flexibility matrix for the structural elements.

UNIT – IV: Stiffness matrix method
Introduction- stiffness matrix-relationship between flexibility and stiffness matrices-flexibility matrix method-stiffness matrix method – application to simple beams.

Learning Outcomes:
At the end of this unit, the student will be able to
- Develop stiffness matrix for the structural elements.
- Develop relationship between flexibility and stiffness matrices.

UNIT – V: Plastic analysis
Introduction- definition of plastic hinge and plastic moment capacity – Assumptions- shape factor- shape factor for general sections – collapse load – basic theorems for finding collapse loads-methods of plastic analysis-static method-kinematic method- kinematic method applied to beams and simple frames- beam mechanism- sway mechanism-combined mechanism.

Learning Outcomes:
At the end of this unit, the student will be able to
- To know plastic moment capacity of a structural member.
- To find the collapse load for a structural member.
- To find the collapse mechanism for a structural member.

TEXT BOOKS:
1. Ramamurtham S., "Theory of Structures", Dhanpat Rai Publishing Company (p) Ltd,
2. C. S. Reddy, "Basic Structural Analysis", Tata McGraw Hill
3. S.S. Bhavikatti, "Structural analysis", Volume 1 and 2, Vikas publishing house pvt. Ltd.
4. Dr.Vaidyanathan, Dr.P.Perumal, "Comprehensive structural analysis", Vol-II, Laxmi Publications (P) Ltd.

REFERENCES:
1. Timoshenko & Young, "Theory of Structures", Tata McGraw Hill
2. Junarkar S. B., "Structural Mechanics", Vol I & II, Charotar Publishers
3. C. K. Wang, "Intermediate Structural Analysis", McGraw Hill

COURSE OUTCOMES:
At the end of the course student will be able to
- Analyze the final moments at the ends of the members
- Analyze bending moment, normal thrust and radial shear in the arches
- Analyze the variation of shear force and bending moment in the members due to rolling loads
- Analyze the degree of indeterminacy of the structures, reactions and displacements
- Analyze the formation of plastic hinges in different mechanisms

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Professional Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	BUILDING CONSTRUCTION PRACTICE					SEE	70 M

COURSE OBJECTIVES:

- To Impart knowledge in investigation of soil condition, Deciding and design of suitable foundation for different structures
- To examine the good materials to be used for the construction work
- To teach to supervision of different types of masonry
- To illustrate the methodology in selection of materials, design and supervision of suitable type of floor and roof.
- To teach the methodology of constructing advances structures

UNIT -I:Structural Components
Foundations – classification of Foundations – consideration in selection of foundation types – Masonry – Brick and block walls – Cavity walls – Damp–proof courses and membranes – Mortars – Arches and openings – Windows – Glass and glazing –Doors – Stairs – Types and Applications – Cladding to external walls – Flat roofs – Dormer windows – Formwork & Scaffolding – Precast concrete frames – Portal frames – Types – components – Framed structures– Components – Construction Procedure – Panel walls – National Standards.

Learning Outcomes:
At the end of this unit, the student will be able to

- Understand components of structures and their performance
- Explain construction materials their importance
- Understand formwork and scaffolding

UNIT -II:Internal Construction and Finishes
Internal elements – Internal walls – Construction joints – Internal walls, fire protection – separating walls – Partitions – Plasters and plastering – Domestic floors and finishes – Sound insulation – Timber, concrete and metal stairs–Internal doors – Door – Fire resisting doors – Plasterboard ceilings – Suspended ceilings –Paints and painting – Components of Paints – Typesof Paint – Considerations in Selecting Paints – Cement Paints – Oil Paints –Emulsion - Paints – Whitewash and Colour wash – Application of Paints – Distempers – Varnishes – Safety –Joinery production – Composite boarding – National Standards.

Learning Outcomes:
At the end of this unit, the student will be able to

- Understand internal components of structures and their performance
- Explain different features of interiors of a building and their importance
- Compare different types of construction materials
- Examine relative advantages and limitations

UNIT- III:Construction of high rise buildings
Construction methods and techniques using different materials, Minerals, Admixtures in-situ concrete, Precast Concrete & Structural Steel, finished concrete, tunnel form, fire Fighting, Safety & Hazards, Job Safety Analysis. Innovative methods of construction – Slip form technology, Jumpform technology, Aluform& Tunnel Form Technology, Dry wall technology, Plastering Machines.

Learning Outcomes:
At the end of this unit, the student will be able to

- Develop knowledge on construction of high rise building
- Understand materials used for components of structures
- Explain safety requirements and provisions in high rise buildings

UNIT -IV:Concepts and components of bridges
Bridges, Steel Bridges, Arch Bridges, Cantilever Bridges Segmental construction & Box Girders. Construction of special type of bridges such as cable stayed bridge, suspension and Pre-stressed bridge, construction of foundation and Super structure. Construction of Metro Railway & Monorail - Underground and over ground structures, different methods and techniques of construction. Problems and solutions – during maintenance and upkeep of structures. Fire, Ventilation, Dewatering and power supply, Subsidence, Vibration etc., Concept of Mag-rail.

Learning Outcomes:
At the end of this unit, the student will be able to

- Classify types of bridges based on features materials and engineering
- Develop procedures for construction of different types of bridges
- Study advanced technologies in developing Metrorail facilities
- Appraise importance of maintenance of bridges

UNIT -V:Construction of Power Generating Structures
Atomic Power stations, Thermal power stations- Generation Power Plants, Windmills, Transmission towers, Chimneys (single and multi-flue), cooling towers - Natural draft cooling towers (NDCT) & Induced draft cooling tower (IDCT), Ash handling system, Containment Structure, Electro Static Precipitator (ESP), Case study of Kaiga atomic power station, Madras atomic power station. Or Any other Case Study and Safety Hazards

Learning Outcomes:
At the end of this unit, the student will be able to

- Understand procedures for construction of power generating infrastructure
- Develop knowledge on existing important power plants and their role in development

TEXT BOOKS:

1. Roy Chudley and Roger Greeno, “Construction Technology”, Prentice Hall, 2005.
2. Peurifoy, “Construction Planning, Equipment and methods”, Tata McGraw Hill Publication

REFERENCES:

1. Mahesh Varma, “Construction Equipment Planning and Applications”.
2. Kumar Niraj Jha, - “Formwork for Concrete Structures”, Mc Graw Hill Publication
3. Sushil Kumar “Building Materials and construction”, 20th edition, reprint 2015, Standard Publishers
4. B. C. Punmia, Ashok Kumar Jain, Arun Kumar Jain, “Building Construction”, Laxmi Publications (P) Ltd., New Delhi.

COURSE OUTCOMES:

At the end of the course, the student will be able to

- Classify suitable materials for buildings and adopt suitable construction techniques.
- Adopt suitable internal finishes and maintenance work to enhance durability of buildings.
- Design of high rise buildings.
- Design of power generation structures.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Professional Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	SUBSURFACE INVESTIGATION AND INSTRUMENTATION					SEE	70 M

COURSE OBJECTIVES:

- To discuss the importance of site investigation,
- To narrate various exploration techniques
- To describe soil sampling techniques.
- To train with in-situ sub soil exploration methods
- To demonstrate instrumentation for sub soil exploration.

UNIT -I: Exploration and geophysical methods

Exploration program planning -methods of exploration- preliminary and detailed design-spacing and depth of bores, data presentation. Geophysical exploration and interpretation, seismic and electrical methods, cross bore hole, single bore hole – up hole -down hole methods.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand exploration process
- Learn about different geophysical methods of exploration.

UNIT –II: Exploration Techniques

Methods of boring and drilling, non-displacement and displacement methods, drilling in difficult subsoil conditions, limitations of various drilling techniques, stabilization of boreholes, bore logs.

Learning Outcomes:

At the end of this unit, the student will be able to

- Learn various exploration techniques.
- Determine appropriate methods of exploration based on limitations

UNIT -III: Soil Sampling

Sampling Techniques – quality of samples – factors influencing sample quality - disturbed and undisturbed soil sampling advanced sampling techniques, offshore sampling, shallow penetration samplers, preservation and handling of samples.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand concepts of sampling
- Study different types of sampling techniques.

UNIT -IV: Field Testing In Soil Exploration

Field tests, penetration tests, Field vane shear, Insitu shear and bore hole shear test, pressure meter test, dilatometer test - plate load test–monotonic and cyclic; field permeability tests – block vibration test. Procedure, limitations, correction and data interpretation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Develop in-situ soil exploration methods.

- Interpret data of soil exploration and documentation

UNIT -V: Instrumentation

Instrumentation in soil engineering, strain gauges, resistance and inductance type, load cells, earth pressure cells, settlement and heave gauges, pore pressure measurements - slope indicators, sensing units, case studies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Choose appropriate instrumentation in sub soil exploration process.
- Soil Character measurement and case studies.

TEXT BOOKS:

1. Alam Singh and Chowdhary G. R., "Soil Engineering in Theory and Practice, Volume-2, Geotechnical testing and instrumentation", CBS Publishers and Distributors, New Delhi, 2006.
2. Dunnicliff J., and Green, G. E., "Geotechnical Instrumentation for Monitoring Field Performance", John Wiley, 1993.

REFERENCES:

1. Bowles J. E., "Foundation Analysis and Design", 5th Edition, The McGraw-Hill companies, Inc., New York, 1995.
2. C. Venkataramiah, "Geotechnical Engineering", New age International Pvt . Ltd, (2002).
3. Hanna T. H., "Field Instrumentation in Geotechnical Engineering", Trans Tech., 1985.
4. Hunt R. E., "Geotechnical Engineering Investigation Manual", McGraw Hill, 1984.

COURSE OUTCOMES:

At the end of the course student is able to

- Plan and execute sub soil investigation programme.
- Handle both laboratory and in-situ testing techniques.
- Carry out collection, handling and preservation of samples.
- Handle instruments during sub soil exploration process

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Professional Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	ENVIRONMENTAL POLLUTION AND CONTROL					SEE	70 M

COURSE OBJECTIVES:

- Impart knowledge on aspects of air pollution & control and noise pollution
- Impart concepts of treatment of waste water from industrial source.
- Differentiate the solid and hazardous waste based on characterization
- Introduce sanitation methods essential for protection of community health.
- Provide basic knowledge on sustainable development.

UNIT – I:Air Pollution

Air pollution Control Methods–Particulate control devices – Methods of Controlling Gaseous Emissions – Air quality standards. Noise Pollution: Noise standards, Measurement and control methods – Reducing residential and industrial noise – ISO:14000.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand control mechanism of air pollutants
- Design noise reduction techniques.

UNIT –II:Industrial waste water Management

Strategies for pollution control – Volume and Strength reduction – Neutralization – Equalization – Proportioning – Common Effluent Treatment Plants – Recirculation of industrial wastes – Effluent standards.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the importance of treatment process of industrial effluents.
- Design treatment plants

UNIT – III:Solid Waste Management

solid waste characteristics – basics of on-site handling and collection – separation and processing – Incineration- Composting-Solid waste disposal methods
– fundamentals of Land filling.

Hazardous Waste: Characterization – Nuclear waste – Biomedical wastes – Electronic wastes – Chemical wastes – Treatment and management of hazardous waste-Disposal and Control methods.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classification of solid waste and separation and procession solid waste
- Identification of Hazardous wastes
- Plan and execute solid waste and hazardous waste management.

UNIT – IV: Environmental Sanitation

Environmental Sanitation Methods for Hostels and Hotels, Hospitals, Swimming pools and public bathing places, social gatherings (melas and fares), Schools and Institutions, Rural Sanitation-low cost waste disposal methods.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand importance of hygienic environment
- Suggest appropriate rural sanitation methods to keep surrounding clean.

UNIT – V:Sustainable Development

Definition- elements of sustainable developments-Indicators of sustainable development- Sustainability Strategies- Barriers to Sustainability–Industrialization and sustainable development – Cleaner production in achieving sustainability- sustainable development.

Learning Outcomes:

At the end of this unit, the student will be able to

- Execute sustainable development strategies.

TEXT BOOKS:

1. Peavy, H. S., Rowe, D.R, Tchobanoglous, "Environmental Engineering", G.Mc-Graw Hill International Editions, New York 1985.
2. J. G. Henry and G.W. Heinke, "Environmental Science and Engineering", Pearson Education.

REFERENCES:

1. G. L. Karia and R.A. Christian, "Waste water treatment- concepts and design approach", Prentice Hall of India
2. M. N. Rao and H. V. N. Rao, "Air pollution", Tata Mc.Graw Hill Company.
3. Ruth F. "Weiner and Robin Matthews Environmental Engineering", 4th Edition Elesevier, 2003.
4. K. V. S. G. Murali Krishna, "Air Pollution and Control" by, Kousal& Co. Publications, New Delhi.

COURSE OUTCOMES:

At the end of the course, the students will be able to:

- Understand the fundamentals of solid waste management, practices adopted in his town/village and its importance in keeping the health of the city.
- Identify the air pollutant control devices and have knowledge on the NAAQ standards and air emission standards.
- Differentiate the treatment techniques used for sewage and industrial wastewater treatment.
- Inventing the methods of environmental sanitation and the management of community facilities without spread of epidemics.
- Appreciate the importance of sustainable development while planning a project or executing an activity.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Professional Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	ADVANCED SURVEYING					SEE	70 M

COURSE OBJECTIVES:

- To make the student to get well conversant with the fundamentals of triangulation surveying.
- To introduce to the students the methods of hydrographic surveying
- To make the student to use photogrammetry in surveying
- To enable the student to set simple horizontal curves.
- To introduce the knowledge construction surveys and usage of modern instrument such as total station.

UNIT – I:
Triangulation: Geodetic surveying-classification of triangulation system-triangulation figures-strength of figure-reconnaissance- signals and towers.
Base line measurement- calculation of length of base line-Selecting a base line site- apparatus for baseline measurement-fieldwork for base measurement-corrections to the observed length of a base line-the base net-auxiliary operations in base line work.

Learning Outcomes:
At the end of this unit, the student will be able to

- To impart basic concepts of triangulation surveying.
- To impart the essentiality of the base line measurement in a triangulation system.

UNIT – II: Hydrographic surveying
Introduction-tides-equilibrium theory-spring tides and neap tides-priming and lagging-primary and derivative tide waves – lunar tidal interval- tide prediction-tide gauges-mean sea level-shoreline surveys-sounding equipment and methods-locating the soundings –reduction and plotting the soundings-three point problem-tidal current surveys-capacity of a reservoir –river surveying –area velocity method-weir method-chemical method .

Learning Outcomes:
At the end of this unit, the student will be able to

- To impart basic principles in hydrographic surveying.
- To know practical applications of soundings in hydrographic surveying.

UNIT – III: Photogrammetric Surveying
Introduction, Basic concepts, perspective geometry of aerial photograph, relief and tilt displacements, terrestrial photogrammetry, flight planning; Stereoscopy, ground control extension for photographic mapping- aerial triangulation, radial triangulation, methods; photographic mapping- mapping using paper prints, mapping using stereo plotting instruments, mosaics, map substitutes.

Learning Outcomes:
At the end of this unit, the student will be able to

- Understand photogrammetry adopting various techniques.
- Map areas using triangulation
- Distinguish different types of plotting instruments

UNIT -IV: Typical Curve Setting

Compound and reverse curves- elements of compound curve-relationship between the parts of a compound curve-setting out compound curve-elements of a reverse curve-relatlionships between various parts of a reverse curve.

Transition curves-general requirements-length of transition curve- the ideal transition curve: clothoid-characteristics of a transition curve-computations and setting out – spiraling compound curves – spiraling of reverse curves – Bernoulli's lemniscates curve. Vertical curves: Introduction to vertical curves – Types of vertical curves.

Learning Outcomes:

At the end of this unit, the student will be able to

- To understand about necessity of compound and reverse curves.
- To understand the essentiality condition for transition curves
- To understand the different vertical curves.

UNIT -V:

Remote Sensing: Introduction –Electromagnetic Spectrum, interaction of electromagnetic radiation with the atmosphere and earth surface, remote sensing data acquisition: platforms and sensors; visual image interpretation; digital image processing.

GPS: Segments, GPS measurements, errors and biases, co-ordinate transformation, accuracy considerations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand principles of remote sensing.
- Carryout date acquisition and interpretation
- Understand the principles of GPS

TEXT BOOKS:

- R. Subramanian, "Surveying and leveling", Oxford university press, New Delhi.
- Chandra A M, "Higher Surveying", New age International Pvt. Ltd., Publishers, New Delhi, 2002.
- Hoffman. B, H. Lichtenegga and J. Collins, "Global Positioning System" - Theory and Practice, Springer -Verlag Publishers, 2001.
- C.Venkatramaiah, "Text book of surveying", 2nd edition, Universities press, 2018

REFERENCES:

1. Arthur R Benton and Philip J Taety, "Elements of Plane Surveying", McGraw Hill – 2000.
2. Arora K R "Surveying Vol 1, 2 & 3), Standard Book House, Delhi, 2004.
3. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain – "Surveying" (Vol – 1, 2 & 3), Laxmi Publications (P) ltd., New Delhi.
4. Chandra A M, "Plane Surveying", New Age International Pvt. Ltd., New Delhi, 2002.
5. Bhavikatti; "Surveying", Vikas publishing house ltd.
6. Duggal S K, "Surveying (Vol – 1 & 2)", Tata McGraw Hill Publishing Co. Ltd. New Delhi, 2004.
7. R. Agor Khanna "Surveying and leveling", Publishers 2015.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Apply triangulation in surveying
- Correlate knowledge to frontiers like Hydrography, Electronic Distance Measurement, Global Positioning System, Photogrammetry and Remote Sensing.
- Identify data collection methods and prepare field notes

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Professional Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	URBAN HYDROLOGY					SEE	70 M

COURSE OBJECTIVES:

- To impart impact of urbanization on catchment hydrology.
- To narrate the importance of rainfall runoff data for urban hydrology.
- To teach techniques for peak flow estimation for storm water drainage system design.
- To explain the design concepts of components in urban drainage systems.
- To Train for preparation of master urban drainage system.

UNIT -I:
Introduction
Urbanization and its effect on water cycle – urban hydrologic cycle – Effect of urbanization on hydrology. **Precipitation Analysis**: Importance of short duration of rainfall and runoff data, methods of estimation of time of concentration and design of urban drainage systems, Intensity-Duration -Frequency (IDF) curves, design storms for urban drainage systems.

Learning Outcomes:
At the end of this unit, the student will be able to

- Define Urbanization and its effects
- Understand basic concepts of hydrological cycle.

UNIT -II:Methods of Urban Drainage

Time of concentration, peak flow estimation approaches, rational method, NRCS curve number approach, runoff quantity and quality, wastewater and storm water reuse, major and minor systems. Drainage systems**:** Open channel, underground drains, appurtenances, pumping, source control.

Learning Outcomes:
At the end of this unit, the student will be able to

- Acquire skills for rainfall data acquisition
- Design of drainage system.

UNIT -III:Analysis and Management

Storm water drainage structures, design of storm water network- Best Management Practices– detention and retention facilities, swales, constructed wetlands, models available for storm water management.

Learning Outcomes:
At the end of this unit, the student will be able to

- Design drainage network scheme.

UNIT -IV:Master drainage plans

Issues – typical urban drainage master plan, interrelation between water resources investigation and urban planning processes, planning objectives, comprehensive planning, use of models in planning.

Learning Outcomes:
At the end of this unit, the student will be able to

- Prepare proper plan for storm water drainage system

UNIT –V:Hydrological models

General principles of hydrological modelling - The Rational Method - The time-area method - The unit hydrograph method - Physically based distributed models - Physically based partially distributed models - Hydraulic modelling - Model calibration and validation - Probabilistic models - Expert systems

Learning Outcomes:
At the end of this unit, the student will be able to

- Develop hydraulic models.

TEXT BOOKS:

1. Akan A.O and R.L. Houghtalen, "Urban Hydrology, Hydraulics and Stormwater Quality: Engineering Applications and Computer Modelling (2006)", Wiley International.
2. Hall M. J., Urban Hydrology (1984), Elsevier Applied Science Publisher.

REFERENCES BOOKS:

1. Geiger W. F., JMarsalek, W. J. Rawls and F. C. Zuidema, "Manual on Drainage in
2. Urbanised area' (1987 – 2 volumes)", Unesco,
3. Wanielista M. P. and Eaglin, Hydrology, "Quantity and Quality Analysis (1997)", Wiley and Sons.
4. Stahre P. and Urbonas B., "Stormwater Detention for Drainage (1990)", Water Quality and CSO Management, Prentice Hall.
5. Maksimovic C. and J. A. Tejada-Guibert, "Frontiers in Urban Water Management", Deadlock or Hope (2001), IWA Publishing.

COURSE OUTCOMES:
At the end of the course the student will be able to

- Develop intensity duration frequency curves for urban drainage systems.
- Develop design storms to size the various components of drainage systems.
- Apply best management practices to manage urban flooding.
- Develop master drainage plan for an urbanized area.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Open Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	EXPERIMENTAL STRESS ANALYSIS					SEE	70 M

COURSE OBJECTIVES:
To bring awareness on experimental method of finding the response of the structure to different types of load.

- Demonstrates principles of experimental approach.
- Teaches regarding the working principles of various strain gauges.
- Throws knowledge on strain rosettes and principles of non destructive testing of concrete.
- Gives an insight into the principles of photo elasticity.

UNIT-I: Principles of experimental approach
Merits of Experimental Analysis - Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods –Simplification of problems.

Learning outcomes:
At the end of the unit, students will be able to:
- Demonstrate the merits and principles of experimental approach
- Give an insight into the uses and advantages of experimental stress analysis

UNIT-II: Strain measurement using strain gauges
Definition of strain and its relation of experimental Determinations Properties of Strain Gauge Systems- Types of Strain Gauges – Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – various types –Gauge factor – Materials of adhesion base.

Learning outcomes:
At the end of the unit, students will be able to:
- Introduce various strain gauge systems and their properties
- Give information regarding the gauge factor and materials of adhesion bases

UNIT-III: Strain rossettes and non – destructive testing of concrete
Introduction – the three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge. Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.

Learning outcomes:
At the end of the unit, students will be able to:
- Introduces various strain rosettes and corrections for strain gauges
- Gives an insight into the destructive and non destructive testing of concrete

UNIT-IV: Theory of photoelasticity
Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster‟s Stress Optic law.

Learning outcomes:
At the end of the unit, students will be able to:
- Introduces stress optic laws.
- Gives the arrangements and working principles of polariscope.

UNIT-V: Two dimensional photoelasticity
Introduction – Iso-chromatic Fringe patterns-Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

Learning outcomes:
At the end of the unit, students will be able to:
- Introduces the understanding of different fringe patterns.
- Introduces model analysis and properties of photo elastic materials.

TEXT BOOKS:
1. J.W.Dally and W.F.Riley, "Experimental stress analysis College House Enterprises"
2. Dr.Sadhu Singh, "Experimental stress analysis", khanna Publishers

REFERENCE BOOKS:
1. U.C.Jindal, "Experimental Stress analysis", Pearson Publications.
2. L.S.Srinath, "Experimental Stress Analysis", MC.Graw Hill Company Publishers.

COURSE OUTCOMES:
After completion of the course
- The student will be able to understand different methods of experimental stress analysis
- The student will be able to understand the use of strain gauges for measurement of strain
- The student will be exposed to different Non destructive methods of concrete
- The student will be able to understand the theory of photo elasticity and its applications in analysis of structures

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Open Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	BUILDING TECHNOLOGY					SEE	70 M

COURSE OBJECTIVES:
- To impart to know different types of buildings, principles and planning of the buildings.
- To identify the termite control measure in buildings, and importance of grouping circulation, lighting and ventilation aspects in buildings.
- To know the different modes of vertical transportation in buildings.
- To know the utilization of prefabricated structural elements in buildings.
- To know the importance of acoustics in planning and designing of buildings.

UNIT-I:
Overview of the course, basic definitions, buildings-types-components- economy and design-principles of planning of buildings and their importance. Definitions and importance of grouping and circulation-lighting and ventilation-consideration of the above aspects during planning of building.

Learning outcomes:
At the end of the unit, students will be able to:
- To be able to plan the building with economy and according to functional requirement.

UNIT-II:
Termite proofing: Inspection-control measures and precautions- lighting protection of buildings-general principles of design of openings-various types of fire protection measures to be considered while panning a building.

Learning outcomes:
At the end of the unit, students will be able to:
- Able to know the termite proofing technique to the building and protection form lightening effects.
- To be able to know the fire protection measure that are to be adopted while planning a building.

UNIT-III:
Vertical transportation in a building: Types of vertical transportation-stairs-different forms of stairs- planning of stairs- other modes of vertical transportation – lifts-ramps-escalators.

Learning outcomes:
At the end of the unit, students will be able to:
- To be able to know the different modes of vertical transportation and their suitability

UNIT-IV:
Prefabrication systems in residential buildings- walls-openings-cupboards-shelves etc., planning and modules and sizes of components in prefabrication. Planning and designing of residential buildings against the earthquake forces, principles, seismic forces and their effect on buildings.

Learning outcomes:
At the end of the unit, students will be able to:
- Identify the adoption of prefabricated elements in the building.

- Know the effect of seismic forces on buildings

UNIT-V:

Acoustics – effect of noise – properties of noise and its measurements, principles of acoustics of building. Sound insulation- importance and measures.

Learning outcomes:

At the end of the unit, students will be able to:

- To know the effect of noise, its measurement and its insulation in planning the buildings

TEXT BOOKS:

1. Varghese, “Building construction”, PHI Learning Private Limited.
2. Punmia.B.C, “Building construction”, Jain.A.K and Jain.A.K Laxmi Publications.
3. S.P.Arora and S.P.Brndra “Building construction”, Dhanpat Rai and Sons Publications,
4. New Delhi
5. “Building construction-Technical teachers training institute”, Madras, Tata McGraw Hill.

REFERENCE BOOKS:

1. National Building Code of India, Bureau of Indian Standards

COURSE OUTCOMES:

After completion of the course the student will be able to

- Understand the principles in planning and design the buildings.
- Know the different methods of termite proofing in buildings.
- Know the different methods of vertical transportation in buildings.
- Know the implementation of prefabricated units in buildings and effect of earthquake on buildings.
- Know the importance of acoustics in planning and designing of buildings.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Open Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	ELECTRICAL ENGINEERING MATERIALS					SEE	70 M

COURSE OBJECTIVES:
To make the students learn about
- Classification of materials.
- Properties of materials and its applications.
- Domestic wiring and earthing

UNIT-I: Conducting Materials
Introduction – classification of materials – Metals and Non metals, physical, thermal, mechanical and electrical properties of materials – classification of electrical materials – concept of atom – electron configuration of atom, conductors, general properties of conductors, factors effecting resistivity of electrical materials –electrical/mechanical/thermal properties of copper, aluminum, iron, steel, lead, tin and their alloys – applications.

Learning outcomes:
At the end of the unit, students will be able to:
- Uunderstand the classification of conducting materials.
- Analyze the properties of different conducting materials
- Apply the materials where it is applicable
- Know about electron configuration of atom

UNIT-II: Dielectric and High Resistivity Materials
Introduction – solid, liquid and gaseous dielectrics, leakage current, permittivity, dielectric constant, dielectric loss – loss angle – loss constant, Breakdown voltage and dielectric strength of– solid, liquid and gaseous dielectrics, effect of break down– electrical and thermal effects, Polarization – electric, ionic and dipolar polarization. Effect of temperature and Frequency on dielectric constant of polar dielectrics. High Resistivity materials – electrical / thermal / mechanical properties of Manganin, Constantan, Nichrome, Tungsten, Carbon and Graphite and their applications in electrical equipment.

Learning outcomes:
At the end of the unit, students will be able to:
- Understand the classification of dielectric and high resistivity materials.
- Analyze the properties of dielectric and high resistivity materials
- Understand about concept of polarization and dipolar polarization
- Apply the materials where it is applicable

UNIT-III: Solid Insulating Materials
Introduction – characteristics of a good electrical insulating materials – classification of insulating materials – electrical, thermal, chemical and mechanical properties of solid insulating materials - Asbestos, Bakelite, rubber, plastics, thermo plastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

Learning outcomes:
At the end of the unit, students will be able to:
- Understand about various characteristics of solid insulating materials.
- Understand the classification of solid insulating materials.
- Analyze the properties of solid insulating materials.

- Apply the materials where it is applicable.

UNIT-IV: Liquid & Gas Insulating Materials

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids – Electrical, thermal and chemical properties – transformer oil – properties – effect of moisture on insulation properties Gaseous insulators – classification based on dielectric strength – dielectric loss, chemical stability properties and their applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the classification of liquid insulating materials.
- Analyze the properties of liquid insulating materials.
- Apply the materials where it is applicable.
- Understand about properties and classification of gaseous insulators.

UNIT-V: Domestic Wiring

Wiring materials and accessories – Types of wiring – Types of Switches - Specification of Wiring – Stair case wiring - Fluorescent lamp wiring- Godown wiring – Basics of Earthing – single phase wiring layout for a residential building.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand about wiring materials and accessories
- Understand about earthing and wiring layout of domestic buildings
- Design and develop Residential wiring
- Know about godown wiring

TEXT BOOKS:

1. G.K. Mithal, "Electrical Engineering Materials", Khanna publishers, 2nd edition, 1991.
2. R.K. Rajput, A course in "Electrical Engineering Materials", Laxmi publications, 2009.

REFERENCE BOOKS:

1. C.S. Indulkar and S. Thiruvengadam, "An Introduction to Electrical Engineering Materials" S Chand & Company, 2008.
2. Technical Teachers Training Institute, "Electrical engineering Materials", 1st Edition, Madras, McGraw Hill Education, 2004.
3. by S.P. Seth, "A course in Electrical Engineering Materials Physics Properties & Applications", Dhanapat Rai & Sons Publications, 2018.

COURSE OUTCOMES:

After completing the course, the student should be able to:

- Understand the classification of materials, domestic wiring materials and earthing.
- Analyze the properties of different electrical materials
- Apply where the materials are applicable based on properties of materials
- Design and develop Residential wiring, godown wiring and earthing,

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Open Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	INTRODUCTION TO HYBRID AND ELECTRICAL VEHICLES					SEE	70 M

COURSE OBJECTIVES:

- Provide good foundation on hybrid and electrical vehicles.
- To address the underlying concepts and methods behind power transmission in hybrid and electrical vehicles.
- Familiarize energy storage systems for electrical and hybrid transportation.
- To design and develop basic schemes of electric vehicles and hybrid electric vehicles.

UNIT I: Electric Vehicle Propulsion and Energy Sources

Introduction to electric vehicles, vehicle mechanics - kinetics and dynamics, roadway fundamentals propulsion system design - force velocity characteristics, calculation of tractive power and energy required, electric vehicle power source - battery capacity, state of charge and discharge, specific energy, specific power, Ragone plot. battery modeling - run time battery model, first principle model, battery management system- soc measurement, battery cell balancing. Traction batteries - nickel metal hydride battery, Li-Ion, Lipolymer battery.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Summaries the concepts of electrical vehicle propulsion and energy sources. (l2)
- Identify the types of power sources for electrical vehicles.(l3)
- Demonstrate the design considerations for propulsion system. (l2)
- Solve the problems on tractive power and energy required. (l3)

UNIT II: Electric Vehicle Power Plant And Drives

Introduction electric vehicle power plants. Induction machines, permanent magnet machines, switch reluctance machines. Power electronic converters-DC/DC converters - buck boost converter, isolated DC/DC converter. Two quadrant chopper and switching modes. AC drives-PWM, current control method. Switch reluctance machine drives - voltage control, current control.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Choose a suitable drive scheme for developing an electric vehicles depending on resources.(l1)
- List the various power electronic converters. (l1)
- Describe the working principle dc/dc converters and buck boost convertor. (l2)
- Explain about ac drives. (l2)

UNIT III: Hybrid And Electric Drive Trains

Introduction hybrid electric vehicles, history and social importance, impact of modern drive trains in energy supplies. Hybrid traction and electric traction. Hybrid and electric drive train topologies. Power flow control and energy efficiency analysis, configuration and control of DC motor drives and induction motor drives, permanent magnet motor drives, switch reluctance motor drives, drive system efficiency.

Learning Outcomes:
After successful completion of this unit, the students will be able to

- Identify the social importance of hybrid vehicles. (l3)
- Discus impact of modern drive trains in energy supplies. (l6)
- Compare hybrid and electric drive trains.(l2)
- Analyze the power flow control and energy efficiency. (l6)

UNIT IV: Electric and Hybrid Vehicles - Case Studies
Parallel hybrid, series hybrid -charge sustaining, charge depleting. Hybrid vehicle case study – Toyota Prius, Honda Insight, Chevrolet Volt. 42 V system for traction applications. Lightly hybridized vehicles and low voltage systems. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid electric heavy duty vehicles, fuel cell heavy duty vehicles.

Learning Outcomes:
After successful completion of this unit, the students will be able to

- List the various electric and hybrid vehicles in the present market. (l1)
- Discus lightly hybridized vehicle and low voltage systems.(l6)
- Explain about hybrid electric heavy duty vehicles and fuel cell heavy duty vehicles. (l2)

UNIT V: Electric And Hybrid Vehicle Design :
Introduction to hybrid vehicle design. Matching the electric machine and the internal combustion engine. Sizing of propulsion motor, power electronics, drive system. Selection of energy storage technology, communications, supporting subsystem. Energy management strategies in hybrid and electric vehicles - energy management strategies- classification, comparison, implementation.

Learning Outcomes:
After successful completion of this unit, the students will be able to

- Illustrate matching the electric machine and the internal combustion engine. (l2)
- Select the energy storage technology. (l3)
- Select the size of propulsion motor. (l3)
- Design and develop basic schemes of electric and hybrid electric vehicles. (l3)

TEXT BOOKS:

1. Iqbal Hussein, "Electric and Hybrid Vehicles: Design Fundamentals", 2nd edition, CRC Press, 2003.
2. Amir Khajepour,M. Saber Fallah,AvestaGoodarzi, "Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach", illustrated edition, John Wiley & Sons, 2014.
3. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, "Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design", CRC Press, 2004.

REFERENCES BOOKS:

1. James Larminie, John Lowry, "Electric Vehicle Technology", Explained, Wiley, 2003.
2. John G. Hayes,G. Abas Goodarzi, "Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles", 1st edition, Wiley-Blackwell, 2018.

COURSE OUTCOMES:
After learning the course the students will be able to:

- Explain the working of hybrid and electric vehicles. (l2)
- Choose a suitable drive scheme for developing an hybrid and electric vehicles depending on resources. (l3)
- Develop the electric propulsion unit and its control for application of electric vehicles.(l3)

- Choose proper energy storage systems for vehicle applications. (I3)
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles.(I3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Open Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	RAPID PROTOTYPING					SEE	70 M

COURSE OBJECTIVES:
- Familiarize techniques for processing of CAD models for rapid prototyping.
- Explain fundamentals of rapid prototyping techniques.
- Demonstrate appropriate tooling for rapid prototyping process.
- Focus Rapid prototyping techniques for reverse engineering.
- Train Various Pre – Processing, Processing and Post Processing errors in RP Processes.

UNIT I:
Introduction: Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.
RP Software: Need for RP software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, SolidView, 3DView, etc., software, Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP.

Learning Outcomes:
At the end of the unit, the student will be able to
- Explain prototyping process. (l2)
- Classify different rapid prototyping processes. (l2)
- Summarize rp software's and represent a 3d model in stl format, other rp data formats.(l2)

UNIT II:
Solid and Liquid Based RP Systems: Stereolithography (SLA): Principle, Process, Materials, Advantages, Limitations and Applications. Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications.
Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications.
Laminated Object Manufacturing (LOM): Principle, Process, Materials, Advantages, Limitations, Applications.

Learning Outcomes:
At the end of the unit, the student will be able to
- Explain the principles, advantages, limitations and applications of Solid and Liquid based AM systems. (L2)
- Identify the materials for Solid and Liquid based AM systems. (L2)

UNIT III:
Powder Based RP Systems: Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS), Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.
Other RP Systems: Three Dimensional Printing(3DP):Principle,Process,Advantages, Limitations and Applications. Ballastic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

Learning Outcomes:
At the end of the unit, the student will be able to

- Explain the principles, advantages, limitations and applications of powder based AM systems. (L2)
- Understand the principles, advantages, limitations and applications of other Additive Manufacturing Systems such as 3D Printing, Ballistic Particle Manufacturing and Shape Deposition Modeling. (L2)

UNIT IV:
Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods.

Reverse Engineering (RE): Meaning, Use, RE – The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Learning Outcomes:
At the end of the unit, the student will be able to

- Classify Rapid Tooling methods. (L2)
- Explain the concepts of reverse engineering and scanning tools. (L2)

UNIT V:
Errors in RP Processes: Pre-processing, processing, post-processing errors, Part building errors in SLA, SLS, etc.

RP Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

Learning Outcomes:
At the end of the unit, the student will be able to

- Identify various Pre – Processing, Processing and Post – Processing errors in RP processes. (L2)
- Apply of RP in engineering design analysis and medical applications. (L3)

TEXT BOOKS:

- Chua C.K., Leong K.F. and Lim C.S., “Rapid Prototyping: Principles and Applications”, 2nd edition, World Scientific Publishers, 2003.
- Ian Gibson, David W. Rosen, Brent Stucker, “Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing”, 1st Edition, Springer, 2010.
- Rafiq Noorani, “Rapid Prototyping: Principles and Applications in Manufacturing”, John Wiley & Sons, 2006.

REFERENCE BOOKS:

- Liou W. Liou, Frank W., Liou, “Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development”, CRC Press, 2007.
- Pham D.T. and Dimov S.S., “Rapid Manufacturing; The Technologies and Application of RPT and Rapid tooling”, Springer, London 2001.
- Gebhardt A., “Rapid prototyping”, Hanser Gardener Publications, 2003.
- Hilton P.D. and Jacobs P.F., “Rapid Tooling: Technologies and Industrial Applications”, CRC Press, 2005.

COURSE OUTCOMES:
At the end of the course, the student will be able to

- Use techniques for processing of CAD models for rapid prototyping. (L3)
- Understand and apply fundamentals of rapid prototyping techniques. ((L3)
- Use appropriate tooling for rapid prototyping process. (L3)
- Use rapid prototyping techniques for reverse engineering. (L3)
- Identify Various Pre – Processing, Processing and Post Processing errors in RP processes. (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs

Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	Analog Electronics					SEE	70 M

COURSE OBJECTIVES:

- To understand the characteristics of various types of electronic devices and circuits (L1).
- To apply various principles of electronic devices and circuits to solve complex Engineering problems (L2).
- To analyze the functions of various types of electronic devices and circuits (L3).
- To evaluate the functions of various types of electronic devices and circuits in real time applications (L3).
- To design various types of electronic circuits for use in real time applications (L4).

UNIT-I:Diodesand Applications

Properties of intrinsic and extrinsic semiconductor materials. Characteristics of PN junction diode and Zener diode. Applications of PNdiode as a switch, rectifier and Zener diode as regulator. Special purpose diodes: Schottky diode, Tunnel diode, Varactor diode, photodiode and LED.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the characteristics of various types of diodes (L1).
- Apply the principles of diodes to solve complex Engineering problems (L2).
- Analyze the functions of diodes in forward and reverse bias conditions (L3).
- Evaluate the functions of diodes in real time applications (L3).
- Design rectifiers and switches using diodes (L4).

UNIT-II:BJT and its Applications

Construction, Operation, and Characteristics in CE, CB and CC configurations. Fixed-Bias and Voltage Divider-Bias. Applications as switch and amplifier.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the characteristics and biasing of BJT (L1).
- Apply the principles of BJT to solve complex Engineering problems (L2).
- Analyse the functions of BJT in various configurations (L3).
- Evaluate the functions of BJT in real time applications (L3).
- Design amplifiers and switches using BJT (L4).

UNIT-III:FETs and Applications

JFETs: Construction, Operation, and Characteristics in CS configurations. Fixed-Bias and Voltage Divider - Bias. Applications as switch and amplifier.

MOSFETs: Construction, Operation, and Characteristics of Enhancement and Depletion modes in CS configurations. Biasing in Enhancement and Depletion modes. Applications as switch.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the characteristics and biasing of FETs (L1).
- Apply the principles of FETsto solve complex Engineering problems (L2).
- Analyze the functions of FETs in CSconfiguration (L3).
- Evaluate the functions of FETs in real time applications (L3).

- Design amplifiers and switches using FETs (L4).

UNIT-IV:Feedback Amplifiers and Oscillators

Feedback Amplifiers: Concept of feedback, General characteristics of negative feedback amplifiers, Voltage-series, Current-series, Voltage-shunt, and Current-shunt feedback amplifiers. **Oscillators:**Conditions for oscillations, Hartley and Colpitts oscillators, RC phase-shift and Wien-bridge oscillators.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of negative & positive feedback and characteristics feedback amplifiers (L1).
- Apply the principles of feedback amplifiers and oscillators to solve complex Engineering problems (L2).
- Analyze the functions of feedback amplifiers and oscillators (L3).
- Evaluate the functions of feedback amplifiers and oscillators in real time applications (L3).
- Design feedback amplifiers and oscillators for specific applications (L4).

UNIT-V:Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits

Wave-Shaping & Multivibrator Circuits: Introduction, Waveform Shaping Circuits –RC and RL Circuits. Clippers, Comparator and Clampers. Bistable, Schmitt Trigger, Monostable and Astable Multivibrators.

Linear Integrated Circuits: Operational Amplifier: Introduction, Block diagram, Basic applications – Inverting, Non-inverting, Summing amplifier, Subtractor, Voltage Follower. IC 555 Timer and IC 7805 Regulator.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the operation of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits (L1).
- Apply the principles of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits to complex Engineering solve problems (L2).
- Analyse the functions of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits (L3).
- Evaluate the functions of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits in real time applications (L3).
- Design Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits for specific applications (L4).

Note: In all the units, only qualitative treatment is required.

TEXT BOOKS:

1. S. Salivahanan and N. Suresh Kumar, “Electronic Devices and Circuits”, 4th Edition, McGraw Hill Education (India) Pvt Ltd., 2017.

REFERENCES BOOKS:

- J. Milliman, Christos C Halkias, and Satyabrata Jit, “Electronics Devices and Circuits”, 4th Edition, McGraw Hill Education (India) Pvt Ltd., 2015.
- David A. Bell “Electronics Devices and Circuits”, 5th Edition, Oxford University Press, 2008.

COURSE OUTCOMES:

At the end of the course, the student should be able to

- Understand the characteristics of various types of electronic devices and circuits

- Apply various principles of electronic devices and circuits to solve complex
- Engineering problems
- Analyse the functions of various types of electronic devices and circuits, Evaluate the functions of various types of electronic devices and circuits in real time applications
- Design various types of electronic circuits for use in real time applications.

Blooms' learning levels:
L1: Remembering and Understanding
L2: Applying
L3: Analyzing/Derive
L4: Evaluating/Design
L5: Creating

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
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Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs

Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	Digital Electronics					SEE	70 M

COURSE OBJECTIVES:

- To introduce different methods for simplifying Boolean expressions
- To analyze logic processes and implement logical operations using combinational logic circuits
- To understand characteristics of memory and their classification.
- To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines
- To understand concept of Programmable Devices

UNIT- I:

Minimization Techniques and Logic Gates Minimization Techniques**:** Boolean postulates and laws – De-Morgan's Theorem - Principle of Duality - Boolean expression - Minimization of Boolean expressions –– Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS)– Karnaugh map Minimization – Don't care conditions – Quine - McCluskey method of minimization. Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates, NAND– NOR implementations – Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics – Tristate gates.

Learning Outcomes:

At the end of the unit, the student should be able to:

- Learn Boolean algebra and logical operations in Boolean algebra. (L1)
- Apply different logic gates to functions and simplify them. (L2)
- Analyze the redundant terms and minimize the expression using Kmaps and tabulation methods (L3)

UNIT- II:

Combinational Circuits -Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/ Demultiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator.

Learning Outcomes:

At the end of the unit, the student should be able to:

- Apply the logic gates and design of combinational circuits(L2)
- Design of different combinational logic circuits(L4)

UNIT -III:

Sequential Circuits-Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Characteristic table and equation –Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor- Asynchronous Ripple or serial counter – Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Down counters – Programmable counters – Design of Synchronous counters: state diagram- State table –State minimization –State assignment - Excitation table and maps-Circuit implementation - Modulo–n counter, Registers – shift registers - Universal shift registers – Shift register counters – Ring counter – Shift counters - Sequence generators.

Learning Outcomes:

At the end of the unit, the student should be able to:

- Understand the clock dependent circuits (L1)

- Identify the differences between clocked and clock less circuits, apply clock dependent circuits(L2)
- Design clock dependent circuits(L4)

UNIT -IV:

Memory Devices Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM – EAPROM, RAM – RAM organization – Write operation – Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell- Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell –Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL

Learning Outcomes:

At the end of the unit, the student should be able to:

- Understand the principle of operation of basic memory devices, and programmable logic devices. (L1)
- Implement combinational logic circuits using memory and programmable logic devices (L2)

UNIT -V:

Synchronous and Asynchronous Sequential Circuits Synchronous Sequential Circuits: General Model – Classification – Design – Use of Algorithmic State Machine – Analysis of Synchronous Sequential Circuits Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits – Incompletely specified State Machines – Problems in Asynchronous Circuits – Design of Hazard Free Switching circuits.

Learning Outcomes:

At the end of the unit, the student should be able to:

- Understand how synchronous and asynchronous sequential circuit works (L1)
- Understand the FSM and its design principles. (L1)
- Analyze the procedure to reduce the internal states in sequential circuits (L3)
- Illustrate minimization of complete and incomplete state machines and to write a minimal cover table(L2)

TEXT BOOKS:

1. M. Morris Mano, “Digital Design”, 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. ZviKohavi, “Switching and Finite Automata Theory”, 3rd Edition, South Asian Edition, 2010,

REFERENCES BOOKS:

1. John F.Wakerly, “Digital Design”, Fourth Edition, Pearson/PHI, 2008
2. John.M Yarbrough, “Digital Logic Applications and Design”, Thomson Learning, 2006.
3. Charles H.Roth. “Fundamentals of Logic Design”, 6th Edition, Thomson Learning, 2013.
4. Donald P.Leach and Albert Paul Malvino, “Digital Principles and Applications”, 6th Edition, TMH, 2006.
5. Thomas L. Floyd, “Digital Fundamentals”, 10th Edition, Pearson Education Inc, 2011
6. Donald D.Givone, “Digital Principles and Design”, TMH, 2003.

COURSE OUTCOMES:

- Explain switching algebra theorems and apply them for logic functions, discuss about digital logic gates and their properties, Identify the importance of SOP and POS canonical forms in the minimization of digital circuits.
- Evaluate functions using various types of minimizing algorithms like Boolean algebra, Karnaugh map or tabulation method.
- Analyze the design procedures of Combinational & sequential logic circuits.
- Design of different combinational logic circuits, and compare different semiconductor memories.

(V Semester Civil Engineering)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	Free and Open Sources Systems					SEE	70 M

COURSE OBJECTIVES:
This course is designed to:

- Understand the context and operation of free and open source software (FOSS) communities and associated software projects.
- Motivate the students to contribute in FOSS projects
- Familiarize with programming languages like Python, Perl, Ruby
- Elucidate the important FOSS tools and techniques

UNIT I: PHILOSOPHY
Notion of Community--Guidelines for effectively working with FOSS community--, Benefits of Community based Software Development --Requirements for being open, free software, open source software –Four degrees of freedom - FOSS Licensing Models - FOSS Licenses – GPL-AGPL-LGPL - FDL - Implications – FOSS examples.

Learning outcomes:
At the end of the unit, students will be able to:

- Analyze the benefits of Community based Software Development. (L4)
- Explain the degrees of Freedom. (L2)

UNIT II: LINUX
Linux Installation and Hardware Configuration – Boot Process-The Linux Loader (LILO) - The Grand Unified Bootloader (GRUB) - Dual-Booting Linux and other Operating System - Boot-Time Kernel Options- X Windows System Configuration-System Administration – Backup and Restore Procedures-Strategies for keeping a Secure Server.

Learning outcomes:
At the end of the unit, students will be able to:

- Demonstrate Linux Installation and hardware configuration. (L2)
- Compare Linux and Windows System Configurations. (L4)

UNIT III: PROGRAMMING LANGUAGES
Programming using languages like Python, Perl, Ruby

Learning outcomes:
At the end of the unit, students will be able to:

- Explain the syntax of programming Languages Python, Perl and Ruby. (L2)
- Develop applications in the Open source programming Languages. (L6)

UNIT IV: PROGRAMMING TOOLS AND TECHNIQUES
Usage of design Tools like Argo UML or equivalent, Version Control Systems like Git or equivalent,
– Bug Tracking Systems- Package Management Systems

Learning outcomes:
At the end of the unit, students will be able to:

- List various programming tools and explain their uses (L1)
- Make use of the various tools while building applications (L3)

UNIT V: FOSS CASE STUDIES
Open Source Software Development - Case Study – Libre office -Samba

Learning outcomes:

At the end of the unit, students will be able to:

- Elaborate the open Source Software Development(L6)
- Compare Libre office with its proprietary equivalent (L5)

TEXT BOOK:

1. Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “Linux in a Nutshell”, Sixth Edition, OReilly Media, 2009.

REFERENCES BOOKS:

1. Philosophy of GNU URL: http://www.gnu.org/philosophy/.
2. Linux Administration URL: http://www.tldp.org/LDP/lame/LAME/linux-admin-made-easy/.
3. The Python Tutorial available at http://docs.python.org/2/tutorial/.
4. Perl Programming book at http://www.perl.org/books/beginning-perl/.
5. Ruby programming book at http://ruby-doc.com/docs/ProgrammingRuby/.
6. Version control system URL: http://git-scm.com/.
7. Samba: URL : http://www.samba.org/.
8. Libre office: http://www.libreoffice.org/.

COURSE OUTCOMES:

Upon completion of the course, the students should be able to:

- Demonstrate Installation and running of open-source operating systems.(L2)
- Justify the importance of Free and Open Source Software projects. (L5)
- Build and adapt one or more Free and Open Source Software packages. (L6)
- Utilize a version control system. (L3)
- Develop software to and interact with Free and Open Source Software development projects.(L3)

(V Semester Civil Engineering)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	COMPUTER GRAPHICS AND MULTIMEDIA ANIMATION					SEE	70 M

COURSE OBJECTIVES:
This course is designed to:

- Introduce the use of the components of a graphics system and become familiar with the building approach of graphics system components and related algorithms.
- Understand the basic principles of 3- 3-dimensional computer graphics.
- Provide insites on how to scan, convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
- Provide an understanding of mapping from world coordinates to device coordinates, clipping, and projections.
- Discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

UNIT I: **OVERVIEW OF COMPUTER GRAPHICS SYSTEM**
Overview of Computer Graphics System – Video display devices – Raster Scan and random scan system – Input devices – Hard copy devices.

Learning outcomes:
At the end of the unit, students will be able to:

- Explain the overview of computer graphics with visualization. (L2)
- Classify the Input devices. (L2)
- Distinguish raster scan and random scan systems. (L4)

UNIT II:OUTPUT PRIMITIVES AND ATTRIBUTES
Drawing line, circle and ellipse generating algorithms – Scan line algorithm – Character Generation – attributes of lines, curves and characters – Antialiasing.

Learning outcomes:
At the end of the unit, students will be able to:

- Analyse output primitives and attributes. (L4)
- Design algorithms based on output. (L6)

UNIT III: TWO-DIMENSIONAL GRAPHICS TRANSFORMATIONS AND VIEWING:
Two-dimensional Geometric Transformations – Windowing and Clipping – Clipping of lines and clipping of polygons.

Learning outcomes:
At the end of the unit, students will be able to:

- Create two-dimensional graphics. (L6)
- Examine the clipping of polygon. (L4)
- Compare different forms of variations. (L2)

UNIT IV:THREE-DIMENSIONAL GRAPHICS AND VIEWING
Three-dimensional concepts – Object representations- Polygon table, Quadric surfaces, Splines, Bezier curves and surfaces – Geometric and Modelling transformations – Viewing - Parallel and perspective projections.

Learning outcomes:

At the end of the unit, students will be able to:

- Create three-dimensional graphics. (L6)
- Explain the Quadric surfaces and polygon table. (L2)
- Define modelling transformations. (L1)

UNIT V:REMOVAL OF HIDDEN SURFACES

Visible Surface Detection Methods – Computer Animation.

Learning outcomes:

At the end of the unit, students will be able to:

- List the different types of detection methods. (L1)
- Compare various computer animations. (L2)

TEXTBOOK:

1. Hearn, D. and Pauline Baker,M., Computer Graphics (C-Version), 2nd Edition, Pearson Education, 2002.

REFERENCES BOOKS:

1. Neuman, W.M., and Sproull, R.F., Principles of Interactive Computer Graphics, Mc Graw Hill Book Co., 1979.
2. Roger, D.F., Procedural elements for Computer Graphics, Mc Graw Hill Book Co., 1985.
3. Asthana, R.G.S and Sinha, N.K., Computer Graphics, New Age Int. Pub. (P) Ltd., 1996.
4. Floey, J.D., Van Dam, A, Feiner, S.K. and Hughes, J.F, Computer Graphics, Pearson Education, 2001.

COURSE OUTCOMES:

Upon completion of the course, the students should be able to:

- Explain the basic concepts used in computer graphics. (L2)
- Inspect various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping. (L4)
- Assess the importance of viewing and projections. (L5)
- Define the fundamentals of animation, virtual reality and its related technologies. (L3)
- Analyze the typical graphics pipeline (L4)

(V Semester Civil Engineering)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	BREWING TECHNOLOGY					SEE	70 M

PREAMBLE
This course covers the origin of brewing and ingredients used, methods and equipment used and innovations in this field.

COURSE OBJECTIVES

- To understand the Beer manufacturing, ingredients and their roles.
- To understand overall view of a brewing industry

UNIT – I:
Introduction of brewing, history of brewing; Raw materials: barley, hops, water, yeast; Adjuncts for beer production: Maize, rice, millet, wheat, sugar etc. Malt production, role of enzymes for malting; Barley storage, steeping, germination, kilning, cooling, storage;

Learning Outcomes:
At the end of the unit, the student should be able to:

- Introduction of brewing, history of brewing
- Raw materials like barley, hops, water, yeast
- Adjuncts for beer production: Maize, rice, millet, wheat, sugar etc
- Malt production, role of enzymes for malting
- Barley storage, steeping, germination, kilning, cooling, storage

UNIT – II:
Malt from other cereals, caramel malt, roasted malt, smoked malt, malt extract; Malt quality evaluation, Wort production, malt milling, Mashing, Mashing vessels; Wort boiling, clarification, cooling and aeration Enzyme properties, starch degradation, b-glucan degradation; Conversion of fatty matter, Biological acidification

Learning Outcomes:
At the end of the unit, the student should be able to:

- Malt from other cereals, caramel malt, roasted malt, smoked malt, malt extract
- Malt quality evaluation, Wort production, malt milling, Mashing, Mashing vessels
- Wort boiling, clarification, cooling and aeration Enzyme properties, starch degradation, b-glucan degradation
- Conversion of fatty matter, Biological acidification

UNIT – III:
Beer production methods, fermentation technology, changes during fermentation; Filtration procedure and equipment, beer stabilization conditions and durations, beer carbonation process; Packaging equipment and packaging materials, storage conditions and distribution process

Learning Outcomes:
At the end of the unit, the student should be able to:

- Beer production methods, fermentation technology, changes during fermentation
- Filtration procedure and equipment, beer stabilization conditions and durations, beer carbonation process

- Packaging equipment and packaging materials, storage conditions and distribution process

UNIT – IV:
Brewing Equipment. Grain mill, kettles, siphons, carboys, fermentation equipment, wort chillers, pumps beer bottles, cans, labels, bottle caps, sanitation equipments Preventive Production of beer against technology, ling phenomenon of beer, possible measures against staling reactions, oxidation

Learning Outcomes:
At the end of the unit, the student should be able to:
- Brewing Equipments like Grain mill, kettles, siphons, carboys, fermentation equipment, wort chillers
- pumps beer bottles, cans, labels, bottle caps, sanitation equipments
- Preventive Production of beer against technology, ling phenomenon of beer, possible measures against staling reactions, oxidation

UNIT – V:
Recent advances: Immobilized Cell Technology in Beer Production, immobilized yeast cell technology Energy management in the brewery and maltings; waste water treatment Automation and plant planning

Learning Outcomes:
At the end of the unit, the student should be able to:
- Immobilized Cell Technology in Beer Production, immobilized yeast cell technology
- Energy management in the brewery and maltings
- waste water treatment Automation and plant planning

TEXT BOOKS:

1. Brewing: “Science and Practice, Brookes and Roger Stevens”, Dennis E. Briggs, Chris A. Boulton, Peter A. 2004, Woodhead publishing limited.
2. Die Deutsche “Bibliothek Technology: “Brewing and Malting”, Wolfgang Kunze. 2010, Bibliographic information published

REFERENCES:

1. “Handbook of Brewing”: Process, Technology, Markets, Hans Michael Eblinger. 2009, Wiley-VCH Verlag GmbH & Co.
2. Brewing: “New Technologies”, Charles W. Bamforth. 2006, Woodhead Pub.

COURSE OUTCOMES:
By the end of this course, students will attain the:
- Knowledge of beer making, chemistry of ingredients used for brewing,
- Knowledge on brewing industry, Unit operations and equipments involved.

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Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	COMPUTER APPLICATIONS IN FOOD TECHNOLOGY					SEE	70 M

PREAMBLE
This course covers all facets of computerization and various software's used and their usage.

COURSE OBJECTIVES:

- Able to know about "The necessity of Software & their applications in Food Industries"
- Able to Implement the Programs in 'C' to perform various operations that are related to Food Industries.

UNIT – I:
Computerization, Importance of Computerization in food industry and IT applications in food industries. Computer operating environments and information system for various types of food industries. Introduction to Bar charts and Pie charts & the procedure to develop bar charts and pie charts on given Data.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Computerization, Importance of Computerization in food industry and IT applications in food industries.
- Computer operating environments and information system for various types of food industries.
- Introduction to Barcharts and Piecharts& the procedure to develop barcharts and piecharts on given Data.

UNIT – II:
Introduction to Software & Programming Languages, Properties, Differences of an Algorithm and Flowcharts, Advantages and disadvantages of Flowcharts & Algorithms. Introduction, Fundamentals & advantages of 'C'. Steps in learning 'C' (Character set, Identifiers, Keywords) Steps in learning 'C' (Data types, Constants, Variables, Escape sequences).

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Introduction to Software & Programming Languages, Properties, Differences of an Algorithm and Flowcharts
- Advantages and disadvantages of Flowcharts & Algorithms. Introduction, Fundamentals & advantages of 'C'.
- Steps in learning 'C' (Character set, Identifiers, Keywords)
- Steps in learning 'C' (Data types, Constants, Variables, Escape sequences).

UNIT – III:
Steps in learning 'C' (Operators, Statements) Steps in learning 'C' (Header Files, Input & Output functions: Formatted I/O functions, Unformatted I/O functions). Basic Structure of a simple 'C' program. Decision Making/Control Statements. Branching, Concept of Looping & Looping statements.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Steps in learning 'C' (Operators, Statements)
- Steps in learning 'C' (Header Files, Input & Output functions: Formatted I/O functions, Unformatted I/O functions).
- Basic Structure of a simple 'C' program. Decision Making/Control Statements.
- Branching, Concept of Looping & Looping statements.

UNIT – IV:
Concept of Functions (Defining a function & Function Prototypes, Types of functions: Library functions & User defined functions. Concept of various types of User Defined Functions (i.e., About 4 types). Concept of Arrays & Types of Arrays (Single, Double and Multi-Dimensional Arrays). Concept of a String Library Functions.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Concept of Functions (Defining a function & Function Prototypes, Types of functions: Library functions & User defined functions.
- Concept of various types of User Defined Functions (i.e., About 4 types).
- Concept of Arrays & Types of Arrays (Single, Double and Multi-Dimensional Arrays).
- Concept of a String Library Functions.

UNIT – V:
Concept of Pointers, Structures & Unions. Introduction to Data Structures, Types of Data Structures (Primary & Secondary Data Structures) Concept of Linked Lists, Types of Linked Lists & Basic operations on linked Lists. Concept of Stacks & Operations on Stacks (PUSH & POP Operations) Concept of Queues and types of Queues Operations on a Queue (ENQUEUE & DEQUEUE Operations)

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Concept of Pointers, Structures & Unions. Introduction to Data Structures, Types of Data Structures (Primary & Secondary Data Structures)
- Concept of Linked Lists, Types of Linked Lists & Basic operations on linked Lists.
- Concept of Stacks & Operations on Stacks (PUSH & POP Operations)
- Concept of Queues and types of Queues Operations on a Queue (ENQUEUE & Dequeue Operations)

TEXT BOOKS

1. YeswanthKanethkar, Let us 'C'
2. Balaguruswamy E., "Computer Programming in 'C'"
3. Mark Allen Waise , "Data Structures"

REFERENCES

1. M. S Excel 2000, Microsoft Corporation
2. M. S. Office – Microsoft Corporation
3. Verton M.V. "Computer concepts for Agri Business", AVI Pub. Corp., West Port, USA.

COURSE OUTCOMES:
By the end of the course, the students will be able to

- know about the various steps which are related to computer and Software and their application in Food Industries
- know about the various steps which are necessary to implement the programs in 'C'

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Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	OPTIMIZATION TECHNIQUES					SEE	70 M

COURSE OBJECTIVES:
The student will be able to learn:

- The basic concepts of Optimization
- The emphasis of this course is on different classical Optimization techniques linear programming and simplex algorithms.
- About optimality of balanced transportation Problems
- About Constrained and unconstrained nonlinear programming.
- About principle of optimality and dynamic programming

UNIT – I: Introduction and Classical Optimization Techniques
Statement of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Classical Optimization Techniques: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions – Numerical examples.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- To know how to formulate statement of optimization problem with or without constraints
- To know about classification of single and multivariable optimization problems
- To know about necessary and sufficient conditions in defining the optimization problems
- To understand how to formulate Kuhn-Tucker conditions and to solve numerical problems

UNIT – II: Linear Programming
Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm – Numerical examples.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- To know about formulation of LPP
- To know about formulations of GPP
- To understand various theorems in solving simultaneous equations
- To understand about necessity of Simplex method and to solve numerical problems

UNIT – III: Nonlinear Programming – One Dimensional Minimization methods
Introduction, Unimodal function, Elimination methods- Unrestricted Search, Exhaustive Search, Dichotomous Search, Fibonacci Method, Golden Section Method and their comparison; Interpolation

methods - Quadratic Interpolation Method, Cubic Interpolation Method and Direct Root Methods – Numerical examples.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- To know about NLP in one dimensional optimization problems
- To understand about various search methods
- To learn about various interpolation methods
- To distinguish and compare the various elimination methods with numerical examples

UNIT – IV: Unconstrained & Constrained Nonlinear Programming
Unconstrained Optimization Techniques: Introduction- Classification of Unconstrained Minimization Methods, General Approach, Rate of Convergence, Scaling of Design Variables; Direct Search methods- Random Search Methods, Grid Search Method, Pattern Directions, Powell's Method and Simplex Method
Constrained Optimization Techniques: Introduction, Characteristics of a Constrained Problem, Direct Search Methods - Random Search Methods, Basic Approach in the Methods of Feasible Directions, Rosen's Gradient Projection Method, Generalized Reduced Gradient Method and Sequential Quadratic Programming.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- To distinguish between unconstrained and constrained optimization problems
- To learn about direct search methods in unconstrained NLP problems and comparison
- To understand about direct search methods in constrained NLP problems and comparison
- To do exercises for solving numerical examples of various methods

UNIT – V: Dynamic Programming
Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution
– Numerical examples.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- To know what is DP problem?
- To know about computational procedure in solving DPP
- To know Calculus and Tabular methods of solving with numerical examples of various methods

TEXT BOOKS:

1. S. S. Rao, "Engineering optimization": Theory and practice 3rd edition, New Age International (P) Limited, 1998.
2. H.S. Kasana& K.D. Kumar, "Introductory Operations Research Springer (India)", 2004.

REFERENCES:

1. R Fletcher, "Practical Methods of Optimization" , 2nd Edition, Wiley Publishers, 2000.
2. Jorge Nocedal and Wright S, "Numerical Optimization Springer", 1st Edition, 1999.
3. by K.V. Mital and C. Mohan, "Optimization Methods in Operations Research and systems Analysis" 3rd Edition, New Age International (P) Limited, 1996.
4. by S.D. Sharma, "Operations Research", Kedar Nath, 2012.
5. by H.A. Taha, "Operations Research", 9th Edition, An Introduction Pearson, 2010.
6. G. Hadley, "Linear Programming", Narosa, 2002.

COURSE OUTCOMES:

The student gets thorough knowledge on:

- Basic methods, principles in optimization
- Formulation of optimization models, solution methods in optimization
- Finding initial basic feasible solutions.
- Methods of linear and non-linear (constrained and unconstrained) programming.
- Applications to engineering problems.

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Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:		2	1	0	3	CIA	30 M
Course Title	:	TECHNICAL COMMUNICATION AND PRESENTATION SKILLS					SEE	70 M

COURSE OBJECTIVES:

- To develop awareness in students of the relevance and importance of technical communication and presentation skills.
- To prepare the students for placements
- To sensitize the students to the appropriate use of non-verbal communication
- To train students to use language appropriately for presentations and interviews
- To enhance the documentation skills of the students with emphasis on formal and informal writing

UNIT -I:Basics of Technical Communication
Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication - LSRW Skills– Barriers to effective communication

Learning Outcomes:
At the end of the module, the learners will be able to

- Understand the importance of LSRW skills
- Identify and overcome the barriers to effective communication
- Realize the need and importance of technical communication

UNIT -II: Informal and Formal Conversation
Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

Learning Outcomes:
At the end of the module, the learners will be able to

- State the difference between formal and informal conversation.
- Apply the knowledge of the difference between the verbal and non-verbal communication
- Evaluate the different aspects of non-verbal communication.

UNIT -III: Written communication
Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication- Art of condensation- summarizing and paraphrasing

Learning Outcomes:
At the end of the module, the learners will be able to

- Know the difference between written and spoken communication
- Apply the awareness of features of effective writing.
- Implement the understanding of summarizing and paraphrasing.

UNIT -IV: Presentation Skills
Nature and importance of oral presentation – Defining the purpose – Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing the presentation –Individual and group presentations - Handling stage fright

Learning Outcomes:
At the end of the module, the learners will be able to

- State the importance of presentation skills in corporate climate.
- Analyze the demography of the audience.
- Plan, prepare and present individual and group presentations.

UNIT -V: Interview Skills
The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

Learning Outcomes:
At the end of the module, the learners will be able to

- Identify the characteristics of the job interview.
- Understand the process of Interviews.
- Develop a positive image using strategies in answering FAQs in interviews

TEXT BOOKS:

1. Ashrif Rizvi, "Effective Technical Communication",TataMcGrahill, 2011
2. Meenakshi Raman &Sangeeta Sharma, "Technical Communication", 3rd Edition, O U Press 2015

REFERENCES:

1. Pushpalatha& Sanjay Kumar, "Communication Skills", Oxford Univsesity Press
2. Barron's/Books on TOEFL/GRE/GMAT/CAT/IELTS DELTA/Cambridge University Press.2012.
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications, 2011.
4. Universities Press (India) Pvt Ltd., "Management Shapers Series", Himayatnagar, Hyderabad 2008.
5. John Hughes & Andrew Mallett, "Successful Presentations" Oxford.
6. Edgar Thorpe and Showick Thorpe, "Winning at Interviews" Pearson
7. Munish Bhargava, "Winning Resumes and Successful Interviews", McGraw Hill

COURSE OUTCOMES:

- Understand the importance of effective technical communication
- Apply the knowledge of basic skills to become good orators
- Analyze non-verbal language suitable to different situations in professional life
- Evaluate different kinds of methods used for effective presentations
- Create trust among people and develop employability skills

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			L	T	P	C		
Course Category	:	Practical	L	T	P	C	Exam	3 Hrs
Course Code	:		0	0	3	3	CIA	30 M
Course Title	:	COMPUTER AIDED CIVIL ENGINEERING DRAWING					SEE	70 M

COURSE OBJECTIVES:

- To make the student prepare engineering drawings conventionally involving various design parameters.
- To introduce fundamentals of computer aided drawing in Civil Engineering.
- To enable the student develop drawing of building components
- To train the student in Producing 2D & 3D drawings
- To enable the students Communicate designs graphically
- To teach methodologies for understanding and verification of CAD

UNIT -I: Introduction to drawing

Introduction to Civil Engineering drawings, Interpretation of typical drawings, Scales – Elements of a building drawing – Plan, Section and Elevation from the given line drawing/Site plan/floor plan of residential and public buildings. Introduction to computer aided drawing, co-ordinate systems, and reference planes. Commands: Initial settings, Drawing commands, Modify commands

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand basic terms plan section and elevation in drawing
- Introduce computer applications in developing drawing skills

UNIT –II: Sign conventions and symbols:

Layers and Annotations in AUTOCAD, Conventional signs – Materials, Architecture, Structure, Electrical and Plumbing, Rebar drawings, Brick Bonds – Header, Stretcher, English and Flemish, one and half, two and two and half brick walls. Doors and Windows

Learning Outcomes:

At the end of this unit, the student will be able to

- Acquaint with AUTOCAD software
- Identify sign conventions and symbols used in civil engineering drawing.

UNIT –III: Introduction to Building Planning

Development of 2D wireframe models in AUTOCAD

Introduction, terminology, Objectives of building bye-laws, Principles under laying building bye laws. Classification of buildings, Open space requirements. Floor area ratio, Floor space index, built up area limitations. Lighting and ventilation requirements.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand building bye-laws
- Understand planning the components of building and standard dimensions.

UNIT –IV: Basics of a building drawing

Elements of planning building drawing, Methods of line and detailed drawing. Site plan, floor plan, elevation and section, drawing of residential buildings. Foundation details.

Learning Outcomes:
At the end of this unit, the student will be able to

- Draw various views of building.
- Develop floor plan, elevation and section

UNIT –V: Pictorial View
Principles of isometrics and perspective view of building.Fundamentals of Building Information Modeling (BIM) using Revit Architecture. Introduction to Revit architecture software tools; Detailed planning of structural components, walls, floors, ceiling, roof, stairs; modify tools; structural modelling, column and beam system, foundations.

Learning Outcomes:
At the end of this unit, the student will be able to

- Understand basic principles of BIM
- Draw the detailed structural elements and visualize.

List of Drawing Experiments:

1. Sign conventions and symbols
2. Masonry bonds
3. Doors and windows
4. Buildings with load bearing walls including details of doors and windows.
5. Taking standard drawings of a typical two storied building including all MEP.
6. Joinery, re-bars, finishing and other details and writing out a description of the RCC framed structures
7. Reinforcement drawings for typical slabs,
8. Reinforcement drawings for typical beams,
9. Reinforcement drawings for typical columns
10. Reinforcement drawings for typical spread footings.
11. Industrial buildings - North light roof structures - Trusses
12. Perspective view of one and two storey buildings

TEXT BOOKS:

1. Subhash C Sharma &Gurucharan Singh (2005), "Civil Engineering Drawing", Standard Publishers
2. Ajeet Singh (2002), "Working with AUTOCAD 2000 with updates on AUTOCAD 200I", Tata- Mc Graw-Hill Company Limited, New Delhi
3. N. Kumara Swamy, A. Kameswara Rao "Building Planning and Drawing"

REFERENCES:

1. Balagopal and Prabhu (1987), "Building Drawing and Detailing", Spades publishing KDR building, Calicut, (Corresponding set of) CAD Software Theory and User Manuals.
2. Sikka, V.B. (2013), "A Course in Civil Engineering Drawing", S. K. Kataria& Sons,
3. Sham Tickoo Swapna D (2009), "AUTOCAD for Engineers and Designers", Pearson Education
4. Venugopal (2007), "Engineering Drawing and Graphics + AUTOCAD", New Age International Pvt. Ltd.,
5. Nawari&Kuenstle,Building "Information Modeling (BIM): A framework for Structural

Design", CRC press ISBN-13: 978-1482240436, ISBN-10: 1482240432, CRC Press, Taylor and Francis Group. http://www.crcpress.com/; spring 2015. By N. Nawari& M. Kuenstle.

6. Eastman BIM Handbook: "A Guide to Building Information Modeling for Owners, Managers, Designers, Engineers and Contractors".

COURSE OUTCOMES:

At The end of the course the student will be able to

- Develop drawing skills for effective demonstration of building details.
- Draw building plans using Computer Aided Design and Drafting software's.
- Develop engineering project drawings incorporating details and design parameters in 2D & 3D.
- Examine efficacy of CAD design.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Practical	L	T	P	C	Exam	3 Hrs
Course Code	:		0	0	0	3	CIA	30 M
Course Title	:	ENVIRONMENTAL ENGINEERING LAB					SEE	70 M

OBJECTIVE: The object of the course is to enable the students to identify the characteristics of water sample.

LABORATORY EXPERIMENTS

1. Determination of pH and Electrical Conductivity (Salinity) of Water and Soil.
2. Determination and estimation of Total Hardness–Calcium & Magnesium.
3. Determination of Alkalinity/Acidity
4. Determination of Chlorides in water and soil
5. Determination and Estimation of total solids, organic solids and inorganic solids and settleable solids by Imhoff Cone.
6. Determination of Iron.
7. Determination of Dissolved Oxygen with D.O. Meter &Wrinklers Method and B.O.D.
8. Determination of N, P, K values in solid waste
9. Physical parameters – Temperature, Colour, Odour, Turbidity, Taste.
10. Determination of C.O.D.
11. Determination of Optimum coagulant dose.
12. Determination of Chlorine demand.
13. Presumptive Coliform test.

TEXT BOOKS:

1. G. S. Birdi “Water supply and sanitary Engineering”, Dhanpat Rai & Sons Publishers.
2. Peavy, H.S, Rowe, D. R. Tchobanoglous, “Environmental Engineering”, Mc-Graw –Hill International Editions, New York 1985.

REFERENCES:

1. B.C. Punmia, Ashok Jain & Arun Jain, “Water Supply Engineering, Vol. 1, Waste water Engineering, Vol. II”, Laxmi Publications Pvt. Ltd, New Delhi.
2. MetCalf and Eddy. “Wastewater Engineering, Treatment, Disposal and Reuse”, Tata McGraw-Hill, New Delhi.
3. S. M. Patil, “Plumbing Engineering. Theory, Design and Practice”,1999.
4. K. N. Duggal, “Elements of environmental engineering”, S. Chand Publishers.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

- Understand about quality of water and purification process
- Select appropriate technique for treatment of waste water.
- Assess the impact of air pollution
- Understand consequences of solid waste and its management.
- Design domestic plumbing systems.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Practical	L	T	P	C	Exam	3 Hrs
Course Code	:		0	0	2	2	CIA	30 M
Course Title	:	ENGINEERING GEOLOGY LAB					SEE	70 M

OBJECTIVE: The object of the course is to enable the students to identify the physical characteristics various rocks.

LABORATORY EXPERIMENTS

1. Physical properties of minerals: Mega-scopic identification of Rock forming minerals – Quartz group, Feldspar group,
2. Identification of Rock forming minerals Garnet group, Mica group
3. Physical properties of minerals: Mega-scopic identification of Talc, Chlorite, Olivine, Kyanite, Asbestos, Tourmelene, Calcite, Gypsum, etc…
4. Physical properties of minerals: Mega-scopic identification of Ore forming minerals – Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc…
5. Megascopic description and identification of Igneous rocks – Types of Granite, Pegmatite, Gabbro, Dolerite, Syenite, Granite Poryphery, Basalt, etc…
6. Megascopic description and identification of Sedimentary rocks – Sand stone, Ferrugineous sand stone, Lime stone, Shale, Laterite, Conglamorate, etc…
7. Megascopic description and identification of Metamorphic rocks – Biotite – Granite Gneiss, Slate, Muscovite &Biotiteschist, Marble, Khondalite, etc…
8. Interpretation and drawing of sections for geological maps showing tilted beds
9. Interpretation and drawing of sections for geological maps showing faults,
10. Interpretation and drawing of sections for geological maps showing unconformities etc.
11. Simple Structural Geology problems.
12. Strength of the rock using laboratory tests.

COURSE OUTCOMES: At the end of the course the students will be able to classify various types of rocks, their properties and they will be familiar with interpretation of geological maps.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Practical	L	T	P	C	Exam	3 Hrs
Course Code	:		2	1	0	3	CIA	50 M
Course Title	:	SOCIALLY RELEVANT PROJECT					SEE	00 M

Socially Relevant Project in 5th Semester

a) Water quality analysis in a village /town

b) Survey camp

c) Road safety Audit

d) Environmental impact Audit

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(V Semester Civil Engineering)

Course Category	:	Practical	L	T	P	C	Exam	3 Hrs
Course Code	:		2	1	0	3	CIA	30 M
Course Title	:	MANDATORY COURSE: CONSTITUTION OF INDIA					SEE	00 M

COURSE OBJECTIVES:
The objective of this course is

- To Enable the student to understand the importance of constitution
- To understand the structure of executive, legislature and judiciary
- To understand philosophy of fundamental rights and duties
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
- To understand the central-state relation in financial and administrative control

UNIT-I:
Introduction to Indian Constitution – Constitution -Meaning of the term - Indian Constitution-Sources and constitutional history - Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy.

Learning Outcomes:
After completion of this unit student will

- Understand the concept of Indian constitution
- Apply the knowledge on directive principle of state policy
- Analyze the History and features of Indian constitution
- Learn about Preamble, Fundamental Rights and Duties

UNIT-II:
Union Government and its Administration Structure of the Indian Union - Federalism - Centre-State relationship – President's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions

Learning Outcomes:
After completion of this unit student will

- Understand the structure of Indian government
- Differentiate between the state and central government
- Explain the role of President and Prime Minister
- Know the Structure of supreme court and High court

UNIT-III:
State Government and its Administration - Governor - Role and Position -CM and Council of ministers - State Secretariat-Organization Structure and Functions

Learning Outcomes:
After completion of this unit student will

- Understand the structure of state government
- Analyze the role of Governor and Chief Minister
- Explain the role of State Secretariat

- Differentiate between structure and functions of state secretariat

UNIT-IV:
Local Administration - District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj - Functions– PRI –Zilla Parishath - Elected officials and their roles – CEO,ZillaParishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy

Learning Outcomes:
After completion of this unit student will

- Understand the local Administration
- Compare and contrast district administration's role and importance
- Analyze the role of Mayor and elected representatives of Municipalities
- Learn about the role ofZillaParishath block level organization

UNIT-V:
Election Commission - Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women

Learning Outcomes:
After completion of this unit student will

- Know the role of Election Commission
- Contrast and compare the role of Chief Election commissioner and Commissionerate
- Analyze the role of state election commission
- Evaluate various commissions viz SC/ST/OBC and women

TEXT BOOKS:

1. Durga Das Basu, " Introduction to the Constitution of India", Prentice – Hall of India Pvt. Ltd.. New Delhi
2. Subash Kashyap, "Indian Constitution", National Book Trust

REFERENCES:

1. J.A. Siwach, "Dynamics of Indian Government & Politics".
2. H.M.Sreevai, "Constitutional Law of India", 4th edition in 3 volumes (Universal Law Publication)
3. J.C. Johari, "Indian Government and Politics", Hans India
4. M.V. Pylee, "Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice", Hall of India Pvt. Ltd.. New Delhi

COURSE OUTCOMES:
At the end of the course, students will be able to

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government ie., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government

- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

E-RESOURCES:

1.nptel.ac.in/courses/109104074/8 2.nptel.ac.in/courses/109104045/
3.nptel.ac.in/courses/101104065/
4.www.hss.iitb.ac.in/en/lecture-details
5.www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution

B.TECH - VI SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:		2	1	0	3	CIA	30 M
Course Title	:	GEOTECHNICAL ENGINEERING -I					SEE	70 M

COURSE OBJECTIVES:
The objective of this course is:

- To enable the student to find out the index properties of the soil and classify it.
- To enable the student to determine permeability of soils using various methods.
- To impart the concept of seepage of water through soils and determine the seepage discharge.
- To enable the students to differentiate between compaction and consolidation of soils and to determine the consolidation settlement.
- To impart knowledge on soil exploration.
- To teach slope stability and safety assessment of earth retaining structures.
- To impart knowledge on bearing capacity and settlement of shallow foundations.
- To throw light on pile and well foundation designs.

UNIT I:INTRODUCTION
Soil formation – soil structure – Adsorbed water – Mass- volume relationship – Relative density. Index Properties Of Soils: Moisture Content, Specific Gravity, In-situ density, Grain size analysis – Sieve and Hydrometer methods – consistency limits and indices – I.S. Classification of soils.

Learning Outcomes:
After completion of this unit student will

- Understand the characteristics of soils
- Assess relationships between different parameters
- Determine soil properties
- Determine Liquid, Shrinkage and Plasticity Limits
- Characterize and classify soils based on different limits.

UNIT II:
PERMEABILITY: Soil water – capillary rise – flow of water through soils – Darcy's law-permeability – Factors affecting – laboratory determination of coefficient of permeability – Permeability of layered systems.
SEEPAGE THROUGH SOILS: Total, neutral and effective stresses –quick sand condition – Seepage through soils – Flow nets : Characteristics and Uses.

Learning Outcomes:
After completion of this unit student will

- Determine the permeability of soils and stratified soils.
- Explain factors effecting permeability
- Estimate the rate of seepage using flow net

UNIT III: STRESS DISTRIBUTION IN SOILS
Boussinesq's and Wester guard's theories for point loads and areas of different shapes – Newmark's influence chart . Compaction: Mechanism of compaction – factors affecting – effects of compaction on soil properties. – Field compaction Equipment – compaction control.

Learning Outcomes:
After completion of this unit student will

- Compute stresses in soils under various loading conditions.
- Explain compaction of soils
- Compaction control can be understand.

UNIT IV:CONSOLIDATION
Types of compressibility – Immediate Settlement, primary consolidation and secondary consolidation - stress history of clay; e-p and e-log p curves – normally consolidated soil, over consolidated soil and under consolidated soil – pre-consolidation pressure and its determination – Terzaghi's 1-D consolidation theory – coefficient of consolidation: square root time and logarithm of time fitting methods.

Learning Outcomes:
After completion of this unit student will

- Understand the consolidations and settlement of soils.
- Differentiate compaction and consolidation
- Assessment of final settlements of soil
- Differentiate primary and secondary consolidation

UNIT V:SHEAR STRENGTH OF SOILS
Importance of shear strength – Mohr's– Coulomb Failure theories – Types of laboratory tests for strength parameters – strength tests based on drainage conditions – strength envelops.

Learning Outcomes:
After completion of this unit student will

- Can able to determine the shear strength of the soil.
- To understand the various shear tests based on drainage conditions.

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TEXT BOOKS:

1. Alam Singh and Chowdhary G. R., "Soil Engineering in Theory and Practice, Volume-2, Geotechnical testing and instrumentation", CBS Publishers and Distributors, New Delhi, 2006.
2. Dunnicliff J., and Green, G. E., "Geotechnical Instrumentation for Monitoring Field Performance", John Wiley, 1993.
3. Purushotham Raj -2013-"Soil Mechanics and foundation engineering" – 2nd edition, Pearson Publishers.

REFERENCES:

1. Bowles J. E., "Foundation Analysis and Design", 5th Edition, The McGraw-Hill companies, Inc., New York, 1995.
2. C. Venkataramiah, "Geotechnical Engineering", New age International Pvt . Ltd, (2002).
3. Hanna T. H., "Field Instrumentation in Geotechnical Engineering", Trans Tech., 1985.
4. Hunt R. E., "Geotechnical Engineering Investigation Manual", McGraw Hill, 1984.

COURSE OUTCOMES:
On completion of the course, the students will be able to:

- Classify various types of soils using USCS and IS classification methods
- Understand the behavior of coarse grained and fine grained soils.
- Design earth dams using different methods.

- Calculate the stress distribution in foundations.
- Know the field Compaction control.
- Determination of settlement of foundations.
- Calculate the shear strength of soil under different drainage conditions.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:		2	1	0	3	CIA	30 M
Course Title	:	DESIGN OF STEEL STRUCTURES					SEE	70 M

COURSE OBJECTIVES:

- To teach different types of Connections and relevant IS code provision.
- To impart with design procedures of beams and columns.
- To enable Design of truss elements
- To enable design of column bases
- To teach design and Plate and Gantry Girders with curtailment of flanges.

UNIT -I:Connections

Bolted connections – Bolt value, Welded connections: Advantages and disadvantages of welding- Strength of welds-Butt and fillet welds: Permissible stresses – IS Code requirements.
Design of fillet weld subjected to in plane and out of plane.

Learning Outcomes:
After completion of this unit student will

- Understand bolted and welded connections
- Estimate strength of welds
- Design Welded and Bolted connections as per IS Codal provisions

UNIT -II:Tension Members and Compression members

Design of members in direct tension and bending –effective length of columns. Slenderness ratio – permissible stresses. Design of compression members. Roof Trusses: types of trusses – Design loads – Load combinations as per IS Code, detailing –Design of simple roof trusses elements (purlins, members and joints) – tubular trusses.

Learning Outcomes:
After completion of this unit student will

- Understand behavior of tension members
- Understand behavior of compression members
- Design and detail of Tension and compression members under different conditions adopting IS Code.
- Design simple roof trusses and elements

UNIT -III:Beams

Allowable stresses, design of simple and compound beams-Curtailment of flange plates - IS Code-provision - Beam - to - beam connection, shear, buckling, check for deflection and bearing, laterally unsupported beams.

Learning Outcomes:
After completion of this unit student will

- Understand behavior of simple and compound beams
- Visualize importance of curtailment of flange plates

- Design and detail of steel beams under different conditions adopting IS Code.

UNIT -IV:

Design of built-up columns and column bases: Built-up columns with lacing and/or battening system. Design of Eccentrically loaded columns, Splicing of columns.

Design of Column bases: slab base and gusseted base under axial load and moment.

Learning Outcomes:

After completion of this unit student will

- Understand behavior of builtup columns
- Understand behavior of column bases
- Design and detail of built-up columns and column bases adopting IS Code.

UNIT -V:Plate Girders

Design of plate girder – IS code Provisions – Welded – Curtailment of flange plates, Design of stiffeners – splicing and connections.

Learning Outcomes:

After completion of this unit student will

- Identify different components of plate girder
- Design and detail of components of plate girder confirming to IS Code
- Understand the functioning of gantry girder for different types of loads

NOTE :Assignment on preparation of drawing sheets showing detailing of various Steel Elements

The students should prepare the following plates.

- Plate 1 Detailing of simple beams
- Plate 2 Detailing of Compound beams including curtailment of flanges
- Plate 3 Detailing of Column including lacing and battens.
- Plate 4 Detailing of Column bases – slab base and gusseted base
- Plate 5 Detailing of steel roof trusses including joint details.
- Plate 6 Detailing of Plate girder including curtailment, splicing

Codes/Tables: IS-800 code books and Structural Steel Tables are to be permitted into the examination Hall.

I S Codes:

1) Indian Standard Code for General Construction in Steel, 3rd revision, Indian Standards Institution, New Delhi, 2008.
2) IS – 875, Code of practice for design loads (other than earth quake) for buildings and structures (Part-1-Part 5), Bureau of Indian standards.
3) Steel Tables.

TEXT BOOKS:

1. N. Subramanian, “Design of Steel Structures Limit state method”, (IS:800-2007) Oxford University Press.
2. S. K. Duggal, “Design of steel structures”, Tata Mc Graw Hill, New Delhi.
3. N. Krishna Raju; “Structural Design and Drawing”, 4th edition, (IS:800-2007) University Press

REFERENCES BOOKS:

1. Sarwar Alam Raz, “Structural Design in Steel”, New Age International Publishers, New Delhi
2. M. Raghupathi, “Design of Steel Structures”, Tata Mc. Graw-Hill.
3. L.S.Jayagopal and D.Tensing, “Design of steel structures”, Vikas publishers

COURSE OUTCOMES:

At the end of this course the student will be able to

- Explain relevant IS codes
- Analysis and design of flexural members and detailing
- Design compression members of different types with connection detailing
- Design Plate Girder and Gantry Girder with connection detailing
- Develop drawings pertaining to different components of steel structures

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	WATER RESOURCE ENGINEERING					SEE	70 M

COURSE OBJECTIVES:

- To Illustrate hydrologic cycle and its relevance to Civil engineering
- To teach students understand physical processes in hydrology & components of the
- hydrologic cycle
- To demonstrate concepts and theory of physical processes and interactions
- To impart on measurement and estimation of the components hydrologic cycle.
- To provide an overview and understanding of Unit Hydrograph theory, flood frequency andits analysis

UNIT -I: Introduction

Engineering hydrology and its applications, Hydrologic cycle, hydrological data-sources of data. **Precipitation**: Types and forms, measurement, rain gauge network, presentation of rainfall data,average rainfall, continuity and consistency of rainfall data, frequency of rainfall, Intensity-Duration-Frequency (IDF) curves, Depth-Area-Duration (DAD) curves, Probable Maximum Precipitation (PMP), design storm

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand basics of engineering hydrology and its applications.
- Demonstrate measurement techniques of precipitation.
- Learn curves related to frequency of rainfall.

UNIT-II: Abstractions from Precipitation:

Initial abstractions. Evaporation: factors affecting, measurement, reduction Evapo-transpiration: factors affecting, measurement, control - Infiltration: factors affecting, Infiltration capacity curve, measurement, infiltration indices.

Learning Outcomes:

At the end of this unit, the student will be able to

- Attain knowledge on factors influencing evaporation.
- Analyze factors influencing infiltration.

UNIT-III: Runoff and Hydrograph analysis

Catchment characteristics**,** Factors affecting runoff, components, computation- empirical formulae, tables and curves, stream gauging, rating curve, flow mass curve and flow duration curve. Components of hydrograph, separation of base flow, effective rainfall hyetograph and direct runoff hydrograph, unit hydrograph, assumptions, derivation of unit hydrograph, unit hydrographs of different durations, principle of superposition and S-hydrograph methods, limitations and applications of unit hydrograph, synthetic unit hydrograph – Floods: Causes and effects .

Learning Outcomes:

At the end of this unit, the student will be able to

- Determine runoff characteristics and factors influencing runoff.
- Examine components of hydro graph.
- Develop knowledge on floods and its effects.

UNIT-IV: Groundwater: Occurrence, types of aquifers, aquifer parameters, porosity, specific yield, permeability, transmissivity and storage coefficient, types of wells, Darcy's law, Dupuit's equation- steady radial flow to wells in confined and unconfined aquifers, yield of a open well-recuperation test.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand basics about ground water.
- Learn and implement Darcy's law and Dupuit's equation.

UNIT-V: IRRIGATION

Introduction-necessity and impotence of irrigation-advantages and ill-effects of irrigation; types of irrigation; methods of application of water; quality for irrigation water; duty and delta; duty at various places; relation between duty and delta; factors affecting duty; methods of improving duty; soil-water-plant relationship; limiting soil moisture conditions, depth and frequency of irrigation.

LIST OF DRAWINGS:

Draw the following irrigation structures.

1. Sloping glacis weir
2. Surplus weir.
3. Tank sluice with tower head
4. Type III Syphon aqueduct.
5. Canal regulator.

TEXT BOOKS:

1. Jayarami Reddy P., "Engineering Hydrology", Laxmi Publications Pvt. Ltd., (2013), New Delhi
2. B.C. Punmia, Pande B. B. Lal, Ashok Kumar Jain and Arun Kumar Jain, "Irrigation and Water Power Engineering", Lakshmi Publications (P) Ltd.
3. C.Satyanarayana Murthy, "Design of minor irrigation and canal structures", Wiley eastern Ltd

REFERENCES:

1. Subramanya K., "Engineering Hydrology", Tata McGraw-Hill Education Pvt Ltd, (2013), New Delhi.
2. Santosh Kumar Garg," Irrigation Engineering and Hydraulic Structure", Khanna Publishers.
3. Chow V.T., D.R Maidment and L.W. Mays, "Applied hydrology", Tata McGraw Hill Education Pvt Ltd, (2011), New Delhi.
4. Mays L.W, "Water Resources Engineering", Wiley India Pvt. Ltd, (2013).

COURSE OUTCOMES

At the end of the course the students are able to

- Understand of the theories and principles governing the hydrologic processes.
- Identify major hydrologic components and apply key concepts to several practical areas of engineering hydrology and related design aspects.

- Develop Intensity-Duration-Frequency and Depth-Area Duration curves to design hydraulic structures.
- Determine aquifer parameters, yield of wells and model hydrologic processes.
- Understand duty and delta.
- Understand soil, water, plant relationships.
- Design the Hydraulic structures.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Professional Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	REPAIR AND REHABILITATION OF STRUCTURES					SEE	70 M

COURSE OBJECTIVE:
- To describe causes of distress in concrete structures and plan repair strategies.
- To explain issues on serviceability and durability of concrete.
- To throw light on various repair materials and their characteristics.
- To demonstrate repair techniques and protection measures.
- To illustrate suitable retrofitting schemes.

UNIT- I: Maintenance and repair strategies

Maintenance, Repair and Rehabilitation, Facets of Maintenance, importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, causes of deterioration.

Learning Outcomes:

After completion of this unit student will
- Understand importance and requirement of maintenance
- Gain knowledge on quantification of repairs and documentation

UNIT -II: Serviceability and Durability of Concrete

Quality assurance for concrete – Strength, Durability and Thermal properties, of concrete Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion - Effects of cover thickness and cracking.

Learning Outcomes:

After completion of this unit student will
- Understand serviceability and durability issues in concrete structures.
- Explain effect due to natural elements on structures

UNIT -III: Materials for Repair

Special concretes and mortar, concrete chemicals, special elements for accelerated strength gain, Expansive cement, polymer concrete, sulphur infiltrated concrete, Ferro cement, Fiber reinforced concrete.

Learning Outcomes:

After completion of this unit student will
- List characteristics of materials used for repair.
- Understand suitability of certain materials for a specific type of repair

UNIT- IV: Techniques for Repair and Protection Methods

Rust eliminators and polymers coating for rebars during repair, foamed concrete, mortar and drypack, vacuum concrete, Gunite and Shotcrete, Epoxy injection, Mortar repair for cracks, shoring and underpinning. Methods of corrosion protection, corrosion inhibitors, corrosion resistant steels, coatings and cathodic protection. Engineered demolition techniques for dilapidated structures – case studies

Learning Outcomes:

After completion of this unit student will

- Explain techniques for repair and rehabilitation.
- Understand methods of corrosion protection and inhibition

UNIT -V: Retrofitting of Structures

Repairs to overcome low member strength. Deflection, Cracking, Chemical disruption, weathering corrosion, wear, fire, leakage and marine exposure.

Learning Outcomes:

After completion of this unit student will

- Develop effective strategies for retrofitting.

TEXT BOOKS:

1. Dension Campbell, Allen and Harold Roper, " Concrete Structures", Materials,
2. "Maintenance and Repair", Longman Scientific and Technical, U.K.

REFERENCES:

1. R T. Allen and S.C. Edwards, "Repair of concrete Structures", Blakie and sons, UK.
2. Santhakumar, A. R. "Training Course notes on damage assessment and Repair in Structures"
3. Raikar, R. N. Learning from failures – "deficiencies in Design, construction and service" R&D centre (SDCPL), Raikar Bhavan, Bombay.
4. N. Palaniappan, "Estate Management, Anna Institute of Management", Madras.
5. F. K. Garas, J. L. Clarke, G.S.T. Armer, "Structural Assessment", Butterworths, UK.
6. A.R. Santhakumar, "Concrete chemicals – Theory and applications, Indian society for construction Engineering and Technology", Madras.

COURSE OUTCOMES:

At the end of the course the student will be able to,

- Understand evaluation procedure and plan for repair.
- Design suitable rehabilitation scheme for serviceability and durability.
- Choose suitable repair material for different magnitudes of distress.
- Apply efficient repair and retrofitting schemes.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Professional Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	GROUND IMPROVEMENT TECHNIQUES					SEE	70 M

COURSE OBJECTIVES:
The objective of this course is:
- To understand need for different ground improvement methods adopted for improving the properties of re-moulded and in-situ soils by adopting different techniques
- To make the student understand how the reinforced earth technology and soil nailing can obviate the problems posed by the conventional retaining walls.
- To know geo-textiles and geo-synthetics can to improve the performance of soils.
- To learn the concepts, purpose and effects of grouting.

UNIT- I
In situ densification methods- in situ densification of granular soils- vibration at ground surface and at depth, impact at ground and at depth – in situ densification of cohesive soils – pre loading – vertical drains – sand drains and geo drains – stone columns.

Learning Outcomes:
After completion of this unit student will
- Understand methods of in-situ densification
- Study different types of drains for soil densification

UNIT –II:
Dewatering – sumps and interceptor ditches – single and multi stage well points – vacuum well points – horizontal wells – criteria for choice of filler material around drains – electro osmosis

Learning Outcomes:
After completion of this unit student will
- Understand methods of dewatering
- Study different types of dewatering and working criteria

UNIT- III:
Stabilization of soils – methods of soil stabilization – mechanical – cement – lime – bitumen and polymer stabilization – use of industrial wastes like fly ash and granulated blast furnace slag.

Learning Outcomes:
After completion of this unit student will
- Study different methods of stabilization of soils
- Study utilization of industrial wastes to stabilize soils

UNIT- IV:
Reinforce earth – principles – components of reinforced earth – design principles of reinforced earth walls – stability checks – soil nailing

Learning Outcomes:
After completion of this unit student will

- Understand principles of reinforced earth in ground improvement
- Study procedures for verification of stability of slopes.

UNIT- V:
Geo-synthetics – Geo-textiles – types – functions, properties and applications – Geo-grids, Geo-membranes and gabions - properties and applications.
Grouting – objectives of grouting – grouts and their applications – methods of grouting – stage of grouting – hydraulic fracturing in soils and rocks – post grout tests

Learning Outcomes:
After completion of this unit student will

- Utilization of advanced materials for ground improvement
- Compare different types of synthetic based soil stabilization material and understand performance
- Understand methods of grouting
- Assess efficiency of grouting adopting different tests

TEXT BOOKS:

1. Manfred R. Haussmann, “Engineering Principles of Ground Modification:, McGraw Hill Pub. Co.,NewYork, 1990
2. Purushotham Raj, “Ground Improvement Techniques”, Laxmi Publications, New Delhi.

REFERENCES:

1. G. L. Siva Kumar Babu, “An introduction to Soil Reinforcement and Geosynthetics”, Universities Press.
2. M. P. Moseley, “Ground Improvement, Blackie Academic and Professional”, USA.
3. Nihar Ranjan Patro, “Ground Improvement Techniques”, Vikas Publishing House (p) Limited, New Delhi.
4. R. M. Koerner, “Designing with Geo-synthetics”, Prentice Hall

COURSE OUTCOMES:
By the end of the course, the student should be able to

- Perceive the knowledge of various methods of ground improvement and their suitability to different field situations.
- Design a reinforced earth embankment and check its stability.
- Understand the functions of Geo-synthetics and their applications in Civil Engineering practice.
- Understand the concepts and applications of grouting.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Professional Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	AIR POLLUTION ENGINEERING					SEE	70 M

COURSE OBJECTIVES:
- To teach the basics of air pollution
- To impart the behavior of air due to metrological influence
- To throw light on air quality management
- To teach the design of air pollution control methods

UNIT –I: Air Pollution

Sampling and analysis of air pollutants, conversion of ppm into μg/m^3. Definition of terms related to air pollution and control - secondary pollutants - Indoor air pollution – Ozone holes and Climate Change and its impact - Carbon Trade.

Learning Outcomes:
After completion of this unit student will
- Learn the basics of air pollutants.
- Estimate the impact of air pollution

UNIT-II: Thermodynamics and Kinetics of Air-pollution

Applications in the removal of gases like SOx, NOx, CO and HC - Air-fuel ratio- Computation and Control of products of combustion, Automobile pollution. Odour pollution control, Flares.

Learning Outcomes:
After completion of this unit student will
- Analyse and compute the parameters of air pollutants
- Evaluate procedures for control of pollution

UNIT –III: Meteorology and Air Pollution

Properties of atmosphere: Heat, Pressure, Wind forces, Moisture and relative Humidity, Lapse Rates - Influence of Terrain and Meteorological phenomena on plume behavior and Air Quality - Wind rose diagrams and Isopleths- Plume Rise Models

Learning Outcomes:
After completion of this unit student will
- Study properties of atmosphere
- Learn plume behavior in different environmental conditions

UNIT-IV: Ambient Air Quality Management

Monitoring of SPM - RPM SO2; NOx and CO - Stack Monitoring for flue gases - Micro-meteorological monitoring – Noise Monitoring - Weather Station. Emission Standards- Gaussian Model for Plume Dispersion.

Learning Outcomes:
After completion of this unit student will

- Study the air quality management.
- Visualize emissions and their permissible standards

UNIT-V: Air Pollution Control Methods

Control of particulates – Control at Sources, Process Changes, Equipment modifications, Design and operation of Control Equipments –Control of NOx and SOx emissions – Environmental friendly fuels - In-plant Control Measures, process changes, methods of removal and recycling. Environmental criteria for setting industries and green belts.

Learning Outcomes:
After completion of this unit student will

- Learn the design principles of particulate and gaseous control.
- Develop environmental friendly fuels and study their properties.

TEXT BOOKS:

1. M. N. Rao and H. V. N. Rao, “Air Pollution”, Tata McGraw Hill Company.
2. K. V. S. G. Murali Krishna, “Air Pollution and Control”, Laxmi Publications, New Delhi, 2015.

REFERENCE BOOKS:

1. R. K. Trivedy and P. K. Goel, “An Introduction to Air pollution”, B.S. Publications.
2. Wark and Warner, Air Pollution, Harper & Row, New York.
3. Garg, S. K, “Environmental Engineering Vol. II (Sewage Disposal and Air Pollution Engineering)”, Khanna Publishers.
4. Arya, S. P., “Air Pollution Meteorology and Dispersion”, Oxford University Press.

COURSE OUTCOMES:
At the end of this course, the students will be able to:

- Evaluating the ambient air quality based on the analysis of air pollutants
- Design particulate and gaseous control measures for an industry
- Judge the plume behavior in a prevailing environmental condition
- Estimate carbon credits for various day to day activities

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Professional Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	RAILWAY ENGINEERING					SEE	70 M

COURSE OBJECTIVES:
The objective of this course is to:

- Comprehend different parts of railway track and their functions.
- Teach track construction and engineering applications
- Explain different essential features and requirements of different types of crossings
- Demonstrate signaling system and maintenance of tracks

UNIT –I: Introduction to Indian Railways
History and Importance of Indian Railways Construction and Maintenance- Permanent Way - Components- Rails, sleepers, ballast-functions and requirements- Gauges, Types, Uniformity of Gauge- Different Gauges in Indian Railways- Associated problems- Ideal Alignment- Standard Rail Sections- Causes and Effects of Creep- Measurement to Reduce Creep- Fixtures and Fastenings.

Learning Outcomes:
After completion of this unit student will

- Understand the basics of railway components.
- Acquaint with gauges, alignment and standard rail sections.
- Understand different types of fixtures and fastenings

UNIT –II: Geometric Design of Railway Track
Geometric design of railway track- Horizontal curves-radius and degree of curve-Cant-Cant Deficiency – Negative Cant – Permissible speed on railway tracks – Gradients- Grade Compensation On Curves.

Learning Outcomes:
After completion of this unit student will

- Understand the geometric elements of railway track.
- Design the geometrics of railway track.

UNIT –III: Rail way signals
Classification of Railway Signals – Semaphore Signals- Working Philosophy Of Semaphore Signal – Other Types Of Signals – Their Functions .

Learning Outcomes:
After completion of this unit student will

- Study the types and classification of signals.
- Understand the functions of various types of signals.

UNIT –IV: Railway Stations and Yards
Purposes- Facilities Required At Railway Stations- Classification Of Stations - Requirements Of Station Yard- Classification Of Yards – Terminals – Junctions – Layouts.

Learning Outcomes:

After completion of this unit student will

- Study the different types of Stations and Yards.
- Understand the functions associated with stations and yards.

UNIT –V: Railway Control Systems

Introduction – Different Types Of Control Systems – Absolute Block System – Automatic Block System – Operational Philosophy of these systems.

Learning Outcomes:

After completion of this unit student will

- Study the types of control systems.
- Understand the operational philosophy of control systems.

TEXT BOOKS:

1. S. C. Saxena and S. P. Arora, “A Text book of Railway Engineering”, Dhanpatrai& Sons, Delhi.
2. C.Venkataramaiah., “Transportation Engineering (Vol – II)”, Universities Press Pvt Ltd, Hyderabad.

REFERENCES:

1. Satish Chandra and M. M. Agarwal, “Railway Engineering”, Oxford University Press, New Delhi
2. R. Srinivasa Kumar, “Transportation Engineering”, Railways, Airports, Docks and Harbors Universities Press Pvt Ltd, Hyderabad. 2014.
3. Vazirani&Chandola, “Transportation Engineering Vol I & II”
4. K. P. Subramanian, “Highway, Railway, Airport and Harbor Engineering”, Sci.Tech publishers.

COURSE OUTCOMES:

At the end of the course, the students will be able to:

- Explain components of Railway track, different Gauges.
- Design Track Gradients as per given requirements.
- Designing various types of Track Turnouts.
- Understand purposes and facilities at railway stations.
- Explain interlocking and modern signal systems.
- Identify surface defects on Railway Track and their remedial measures.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Professional Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	HYDROPOWER DEVELOPMENT					SEE	70 M

COURSE OBJECTIVES:

- To teach concepts of Power potential in the world and India
- To impart with different types of Hydropower Plants and Classification
- To demonstrate different Water Conveyance systems
- To teach about different turbine draft tubes and water hammer effect
- To throw light on Planning and Design of Power house

UNIT -I:
Introduction: Sources of power - Status of Power potential in the world and India. Transmission voltages and Hydropower - Estimation of water power potential. Source of Hydropower - Runoff and Stream flow. Stream flow analysis - Hydrograph, Mass curve and Flow duration curve.

Learning Outcomes:
After completion of this unit student will

- Understand the basics of hydro power system.

UNIT -II:
Hydropower Plants - Classification - Low and High head plants, Pumped storage plants Run - of

- river plants - General arrangement of Run - of - river plants, Valley dam plants, High head diversion plants. Pumped storage plants - Advantages - Types of Pumped storage plants, Two and three unit arrangements.

Learning Outcomes:
After completion of this unit student will

- Classify and components of hydro power plants.

UNIT -III:
a. Water Conveyance systems.

Penstocks, Anchor blocks - Design criteria for Penstocks - Economical diameter of Penstock. Anchor blocks - Design principles of Anchor blocks. Valves, Bends and Manifolds

b. Intakes, canals and tunnels - Types of Intakes, Losses in Intakes, Air entrainment at Intakes - Inlet Aeration. Trash racks.

Learning Outcomes:
After completion of this unit student will

- Acquire Knowledge on external components of hydro power plants.

UNIT- IV:
Turbines - Main types - Hydraulic features - Turbine site, Constructional features - Lay out and arrangement. Draft tubes - Cavitation in Turbines - Governing of Turbines. Turbine Characteristics - Model

testing - Water Hammer - Resonance in Penstocks. Surge tanks - Types and design principles of Simple Surge Tank.

Learning Outcomes:
After completion of this unit student will

- Classify the turbine categories
- Design different types of turbines.

UNIT -V:

Power house planning - Surface Power stations - Power house structure - Power house dimensions - Lighting and ventilations in Power house. Underground power stations - Location of Underground Power station - Components of Underground Power station. Features of some Typical Hydro - Power projects in India.

Learning Outcomes:
After completion of this unit student will

- Study the concepts related to planning of hydro power plants.

TEXT BOOKS:

1. S. K. Garg, “Irrigation engineering and Hydraulic structures”, Standard Book House.
2. Punmia& Lal, “Irrigation and water power engineering” Laxmi publications Pvt. Ltd., New Delhi.

REFERENCES:

1. S K Sharma, “A Textbook Of Irrigation Engineering and Hydraulic Structures”, S. Chand and Company Limited, New Delhi
2. P. N. Modi, “Irrigation and Water Resources & Water Power”, Standard Book House.
3. G. L. Asawa, “Irrigation and water resources engineering”, New Age International Publishers
4. Dilip Kumar Majumdar, “Irrigation water management”, Principles and Practice, PHI Pvt. Ltd. NewDelhi.

COURSE OUTCOMES:
At the end of this course the student will be able to

- Understand the different sources of hydropower and estimation of potential.
- Hypothesizing the relevant procedures for planning hydro power plants.
- Design effective water conveyance systems and design.
- Design power house and features.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	INDUSTRIAL WASTE AND WASTE WATER MANAGEMENT					SEE	70 M

COURSE OBJECTIVES:
- To teach Health and Environment Concerns in waste water management
- To teach material balance and design aspects of the reactors used in waste water treatment.
- To impart knowledge on selection of treatment methods for industrial waste water
- To teach common methods of treatment in different industries
- To provide knowledge on operational problems of common effluent treatment plant

UNIT –I: Industrial water Quantity and Quality requirements

Boiler and cooling waters–Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills Selection of source based on quality, quantity and economics. Use of Municipal wastewater in Industries – Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, Elutriation, Removal of Colour, Odour and Taste.

Learning Outcomes:
At the end of the unit, students will be able to:
- Learn the procedures for assessment of quality of Industrial water
- Suggest different processes of handling waste water

UNIT –II: Basic theories of Industrial Wastewater Management

Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis -Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction – Neutralization and Equalization, Segregation and proportioning- recycling, reuse and resources recovery

Learning Outcomes:
At the end of the unit, students will be able to:
- Measure industrial waste water flow
- Characterize waste water
- Suggest techniques for treatment of waste water.

UNIT –III: Industrial wastewater disposal management

Discharges into Streams, Lakes and oceans and associated problems, Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method

Learning Outcomes:
At the end of the unit, students will be able to:
- Understand options for waste water disposal.
- Explain functioning of common effluent treatment plants

UNIT – IV: Process and Treatment of specific Industries-1

Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants

Learning Outcomes:
At the end of the unit, students will be able to:

- Understand the character of waste water from Steel plants and refineries
- Suggest suitable waste water treatment techniques

UNIT – V: Process and Treatment of specific Industries-2
Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Pharmaceutical Plants

Learning Outcomes:
At the end of the unit, students will be able to:

- Understand the character of waste water from tanneries and distilleries
- Suggest suitable waste water treatment techniques

TEXT BOOKS:

1. M. N. Rao and A. K. Dutta, "Wastewater Treatment", Oxford & IBH, New Delhi.
2. K.V. S. G. Murali Krishna, "Industrial Water and Wastewater Management".

REFERENCES:

1. A. D. Patwardhan, "Industrial Wastewater treatment", PHI Learning, Delhi
2.Metcalf and Eddy Inc., "Wastewater Engineering", Tata McGraw Hill co., New Delhi.
3.G. L. Karia& R.A. "Christian Wastewater Treatment- Concepts and Design Approach", Prentice Hall of India.

COURSE OUTCOMES:
Upon the successful completion of this course, the students will be able to:

- Design treatment methods for any industrial wastewater.
- Examine the manufacturing process of various industries.
- Assess need for common effluent treatment plant for an industry
- Test and analyze BOD, COD, TSS and MPN in waste water.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	BUILDING SERVICES AND MAINTAINANCE					SEE	70 M

COURSE OBJECTIVES:
- To impart knowledge in concepts of building maintenance
- To insists the student to observe various practices of good building maintenance
- To teach the importance safety in buildings
- To demonstrate the use of ventilation in buildings.
- To give the list of different types of machineries in buildings

UNIT – I: PLUMBING SERVICES
Water supply system- fixing of pipes in buildings – maintenance of buildings- water meters-sanitary fittings-design of building drainage- gas supply systems

Learning Outcomes:
At the end of the unit, students will be able to:
- Understand water supply system
- Understand the building drainage system.

UNIT – II: VENTILATION
Necessity of ventilation – functional requirements – systems of ventilation-natural ventilation-artificial ventilation-air conditioning-systems of air conditioning-essentials of air conditioning-protection against fire caused by air conditioning systems.

Learning Outcomes:
At the end of the unit, students will be able to:
- Understand concepts of ventilation
- Understand concepts of air conditioning

UNIT – III: THERMAL INSULATION
Heat transfer system-thermal insulating materials-methods of thermal insulation-economics of thermal insulation-thermal insulation of exposed walls, doors,windows and roofs.

Learning Outcomes:
At the end of the unit, students will be able to:
- Understand methods of insulation
- Understand materials of insulation

UNIT – IV: FIRE SAFETY:
Causes of fire in buildings-fire safety regulations-charecteristics of fire resisting materials- fire resistant construction-heat and smoke detecters-fire alarms-fire fighting pump and water storage.

Learning Outcomes:
At the end of the unit, students will be able to:
- Understand safety regulations of fire system

- Know about the implementation and usage of various fire resistant materials in building construction

UNIT – V: MACHINERIES IN BUILDINGS:
Lifts-essential requirements-design considerations-escalators-essential requirements-electrical installations in buildings-lighting in buildings-methods of electrical wiring-earthing

Learning Outcomes:
At the end of the unit, students will be able to:
- Understanding of different machineries of buildings
- Understanding of electrical installation of buildings

TEXT BOOKS:
1. B.C.Punmia, Er. Ashok K jain, Arun K Jain "Building construction", Laxmi publications pvt.ltd. New Delhi.
2. Janardhan Jah, S.K Sinha, "Building construction", Khanna publishers
3. Rangwala, "Building construction", Charothar publishing house.

REFERENCE BOOKS:
1. David V Chaddrton, "Building services engineering", Outledge
2. P.C Varghees "Building construction", Printice hall india

COURSE OUTCOMES:
At the end, Student will be able to understand
- Concepts of plumbing, drainage system and gas supply system
- Concepts of ventilation and air conditioning
- Concepts of thermal insulation and economics of thermal insulation
- Concepts of fire safety in buildings and fire resistant construction
- Concepts of different machineries of buildings

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	INDUSTRIAL AUTOMATION					SEE	70 M

COURSE OBJECTIVES:

- To understand the basic concepts of Automation
- To understand the concepts of automation cycle and hardware components
- To gain knowledge about pneumatic and hydraulic devices
- To understand the concepts of sensors and actuators
- To know the use of Robotics used in industries automation

UNIT -I:Introduction to Automation
Definition and fundamentals of automation, reasons for Automating, basic elements of an automated system: Power, Program and control system, safety, maintenance & repair diagnosis, error detection and recovery, Automation principles and strategies: USA principle, strategies of automation and production system, automation migration strategy

Learning Outcomes:
At the end of the unit, students will be able to:

- To understand the fundamental concepts of automation and its basic elements
- To understand system safety requirements
- To understand about maintenance and repair strategies
- To know about production system automation

UNIT- II:Mechanization and Automation
Basic principles of Mechanization and automation, product cycle, hard Vs flexible automation, Capital-intensive Vs low cost automation. Types of systems-mechanical, electrical, hydraulic, pneumatic and hybrid systems, Automation using CAMS, Geneva mechanisms, gears etc.
Assembly line Automation: automated assembly systems, transfer systems, vibratory bowl feeders, non-vibratory feeders, part orienting, feed track, part placing & part escapement systems. Introduction to Material storage/ handling and transport systems, and its automation using AS/RS, AGVS and conveyors etc.

Learning Outcomes:
At the end of the unit, students will be able to:

- To know about how to analyse the various automation methods
- To know about assembling and placing of various parts
- To distinguish between mechanization and automation of systems
- To know about material storage, handling and automation using various approaches

UNIT -III:Pneumatics and hydraulics
Hydraulic and pneumatic devices-Different types of valves, Actuators and auxiliary elements in Pneumatics & hydraulics , their applications and use of their ISO symbols. Synthesis and design of circuits (up to 3 cylinders)–pneumatic, electro pneumatics and hydraulics. Design of Electro-Pneumatic Circuits using single solenoid and double solenoid valves; with and without grouping.

Learning Outcomes:
At the end of the unit, students will be able to:

- To know design of various pneumatic and hydraulic components
- To understand about synthesis and design of Pneumatic circuits
- To understand about electro pneumatic circuits
- To design using various solenoid valves with and without grouping

UNIT -IV:Sensors & Actuators Sensors
Selection of sensors (Displacement, temperature, acceleration, force /pressure) based on static and dynamic characteristics. Interfacing: Concept of interfacing, bit accuracy and sampling speed, amplifying electronics, and microcontroller. Actuators: Principle and selection of electro mechanical actuators (1) DC motors (2) Stepper Motors (3) Solenoid Actuators (4) Servo Motors (5) BLDC

Learning Outcomes:
At the end of the unit, students will be able to:

- To know about selection of sensors and actuators based on dynamic characteristics
- To understand about necessity of interfacing sensors with Microcontroller
- To understand principle and selection of actuators
- To apply various electro mechanical actuators to certain machines

UNIT- V:Robots and their applications
Introduction to robots, Types, Classifications, Selection of robots, Robot Degrees of freedom, Robot configuration, Accuracy and repeatability, Specification of a robot, Robot feedback controls: Point to point control and Continuous path control, Control system for robot joint, Adaptive control, Drives and transmission systems, End effectors, Industrial robot applications of robots

Learning Outcomes:
At the end of the unit, students will be able to:

- To know about Robots, classification, selection and specifications
- To understand the use of robotics in industrial applications
- To know about various feedback controls of Robot
- To understand how adaptive control strategies can be used in Robots

TEXT BOOKS:

1. StamatiosManesis and George Nikolakopoulos, “Introduction to Industrial Automation”, CRC Press, 2018.
2. Frank Lamb, “Industrial Automation”, Hands on, Mc Graw Hill Education, 2013.

REFERENCES:

1. Richerd L. Shell and Ernest L. Hall, “Hand Book of Industrial Automation”, CRC Press, 2000.

COURSE OUTCOMES:

1. Understand the basic concepts of Industrial automation
2. Design and analysis of automation methods, placing and assembling of various parts
3. Design of various processing and control circuits using pneumatic and hydraulic elements
4. Selection of sensors based on the industrial application
5. Role of robotics in industrial applications

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	SYSTEM RELIABILITY CONCEPTS					SEE	70 M

COURSE OBJECTIVES:
To make the students learn about:

- The Basic concepts, rules for combining probabilities of events, failure density and distribution functions.
- Evaluation of network Reliability / Unreliability and types of redundancies.
- Evaluation of network Reliability / Unreliability using conditional probability method.
- Expected value and standard deviation of Exponential distribution and Measures of reliability.
- Evaluation of Limiting State Probabilities of one, two component repairable models.

UNIT-I:Basic Probability Theory
Basic concepts – Rules for combining Probabilities of events – Failure Density and Distribution functions – Bernoulli's trials – Binomial distribution – Expected value and standard deviation for binomial distribution – Examples

Learning Outcomes:
At the end of the unit, students will be able to:

- To know about basic rules for probabilities of events
- To distinguish between pdf and cdf
- Get detailed information about Probability of failure density and distribution functions
- Obtain the expected value and standard deviation for binomial distribution.

UNIT-II:Network Modeling and Reliability Evaluation
Basic concepts – Evaluation of network Reliability / Unreliability – Series systems, Parallel systems, Series - Parallel systems, partially redundant systems – Types of redundancies - Evaluation of network Reliability / Unreliability using conditional probability method – Paths based and Cutset based approach – complete event tree and reduced event tree methods - Examples.

Learning Outcomes:
At the end of the unit, students will be able to:

- How to find the Probability of success and failures of network using different approaches for series-parallel configurations.
- Classification of redundancies.
- To find reliability / unreliability of complex systems using different methods
- Comparison of approaches to solve probability index of SISO system

UNIT-III:Time Dependent Probability
Basic concepts – Reliability functions f(t), Q(t), R(t), h(t) – Relationship between these functions – Bath tub curve – Exponential failure density and distribution functions - Expected value and standard deviation of Exponential distribution – Measures of reliability – MTTF, MTTR, MTBF – Evaluation of network reliability / Unreliability of simple Series, Parallel, Series-Parallel systems - Partially redundant systems - Evaluation of reliability measure – MTTF for series and parallel systems – Examples.

Learning Outcomes:
At the end of the unit, the student will be able to

- Understand the concepts of time domain functions and relationship between them.
- Obtain the expected value and standard deviation for exponential distribution.
- Obtain the values of probabilistic measures for series and parallel configurations.
- To obtain probabilistic measures for fully redundant and partially redundant configurations

UNIT-IV:Discrete Markov Chains & Continuous Markov Processes

Markov Chains: Basic concepts – Stochastic transitional Probability matrix – time dependent probability evaluation – Limiting State Probability evaluation – Absorbing states.

Markov Processes: Modeling concepts – State space diagrams – time dependent reliability evaluation of single component repairable model – Evaluation of Limiting State Probabilities of one, two component repairable models – Frequency and duration concepts – Frequency balance approach - Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of Stochastic Transitional Probability Matrix, Limiting State Probability
- To know about evaluation for one and two component repairable models.
- Understand the concept of Frequency balance approach.
- To distinguish between Markov chains and Markov processes

UNIT-V:Multi Component & Approximate System Reliability Evaluation

Recursive relation for evaluation of equivalent transitional rates– cumulative probability and cumulative frequency and 'n' component repairable model – Series systems, Parallel systems, Basic probability indices – Series, Parallel systems – Complex Systems– Cutset approach – Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of recursive relation for evaluation of equivalent transitional rates.
- Obtain the cumulative probability and cumulative frequency for different systems
- To know about computation of basic probability indices for series, parallel configurations
- To know how to evaluate basic probability indices using cut set approach

TEXT BOOKS:

1. Roy Billinton and Ronald N. Allan, "Reliability Evaluation of Engineering Systems", Reprinted in India B. S. Publications, 2007.
2. E. Balagurusamy, "Reliability Engineering", Tata McGraw Hill, 2003.

REFERENCE BOOKS:

1. E. E. Lewis , "Introduction to Reliability Engineering" Wiley Publications.
2. Charles E. Ebeling, "Reliability and Maintainability Engineering", Tata McGraw Hill, 2000.
3. by Ajit Kumar Verma, Srividya Ajit and Durga Rao Karanki, Springer, "Reliability and Safety Engineering" 2nd edition, 2016.
4. Rausand and ArnljotHoyland, "System Reliability Theory Marvin", Wiley Publictions.

COURSE OUTCOMES:

After completing the course, the student should be able to do the following:

- Understand the concepts for combining Probabilities of events, Bernoulli's trial, and
- Binomial distribution.
- Network Reliability/Unreliability using conditional probability, path and cutset based approach, complete event tree and reduced event tree methods.

- Understanding Reliability functions and to develop relationship between these functions, expected value and standard deviation of Exponential distribution and measures of reliabilities.
- Analyze the time dependent reliability evaluation of single component repairable model, frequency and duration concepts, Frequency balance approach.
- Recursive relation for evaluation of equivalent transitional rates, cumulative probability and cumulative frequency and 'n' component repairable model.

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(VI Semester Civil Engineering)

Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	INTRODUCTION TO MECHATRONICS					SEE	70 M

COURSE OBJECTIVES:
- Familiarize the technologies behind modern mechatronic systems.
- Explain fundamentals for the development of fully automated system.
- Develop a robotic or automated systems focusing on the hardware and software integration.
- Demonstrate the development and design of mechatronic system and MEMS.

UNIT – I: Introduction
Definition of Mechatronics, Need for Mechatronics in Industry, Objectives of mechatronics, mechatronics design process, Mechatronics key elements, mechatronics applications – Computer numerical control (CNC) machines, Tool monitoring systems, Flexible manufacturing system (FMS), Industrial Robots, Automatic packaging systems, Automatic inspection systems.

Learning Outcomes:
At the end of the unit, the student will be able to
- Explain the role of mechatronics in industry.(l2)
- Identify the application of mechatronics in automation industry.(l3)

UNIT – II: Sensors
Static characteristics of sensors, Displacement, Position and Proximity sensors, Force and torque sensors, Pressure sensors, Flow sensors, Temperature sensors, Acceleration sensors, Level sensors, Light sensors, Smart material sensors, Micro and Nano sensors, Selection criteria for sensors.

Learning Outcomes:
At the end of the unit, the student will be able to
- Classify various types of sensors. (l2)
- Choose sensors for particular application. (l3)
- Measure different quantity's using sensors. (l4)

UNIT – III: Actuators: Mechanical, Electrical, Hydraulic and Pneumatic Actuation systems, Characteristics and their limitations, Design of Hydraulic and Pneumatic circuits, Piezoelectric actuators, Shape memory alloys, Selection criteria for actuators.

Learning Outcomes:
At the end of the unit, the student will be able to
- Classify various actuation systems. (l2)
- Choose the criterion for different actuators. (l1)

UNIT – IV: Microprocessors, Microcontrollers and Programmable Logic Controllers
Architecture of of Microprocessor, Microcontroller and Programmable Logic Controller, PLC Programming using ladder diagrams, logics, latching, sequencing, timers relays and counters, data handling, Analog input/output, selection of controllers.

Learning Outcomes:
At the end of the unit, the student will be able to
- Understand the architecture of microprocessors, microcontrollers and PLC. (L2)
- Formulate various programs using PLC. (L6)

UNIT – V:
Design of mechotronics systems**,**Mechotronics design elements, Traditional mechatronics systems, Embedded systems, Procedure for designing a mechotronic systems.

Learning Outcomes:
At the end of the unit, the student will be able to

- Understanding design of mechotronics . (L2)
- Various Mechotronics systems. (L4)
- Design Aspects of Mechotronic systems. (L2)

TEXT BOOKS:

1. Er R. Rajput, " A Text book of Mechatronics", S.Chand,2nd edition-2016.
2. James J Allen, "Micro Electro Mechanical Systems Design", CRC Press Taylor & Francis group, 2005.

REFERENCE TEXT BOOKS:

1. WBolton, "Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering", 3rd edition, Pearson Education Press, 2005.
2. Devadas Shetty and Richard A Kolk, "Mechatronic System Design", 2nd edition, Cengage learning, 2010.
3. Clarence W. de Silva, "Mechatronics an Integrated Approach", CRC Press, 2004.
4. Ganesh S Hedge, "Mechatronics", Jones & Bartlett Learning, 2010.

COURSE OUTCOMES:
Upon successful completion of this unit, the student will be able to:

- Explain mechatronics systems in industry. (l2)
- Identify mechatronic systems encountered in practice. (l3)
- Examine the components of a typical mechatronic system. (l4)
- Compare the various techniques used for development of mems. (l4)
- Develop programs using plc. (l6)

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Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	OPTIMIZATION TECHNIQUES THROUGH MATLAB					SEE	70 M

COURSE OBJECTIVES:

- Introduce basics of MATLAB
- Familiarize the fundamentals of optimization
- Explain single variable optimization using various methods
- Implement multi variable optimization using various methods
- Train various evolutionary algorithms.

UNIT -I: Introduction to MAT LAB
Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

Learning Outcomes:
After completion of this unit, students will be able to

- Write simple codes in MATLAB. (L3)
- Plot the data using MATLAB. (L3)
- Implement optimization models in MATLAB. (L3)

UNIT -II: Introduction to Optimization
Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

Learning Outcomes:
After completion of this unit, students will be able to

- Build optimization problem. (l1)
- Solve various optimization problems(l3)
- Compare convex and concave programming (l4)

UNIT -III: Single Variable Optimization
Finite difference method, Central difference method, Runge-Kutta method, interval halving method, golden section method with MATLAB code.

Learning Outcomes:
After completion of this unit, students will be able to

- Understand various methods involving single variable optimization. (l2)
- Develop codes in matlab for different methods. (l3)
- Identify methods for solving a single variable optimization problem. (l3)

UNIT- IV: Multi Variable Optimization
Conjugate gradient method, Newton's method, Powell's method, Flectcher- Reeves method, Hook and Jeeves method, interior penalty function with MATLAB code.

Learning Outcomes:
After completion of this unit, students will be able to

- Apply various methods involving multi variable optimization. (l2)
- Develop codes in matlab for solving various multi variable optimization problems. (l3)

- Choose methods for solving a multi variable optimization problem. (I3)

UNIT -V: Evolutionary Algorithms
Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

Learning Outcomes:
After completion of this unit, students will be able to

- Apply different types of genetic algorithms. (I3)
- Model optimization problems using genetic algorithms in matlab. (I3)
- Compare different genetic algorithms for performance. (I5)

TEXT BOOKS:

1. Rao V.Dukkipati, MATLAB: "An Introduction with Applications", Anshan, 2010.
2. Achille Messac, "Optimization in practice with MATLAB", Cambridge University Press, 2015.
3. Jasbir S Arora, "Introduction to optimum design", 2nd edition. Elsevier, 2004.

REFERENCES:

1. Cesar Perez Lopez, "MATLAB Optimization Techniques", Academic press, Springer publications, 2014.
2. Steven C.Chapra, "Applied Numerical Methods with MATLAB for Engineers and scientists": 4th edition, McGraw-Hill Education, 2018.

COURSE OUTCOMES:
After completion of this course the student can be able to

- Use optimization terminology and concepts, and understand how to classify an optimization problem.(I4)
- Apply optimization methods to engineering problems.(I3)
- Implement optimization algorithms.(I3)
- Compare different genetic algorithms. (I5)
- Solve multivariable optimization problems. (I4)

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Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	BASICS OF VLSI					SEE	70 M

COURSE OBJECTIVES:
The objectives of the course are to

- Learn and Understand IC Fabrication process steps required for various MOS circuits
- Understand and Experience VLSI Design Flow
- Learn Transistor-Level CMOS Logic Design
- Understand VLSI Fabrication and Experience CMOS Physical Design
- Learn to Analyze Gate Function and Timing Characteristics

UNIT – I:
Introduction: Introduction to MOS Technology – MOS, PMOS, NMOS, CMOS and BiCMOStechnologies, fabrication fundamentals: Oxidation, Lithography, Diffusion, Ionimplantation, Metallization and Encapsulation.

Basic Electrical Properties: Basic Electrical Properties of MOS,CMOS and BiCMOS Circuits, IDS-VDSrelationships, MOS transistor threshold Voltage, gm, gds, figure of merit ωo, Passtransistor, NMOS inverter, Various pull - ups, Determination of pull-up to pulldown ratio
(Zpu / Zpd) , CMOS Inverter analysis and design, BiCMOSinverters,Latch-up in CMOS circuits.

Learning Outcomes:
After completion of this unit, students will be able to

- Demonstrate a clear understanding of CMOS fabrication flow and technology scaling (L2)
- Analyze the electrical properties of MOS and BiCMOS circuits (L3)
- Design MOSFET based logic circuit (L4)

UNIT – II: VLSI Circuit Design Processes
VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layouts,Lambda based design rules, Contact cuts , CMOS Lambda based design rules,Layout Diagrams for logic gates, Transistor structures, wires and vias, Scaling ofMOS circuits- Scaling models, scaling factors, scaling factors for device parameters, Limitations of Scaling.

Learning Outcomes:
After completion of this unit, students will be able to

- Understand the design rules and layout diagram for logic gates, limitations of scaling (L1)
- Draw the Layout of simple MOS circuit using Lambda based design rules (L2)

UNIT – III: Gate Level Design and Layout
Architectural issues, Switch logic networks: Gate logic, Alternate gate circuit:Pseudo-NMOS Dynamic CMOS logic. Basic circuit concepts, Sheet ResistanceRS and its concept to MOS, Area Capacitance Units, Calculations, The delay unitT, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-inand fan-out, Choice of layers

Learning Outcomes:
After completion of this unit, students will be able to

- Apply basic circuit concepts to MOS circuits. (L2)
- Estimate the propagation delays in CMOS circuits (L3).

UNIT – IV: Subsystem Design

Subsystem Design, Shifters, Adders, ALUs, Multipliers: Array multiplier, SerialParallel multiplier, Parity generator, Comparators, Zero/One Detectors, Up/DownCounter, Memory elements: SRAM, DRAM, ROM, Serial Access Memories.

Learning Outcomes:
After completion of this unit, students will be able to

- Apply the Lambda based design rules for subsystem design (L2)
- Design of Adders, Multipliers and memories etc(L4)
- Design digital systems using MOS circuits(L4)

UNIT – V: Semiconductor Integrated Circuit Design
PLDs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic,Programmable Logic Array Design Approach.

Learning Outcomes:
After completion of this unit, students will be able to

- Analyze various architectures and device technologies of PLDs(L3)
- Design simple logic circuit using PLA, PAL, FPGA and CPLD.(L4)

TEXT BOOKS:

1. Kamran Eshraghian, “Essentials of VLSI circuits and systems”, EshraghianDouglesand A. Pucknell, PHI, 2005 Edition
2. Wayne Wolf, “Modern VLSI Design”, 3rd Edition, Pearson Education, 1997.

REFERENCE BOOKS:

1. John .P. Uyemura, “CMOS logic circuit Design”, Springer, 2007.
2. Neil H. E Weste, “CMOS VLSI Design – A Circuits and Systems Perspective”, 3rd edition, DavidHarris, Ayan Banerjee, Pearson, 2009.

COURSE OUTCOMES:

- Learn the basic fabrication process of MOS transistors, study CMOS inverter circuits, basic circuit concepts such as Sheet Resistance, Area Capacitance and Delay calculation, Field programmable gate arrays and realization techniques, CPLDs and FPGAs for implementing the various logic functions.
- Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality.
- Analyze the performance of CMOS Inverter circuits.
- Compare various Scaling models and understand the effect of scaling on device parameters

(VI Semester Civil Engineering)

Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	PRINCIPLES OF COMMUNICATION SYSTEMS					SEE	70 M

COURSE OBJECTIVES:

- To understand the concept of various modulation schemes and multiplexing.
- To apply the concept of various modulation schemes to solve engineering problems.
- To analyse various modulation schemes.
- To evaluate various modulation scheme in real time applications.

UNIT-I:Amplitude Modulation

Introduction to Noise and Fourier Transform. An overview of Electronic Communication Systems. Need for Frequency Translation, Amplitude Modulation: DSB-FC, DSB-SC, SSB-SC and VSB. Frequency Division Multiplexing. Radio Transmitter and Receiver.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of noise, Fourier transform, career modulation and frequency division multiplexing (L1).
- Apply the concept of amplitude modulationto solve engineering problems (L2).
- Analyse various amplitude modulation schemes (L3).
- Evaluate various amplitude modulation schemes in real time applications (L3).

UNIT-II:Angle Modulation

Angle Modulation, Tone modulated FM Signal, Arbitrary Modulated FM Signal, FM Modulation and Demodulation. Stereophonic FM Broadcasting.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of angle modulation and its components (L1).
- Apply the concept of frequency modulation to solve engineering problems (L2).
- Analyse angle modulation schemes (L3).
- Evaluate frequency modulation scheme in real time applications (L3).

UNIT-III:Pulse Modulation

Sampling Theorem: Low pass and Band pass Signals. Pulse Amplitude Modulation and Concept of Time Division Multiplexing. Pulse Width Modulation. Digital Representation of Analog Signals.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of various pulse modulation schemes and time division multiplexing (L1).
- Analyse various pulse modulation schemes (L3).

UNIT-IV:Digital Modulation

Binary Amplitude Shift Keying, Binary Phase Shift Keying and QuadraturePhase Shift Keying, Binary Frequency Shift Keying. Regenerative Repeater.

Learning Outcomes:
At the end of the unit, the student should be able to

- Understand the concept of various digital modulation schemes (L1).
- Analyze various digital modulation schemes (L3).

UNIT-V:Communication Systems
Satellite, RADAR, Optical, Mobile and Computer Communication (Block diagram approach only).

Learning Outcomes:
At the end of the unit, the student should be able to

- Understand the concept of various communication systems (L1).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

TEXT BOOKS:

1. Herbert Taub, Donald L Schilling and Goutam Saha, "Principles of Communication Systems", 3rdEdition, Tata McGraw-Hill Publishing Company Ltd., 2008.

REFERENCES:

1. B. P. Lathi, Zhi Ding and Hari M. Gupta, "Modern Digital and Analog Communication Systems", 4th Edition, Oxford University Press, 2017.
2. K. Sam Shanmugam "Digital and Analog Communication Systems", Wiley India Edition,
3. 2008.

COURSE OUTCOMES:

- Understand the concept of various modulation schemes and multiplexing (L1).
- Apply the concept of various modulation schemes to solve engineering problems (L2).
- Analyse various modulation schemes, and evaluate various modulation scheme in real time applications (L3).

Blooms' Learning levels:
L1: Remembering and Understanding
L2: Applying
L3: Analyzing, Evaluating

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Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	FUNDAMENTALS OF VR/AR/MR					SEE	70 M

COURSE OBJECTIVES:
This course is designed to:
- Explore the history of spatial computing and design interactions
- Understand the foundational principles describing how hardware, computer vision algorithms function
- Learn Virtual reality animation and 3D Art optimization
- Demonstrate Virtual reality
- Introduce to the design of visualization tools

UNIT-I:
How Humans interact with Computers: Common term definition, introduction, modalities through the ages (pre- 20th century, through world war-II, post world war-II, the rise of personal computing, computer miniaturization), why did we just go over all of this?, types of common HCI modalities, new modalities, the current state of modalities for spatial computing devices, current controllers for immersive computing systems, a note on hand tracking and hand pose recognition.
Designing for our Senses, Not our Devices: Envisioning a future, sensory technology explained, who are we building this future for?, sensory design, five sensory principles, Adobe's AR story.

Learning Outcomes:
At the end of the unit, students will be able to:
- Explain common modalities and their pros and cons.(L2)
- Demonstrate Mapping modalities to current industry inputs(L2)
- Explore the importance of design with spatial computing(L5)

UNIT-II:
Virtual Reality for Art: A more natural way of making 3D art, VR for animation.
3D art optimization: Introduction, draw calls, using VR tools for creating 3D art, acquiring 3D models vs making them from scratch.
How the computer vision that makes augmented reality possible works: Who are we?, a brief history of AR, how and why to select an AR platform, mapping, platforms, other development considerations, the AR cloud.

Learning Outcomes:
At the end of the unit, students will be able to:
- Utilize VR tools for creating 3D Animations(L3)
- Analyze how and why to Select an AR Platform(L4)

UNIT-III:
Virtual reality and augmented reality: cross platform theory: Why cross platform? The role of game engines, understanding 3D graphics, portabiltity lessons from video game design, simplifying the controller input.
Virtual reality toolkit: open source framework for the community: What is VRTK and why people use it?, the history of VRTK, welcome to the steam VR unity toolkit, VRTK v4, the future of VRTK, success of VRTK.
Three virtual reality and augmented reality development practices: Developing for virtual reality and augmented reality, handling locomotion, effective use of audio, common interaction paradigms.

Learning Outcomes:
At the end of the unit, students will be able to:
- Explain why the design approach should be considered at a holistic high level based on the goal of the experience(L2)
- Build VR solutions using Virtual reality toolkit(L6)
- Interpret the development practices in three Virtual reality and Augmented reality development(L2)

UNIT-IV:
Data and machine learning visualization design and development in spatial computing: Introduction, understanding data visualization, principles for data and machine learning visualization design and development in spatial computing, why data and machine learning visualization works in spatial computing, 2D data visualization vs 3D data visualization in spatial computing, interactivity in data visualizations and in spatial computing, animation, failures in data visualization, good data visualization design optimize 3D spaces, data representations, info graphics, and interactions, defining distinctions in data visualization and big data for machine, how to create data visualization: data visualization creation pipeline, webXR, data visualization challenges in XR, data visualization industry use case examples of data visualization, 3D reconstruction and direct manipulation of real world data, data visualization is for everyone, hands on tutorials, how to create data visualization, resources.

Learning Outcomes:
At the end of the unit, students will be able to:
- Understand, define, and set data and machine visualization design and development principles in embodied reality(L1)
- Demonstrate best practices, and practical tools to create beautiful and functional data visualizations.(L2)

UNIT-V:
Character AI and Behaviors: Introduction, behaviors, current practice: Reactive AI, more intelligence in the system, Deliberative AI, machine learning.
The virtual and augmented reality health technology ecosystem: VR/AR health technology application design, standard UX isn't intuitive, tutorial: insight Parkinson's experiment, companies, case studies from leading Academic institutions.

Learning Outcomes:
At the end of the unit, students will be able to:
- Design a behavioral AI system for a video game(L6)
- Identify issues related to design of virtual reality (VR) and augmented reality (AR) experiences deployed in a health-care context(L3)
- Explain the use of motion data from controllers to reduce the visible tremor of a Parkinson's patient in a virtual environment(L2)

TEXT BOOK:
1. Erin Pangilinan, Steve lukas, and Vasanth Mohan, "Creating Augmented & Virtual Realities", 1st edition, O'REILLY, 2019.

REFERENCE BOOKS:
1. Steve Aukstakalnis, "Practical Augmented Reality", Pearson Education, 2017.

COURSE OUTCOMES:
Upon completion of the course, the students should be able to:
- Explain how the humans interact with computers (L2)
- Apply technical and creative approaches to make successful applications and experiences. (L3)
- Design audio and video interaction paradigms (L6)
- Design Data visualization tools (L6)
- Apply VR/MR/AR in various fields in industry (L3)

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Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	DATA SCIENCE					SEE	70 M

COURSE OBJECTIVES:
This course is designed to:
- Understand the approaches for handling data related problems
- Explore the mathematical concepts required for Data science
- Explain the basic concepts of data science.
- Elucidate various Machine Learning algorithms.
- Introduce Natural Language Processing and Recommender Systems

UNIT- I:
Introduction to Data Science, A Crash Course in Python, Visualising Data.

Learning Outcomes:
At the end of the unit, students will be able to:
- Describe the importance of data analysis (L1).
- Identify the key connectors of Data Science (L4).
- Interpret and Visualize the data using bar charts, line charts and scatter plots (L3).

UNIT-II:
Linear Algebra, Statistics, Probability, Hypothesis and Inference, Gradient Descent.

Learning Outcomes:
At the end of the unit, students will be able to:
- Identify the Correlation between two vectors (L4).
- Test a given hypothesis (L3).
- Compute mean, median and mode for the given data (L3).

UNIT-III:
Getting Data, Working with Data, Machine Leaning, k-Nearest Neighbors, Naïve Bayes.

Learning Outcomes:
At the end of the unit, students will be able to:
- Compute dimensionality reduction using PCA (L3).
- Differentiate supervised and unsupervised learning methods (L4).
- Describe overfitting, under fitting, bias, variance and goodness of learning (L1).
- Solve classification problem using k-nearest neighbour classifier (L3).
- Apply Naïve Bayes classifier to solve decision making problem (L3).

UNIT-IV:
Simple Linear Regression, Multiple Regression, Logistic Regression, Decision Trees, Neural Networks.

Learning Outcomes:
At the end of the unit, students will be able to:
- Describe gradient descent approach, maximum likelihood estimation and method of least squares (L1).
- Apply SVM to determine a hyperplane with maximum margin (L3).
- Determine decision tree for given data (L5).
- Describe Perceptron and Back Propagation (L3).

UNIT-V:
Clustering, Natural Language Processing, Network Analysis, Recommender Systems.
Database and SQL, MapReduce

Learning Outcomes:
At the end of the unit, students will be able to:
- Determine Clusters in data using k-means and Hierarchical Clustering methods (L5).
- Apply basic SQL Operations using NotQuiteABase (L3).
- Compare User-Based and Item-Based Collaborative Filtering (L2).
- Describe Grammer and MapReduce (L1).

TEXT BOOK:
1. Data Science from Scratch, First Principles with Python - Joel Grus, O'Reilly, First Edition.

REFERENCE BOOKS:
1. The Data Science Handbook, Field Cady, WILEY.
2. An Introduction to Data Science, Jeffrey M. Stanton, Jeffrey Stanton, 2012

COURSE OUTCOMES:
After completion of this course the student would be able to
- Visualize the data using bar charts, line charts and scatter plots (L4).
- Analyse Correlation between two data objects (L4).
- Demonstrate feature selection and dimensionality reduction.(L2)
- Solve decision making problems using k-NN, Naïve Bayes, SVM and Decision. Trees (L3).
- Determine Clusters in data using k-means and Hierarchical Clustering methods (L3).
- Design basic SQL Operations using NotQuiteABase (L6)
- Demonstrate the way to use machine learning algorithms using python. (L2)

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Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	FOOD TOXICOLOGY					SEE	70 M

PREAMBLE
This text covers about toxins and their relation in food. Examination, identification and prevention of toxins.

COURSE OBJECTIVES:
- To know the various toxins and their evaluation.
- To understand their tolerance and control measures.

UNIT – I:
Principles of Toxicology: classification of toxic agents; characteristics of exposure; spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity. Evaluation of toxicity: risk vs. benefit: experimental design and evaluation: prospective and retrospective studies: Controls :Statistics (descriptive, inferential): animal models as predictors of human toxicity: Legal requirements and specific screening methods: LD50 and TD50: in vitro and in vitvo studies; clinical trials.

Learning Outcomes:
At the end of unit, students will be able to understand the following
- Classification of toxic agents; characteristics of exposure;
- Spectrum of undesirable effects; interaction and tolerance; biotransformation and mechanisms of toxicity.
- Evaluation of toxicity: risk vs. benefit: experimental design and evaluation:
- Prospective and retrospective studies: Controls: Statistics (descriptive, inferential): animal models as predictors of human toxicity:
- Legal requirements and specific screening methods: LD50 and TD50: in vitro and in vitvo studies; clinical trials.

UNIT – II
Natural toxins in food: natural toxins of importance in food- toxins of plant and animal origin; microbial toxins (e.g., bacterial toxins, fungal toxins and Algal toxins), natural occurrence, toxicity and significance, determination of toxicants in foods and their management.

Learning Outcomes:
At the end of unit, students will be able to understand the following
- Natural toxins in food: natural toxins of importance in food- toxins of plant and animal origin
- Microbial toxins (e.g., bacterial toxins, fungal toxins and algal toxins), natural occurrence, toxicity and significance
- Determination of toxicants in foods and their management

UNIT – III:
Food allergies and sensitivities: natural sources and chemistry of food allergens; true/untrue food allergies; handling of food allergies; food sensitivities (anaphylactoid reactions, metabolic food disorders and

idiosyncratic reactions); Safety of genetically modified food: potential toxicity and allergenisity of GM foods. Safety of children consumables.

Learning outcomes:
At the end of unit, students will be able to understand the following

- Natural sources and chemistry of food allergens; true/untrue food allergies; handling of food allergies
- Food sensitivities (anaphylactoid reactions, metabolic food disorders and idiosyncratic reactions)
- Potential toxicity and allergenisity of gm foods. Safety of children consumables.

UNIT – IV:
Environmental contaminants and drug residues in food: fungicide and pesticide residues in foods; heavy metal and their health impacts; use of veterinary drugs (e.g. Malachite green in fish and β- agonists in pork); other contaminants in food, radioactive contamination of food, Food adulteration and potential toxicity of food adulterants.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Fungicide and pesticide residues in foods; heavy metal and their health impacts
- Use of veterinary drugs (e.g. Malachite green in fish and β- agonists in pork); other contaminants in food, radioactive contamination of food
- Food adulteration and potential toxicity of food adulterants.

UNIT – V:
Food additives and toxicants added or formed during food processing: safety of food additives; toxicological evaluation of food additives; food processing generated toxicants: nitroso-compounds, heterocyclic amines, dietary Supplements and toxicity related to dose: common dietary supplements; relevance of the dose; possible toxic effects.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Safety of food additives; toxicological evaluation of food additives;
- Nitroso-compounds, heterocyclic amines, dietary supplements and toxicity related to dose
- Common dietary supplements; relevance of the dose; possible toxic effects.

TEXT BOOKS:

1. Helferich, W., and Winter, C.K “Food Toxicology”,. CRC Press, LLC. Boca Raton, FL. 2007.
2. Shibamoto, T., and Bjeldanes, L. “Introduction to Food Toxicology”, 2009, 2nd Edition. Elsevier Inc., Burlington, MA.
3. Watson, D.H. “Natural Toxicants in Food”, CRC Press, LLC. Boca Raton, FL1998.

REFERENCE BOOKS:

1. Duffus, J.H., and Worth, H.G. J. “Fundamental Toxicology”, The Royal Society of Chemistry. 2006.
2. Stine, K.E., and Brown, T.M. “Principles of Toxicology”, 2nd Edition. CRC Press. 2006.
3. Tönu, P. “Principles of Food Toxicology”. CRC Press, LLC. Boca Raton, FL. 2007.

COURSE OUTCOMES:
By the end of course

- Student will gain knowledge on principles of toxicity and characteristics of toxins and their classification. Examination and prevention of toxins in foods and etc.

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Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	FOOD PLANT EQUIPMENT DESIGN					SEE	70 M

PREAMBLE
This text focuses on materials used for food plant equipment and factors considered for design of various equipment.

COURSE OBJECTIVES:
- To understand the material properties and codes used.
- To know the design considerations.
- To study the design of evaporators, dryers, crystallizers and etc.

UNIT – I:
Materials and properties: Materials for fabrication, mechanical properties, ductility, hardness, corrosion, protective coatings, corrosion prevention linings equipment, choice of materials, material codes. Design considerations: Stresses created due to static and dynamic loads, combined stresses, design stresses and theories of failure, safety factor, temperature effects, radiation effects, effects of fabrication method, economic considerations

Learning Outcomes:
At the end of unit, students will be able to understand the following
- Materials for fabrication, mechanical properties, ductility, hardness, corrosion, protective coatings
- Corrosion prevention linings equipment, choice of materials, material codes
- Stresses created due to static and dynamic loads, combined stresses, design stresses and theories of failure, safety factor
- Temperature effects, radiation effects, effects of fabrication method, economic considerations

UNIT – II
Design of pressure and storage vessels: Operating conditions, design conditions and stress; Design of shell and its component, stresses from local load and thermal gradient, mountings and accessories. Design of heat exchangers: Design of shell and tube heat exchanger, plate heat exchanger, scraped surface heat exchanger, sterilizer and retort

Learning Outcomes:
At the end of unit, students will be able to understand the following
- Design of pressure and storage vessels includes operating conditions, design conditions and stress
- Design of shell and its component, stresses from local load and thermal gradient, mountings and accessories
- Design of heat exchangers like shell and tube heat exchanger, plate heat exchanger, scraped surface heat exchanger, sterilizer and retort

UNIT – III:
Design of evaporators and crystallizers: Design of single effect and multiple effect evaporators and its components; Design of rising film and falling film evaporators and feeding arrangements for evaporators; Design of crystallizer and entrainment separator

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Design of evaporators like single effect and multiple effect evaporators and its components; rising film and falling film evaporators and feeding arrangements for evaporators;
- Design of crystallizer and entrainment separator

UNIT – IV:
Design of agitators and separators: Design of agitators and baffles; Design of agitation system components and drive for agitation. Design of centrifuge separator; Design of equipment components, design of shafts, pulleys, bearings, belts, springs, drives, speed reduction systems. Design of freezing equipment: Design of ice-ream freezers and refrigerated display system

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Design of agitators and baffles like Design of agitation system components and drive for agitation.
- Design of centrifuge separator like equipment components, design of shafts, pulleys, bearings, belts, springs, drives, speed reduction systems.
- Design of freezing equipment like ice-ream freezers and refrigerated display system

UNIT – V:
Design of dryers: Design of tray dryer, tunnel dryer, fluidized dryer, spray dryer, vacuum dryer, freeze dryer and microwave dryer. Design of extruders: Cold and hot extruder design, design of screw and barrel, design of twin screw extruder. Design of fermenters: Design of fermenter vessel, design problems

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Design of dryers like tray dryer, tunnel dryer, fluidized dryer, spray dryer, vacuum dryer, freeze dryer and microwave dryer
- Design of extruders like Cold and hot extruder design, design of screw and barrel, design of twin screw extruder.
- Design of fermenter vessel, design problems

TEXT BOOKS:

1. Antonio Lopez-Gomez, Gustavo V. Barbosa-Canovas, “Food plant design”, CRC press 2005.
2. George D. Saravacos and Zacharias B. Maroulis, “Food Plant Economics”, CRC Press 2007.

REFERENCES:

1. Peters M., Timmerhaus K. & Ronald W., “Plant Design & Economics for Chemical Engineers”, McGraw Hill.
2. James R Couper, “Process Engg. Economics (Chemical Industries) CRC Press 3. Aries & Newton, Chemical Engg. Cost Estimation”, McGraw Hill.

COURSE OUTCOMES:
By the end of the course, the students will

- Acquires knowledge on theoretical aspects to be design considerations for a food plant equipment and designing of evaporators, separators, storage vessels and etc.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	WAVELET TRANSFORMS AND ITS APPLICATIONS					SEE	70 M

COURSE OBJECTIVE:
This course provides the students to understand Wavelet transforms and its applications.

UNIT-I: Wavelets
Wavelets and Wavelet Expansion Systems - Wavelet Expansion- Wavelet Transform- Wavelet System- More Specific Characteristics of Wavelet Systems -Haar Scaling Functions and Wavelets -effectiveness of Wavelet Analysis -The Discrete Wavelet Transform The Discrete-Time and Continuous Wavelet Transforms.

Learning Outcomes:
Students will be able to
- Understand wavelets and wavelet expansion systems.
- Find wavelet transforms in continuous as well as discrete domains.

UNIT-II: A Multiresolution Formulation of Wavelet Systems
Signal Spaces -The Scaling Function -Multiresolution Analysis - The Wavelet Functions - The Discrete Wavelet Transform- A Parseval's Theorem - Display of the Discrete Wavelet Transform and the Wavelet Expansion.

Learning Outcomes:
Students will be able to
- Illustrate the multi resolution analysis, scaling function.
- Implement parseval theorem.

UNIT-III: Filter Banks and the Discrete Wavelet Transform
Analysis - From Fine Scale to Coarse Scale- Filtering and Down-Sampling or Decimating -Synthesis - From Coarse Scale to Fine Scale -Filtering and Up-Sampling or Stretching - Input Coefficients - Lattices and Lifting - - Different Points of View.

Learning Outcomes:
Students will be able to
- Form fine scale to coarse scale analysis.
- Perform decimating synthesis.
- Find the lattices and lifting.

UNIT-IV:
Multiresolution versus Time-Frequency Analysis- Periodic versus Nonperiodic Discrete Wavelet Transforms -The Discrete Wavelet Transform versus the Discrete-Time Wavelet Transform-Numerical Complexity of the Discrete Wavelet Transform.

Learning Outcomes:
Students will be able to
- Perform multi resolution versus time frequency analysis.
- Perform numerical complexity of discrete wavelet transforms.

UNIT-V:
Bases, Orthogonal Bases, and Biorthogonal Bases -Matrix Examples - Fourier Series Example - Sine Expansion Example - Frames and Tight Frames - Matrix Examples -Sine Expansion as a Tight Frame Example.

Learning Outcomes:
Students will be able to

- Understand the orthogonal bases and Biorthogonal Bases.
- Find the Frames and Tight Frames using Fourier series.

TEXT BOOKS:

1. C. Sidney Burrus, Ramesh A. Gopinath, “Introduction to Wavelets and Wavelets Transforms”,Prentice Hall, (1997).
2. James S. Walker, “A Primer on Wavelets and their Scientific Applications”, CRC Press, (1999).

REFERENCE BOOKS:

1. Raghuveer Rao, “Wavelet Transforms”, Pearson Education, Asia.

COURSE OUTCOMES:
After the completion of course, students will be able to

- Understand wavelets and wavelet expansion systems.
- Illustrate the multi resolution analysis ad scaling functions.
- Form fine scale to coarse scale analysis.
- Find the lattices and lifting.
- Perform numerical complexity of discrete wavelet transforms.
- Find the frames and tight frames using fourier series.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Open Elective -II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	SOFT SKILLS					SEE	70 M

COURSE OBJECTIVES:

- To develop awareness in students of the relevance and importance of soft skills
- To provide students with interactive practice sessions to make them internalize soft skills
- To develop Time management, Positive thinking & Decision making skills
- To enable to manage stress effectively
- To enable them to develop employability skills

UNIT – I: INTRODUCTION

Definition – Scope – Importance- – Methods of improving soft skills – Limits- Analysis – Interpersonal and intrapersonal skills - Verbal and Non-verbal skills.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of soft skills
- Identify the methods of improving soft skills
- Analyze various soft skills in different situations
- Distinguish various soft skills
- Apply various soft skills in day to day life and in workplace

UNIT – II: INTRAPERSONAL SKILLS

Knowing self/temperaments/traits - Johari windows – quotient skills(IQ, EQ, SQ), creativity, decision-making-Attitude – Confidence Building - Positive Thinking –Time Management – Goal setting.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand self and its temperament.
- Apply various techniques to know the self.
- Develop positive thinking
- Develop creative thinking and decision-making skills
- Apply self-knowing tools in day to day and professional life.

UNIT – III: INTERPERSONAL SKILLS

Leadership Skills – Negotiation skills –- Team-building – Crisis Management – Event Management –Ethics and Etiquettes.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of interpersonal skills
- Analyze various tactics in negotiation skills.
- Develop team building spirit.
- Develop crisis management
- Apply interpersonal skills through etiquettes.

UNIT – IV: VERBAL SKILLS
Importance of verbal skills in corporate climate, Listening skills –Mother Tongue Influence (MTI) - Speaking skills – Public speaking - Oral presentations - Writing skills –E-mail etiquettes – Memos - Indianism

Learning Outcomes:
At the end of the module, the learners will be able to

- Understand the importance of verbal skills in corporate climate.
- Explain the need of listening skills.
- Explore MTI and suggest remedies to avoid it.
- Interpret various contexts of speaking.
- Apply verbal skills in personal and professional life.

UNIT – V: NON-VERBAL SKILLS
Importance of body language in corporate culture – body language-Facial expressions – eye contact – posture – gestures – Proxemics – Haptics – Dress Code – Paralanguage –Tone, pitch, pause& selection of words

Learning Outcomes:
At the end of the module, the learners will be able to

- Comprehend the importance of non-verbal communication.
- Expound the need of facial expressions, postures and gestures.
- Analyze proxemics,haptics etc.
- Understand the importance of dress code.
- Apply various techniques to use para language

TEXT BOOKS:
1. Meenakshi Raman &ShaliniUpadhyay " Soft Skills",Cengage Learning, 2018.
2. S. Balasubramaniam, "Soft Skills for Interpersonal Communication", Orient Black Swan, 2017.

REFERENCES:
1. Barun K. Mitra, "Personality Development and Soft Skills**", –**OXFORD Higher Education 2018.
2. AlkaWadkar, "Life Skills for Success ", Sage Publications 2016.
3. Robert M Sheffield, "Developing Soft Skills", Pearson, 2010.
4. DianaBooher, "Communicate With Confidence",TataMcGrawhill, 2012.

COURSE OUTCOMES:
- Recognize the importance of verbal and non verbal skills
- Develop the interpersonal and intrapersonal skills
- Apply the knowledge in setting the SMART goals and achieve the set goals
- Analyze difficult situations and solve the problems in stress-free environment
- Create trust among people and develop employability skills

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Human Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	ENTREPRENEURSHIP & INCUBATION					SEE	70 M

COURSE OBJECTIVES:
The objective of this course is

- To make the student understand about Entrepreneurship
- To enable the student in knowing various sources of generating new ideas in setting up of New enterprise
- To facilitate the student in knowing various sources of finance in starting up of a business
- To impart knowledge about various government sources which provide financial assistance to entrepreneurs/ women entrepreneurs
- To encourage the student in creating and designing business plans

UNIT-I:
Entrepreneurship - Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality - Recent trends in Entrepreneurship.

Learning Outcomes:
At the end if the Unit, the learners will be able to

- Understand the concept of Entrepreneur and Entrepreneurship in India
- Know Entrepreneurship process and emergence of Entrepreneurship
- Analyze the differences between Entrepreneur and Intrapreneur
- Develop a creative mind set and personality
- Understand recent trends in Entrepreneurship across the globe

UNIT-II:
Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas - Opportunity recognition - Feasibility study - Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

Learning Outcomes:
At the end if the Unit, the learners will be able to

- Know the process of starting a new venture
- Analyze the sources of new methods in generating business idea
- Evaluate market feasibility, financial feasibility and technical feasibility
- Design and draw business plans in project preparation and prepare project reports

UNIT-III:
Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India - NBFC's in India - their way of financing in India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions in aid of entrepreneurship development

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Know the various sources of finance to start a new venture
- Contrast & compare between Long term & Short term finance sources
- Analyze the role of banks and other financial institutions in promoting entrepreneurship in India
- Evaluate the need and importance of MSMEs in the growth of country

UNIT-IV:

Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India - Issues & Challenges - Entrepreneurial motivations.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand the role of government in promoting women entrepreneurship
- Know various incentives, subsidies and grants available to women entrepreneurs
- Analyze the role of export-oriented units
- Know about the tax concessions available for Women entrepreneurs
- Prepare to face the issues and challenges.

UNIT-V:

Fundamentals of Business Incubation - Principles and good practices of business incubation-Process of business incubation and the business incubator and how they operate and influence the Type/benefits of incubators - Corporate/educational / institutional incubators - Broader business incubation environment - Pre-Incubation and Post - Incubation process - Idea lab, Business plan structure - Value proposition

Learning Outcomes:

At the end of the Unit, the learners will be able to:

- Understand the importance of business incubation
- Apply brilliant ideas in the process of business incubation
- Analyze the process of business incubation/incubators.
- Contrast & Compare between business incubation and business incubators.
- Design their own business incubation/incubators as viable-business unit.

TEXT BOOKS:

1. D F Kuratko and T V Rao, "Entrepreneurship" - A South-Asian Perspective – Cengage Learning, 2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com)
2. Nandan H, " Fundamentals of Entrepreneurship", PHI, 2013

REFERENCES:

1. Vasant Desai, "Small Scale Industries and Entrepreneurship", Himalaya Publishing 2012.
2. Rajeev Roy "Entrepreneurship", 2nd Edition, Oxford, 2012.
3. B.JanakiramandM.Rizwanall"Entrepreneurship Development: Text & Cases", Excel Books, 2011.
4. Stuart Read, Effectual "Entrepreneurship", Routledge, 2013.

E-RESOURCES:

1. Entrepreneurship-Through-the-Lens-of-enture Capital
2. http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship
3. http://nptel.ac.in/courses/122106032/Pdf/7_4.pd
4. http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurhip/50

COURSE OUTCOMES:

At the end of the course, students will be able to

- Understand the concept of Entrepreneurship and challenges in the world of competition.
- Apply the Knowledge in generating ideas for New Ventures.
- Analyze various sources of finance and subsidies to entrepreneur/women Entrepreneurs.
- Evaluate the role of central government and state government in promoting Entrepreneurship.
- Create and design business plan structure through incubations.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Human Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS					SEE	70 M

COURSE OBJECTIVES:
The objective of this course is
- To inculcate the basic knowledge of micro economics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To know the various types of Market Structures & pricing methods and its strategies
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on Accounting and to explain the process of preparing Financial statements

UNIT -I: INTRODUCTION TO MANAGERIAL ECONOMICS DEMAND
Managerial Economics – Definition – Nature & Scope - Contemporary importance of Managerial Economics - Demand Analysis - Concept of Demand - Demand Function - Law of Demand - Elasticity of Demand - Significance - Types of Elasticity - Measurement of Elasticity of Demand - Demand Forecasting - Factors governing Demand Forecasting - Methods of Demand Forecasting - Relationship of Managerial Economics with Financial Accounting and Management.

Learning Outcomes:
At the end of the Unit, the learners will be able to
- Know the nature and scope of Managerial Economics and its importance
- Understand the concept of demand and its determinants
- Analyze the Elasticity and degree of elasticity
- Evaluate Demand forecasting methods
- Design the process of demand estimation for different types of demand

UNIT -II: THEORY OF PRODUCTION AND COST ANALYSIS
Production Function – Least-cost combination - Short-run and Long-run Production Function - Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale
Cost & Break Even Analysis - Cost concepts and Cost behavior - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems) - Managerial significance and limitations of Break-Even Analysis.

Learning Outcomes:
At the end of the Unit, the learners will be able to
- Know the production function, Input-Output relationship and different cost concepts
- Apply the least-cost combination of inputs
- Analyze the behavior of various cost concepts
- Evaluate BEA for real time business decisions
- Develop profit appropriation for different levels of business activity

UNIT –III: INTRODUCTION TO FORMS OF BUSINESS ORGANIZATIONS AND MARKETS

Market structures - Forms of Business Organizations - Sole Proprietorship - Partnership - Joint Stock Companies - Public Sector Enterprises-Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition – Monopoly - Monopolistic Competition – Oligopoly - Price-Output Determination - Pricing Methods and Strategies.

Learning Outcomes:
At the end of the Unit, the learners will be able to

- Know the structure of markets, features of different markets and forms of business organizations
- Apply the price output relationship in different markets
- Analyze the optimum output levels to maximize profit in different markets
- Evaluate price-output relationship to optimize cost, revenue and profit
- Interpret Pricing Methods and Strategies

UNIT -IV:
CAPITAL AND CAPITAL BUDGETING Concept of Capital - Significance **-** Types of Capital **-** Components of Working Capital - Sources of Short-term and Long-term Capital - Estimating Working capital requirements – Cash Budget
Capital Budgeting – Features ofCapital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Learning Outcomes:
At the end of the Unit, the learners will be able to

- Know the concept of capital budgeting and its importance in business
- Contrast and compare different investment appraisal methods
- Analyze the process of selection of investment alternatives using different appraisal methods
- Evaluate methods of capital budgeting for investment decision making and for maximizing returns
- Design different investment appraisals and make wise investments

UNIT –V:
INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS
Accounting Concepts and Conventions - Introduction Double-Entry Book Keeping, Journal, Ledger, Trial Balance - Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).
Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Learning Outcomes:
At the end of the Unit, the learners will be able to

- Know the concept, convention and significance of accounting
- Apply the fundamental knowledge of accounting while posting the journal entries
- Analyze the process and preparation of final accounts and financial ratios
- Evaluate the financial performance of an enterprise by using financial statements

Data Books Required:
Present Value Factors table

TEXT BOOKS:

1. Varshney &Maheswari: “Managerial Economics”, Sultan Chand, 2013.
2. Aryasri: “Business Economics and Financial Analysis”, 4th edition, MGH, 2019

REFERENCE BOOKS:

1. Ahuja Hl “Managerial economics” 3rd edition, Schand, ,2013
2. S.A. Siddiqui and A.S. Siddiqui: “Managerial Economics and Financial Analysis”, New Age International,. 2013.
3. Joseph G. Nellis and David Parker: “Principles of Business Economics”, 2nd edition, Pearson, New Delhi.
4. Domnick Salvatore: “Managerial Economics in a Global Economy”, Cengage, 2013.

COURSE OUTCOMES:

At the end of the course, students will be able to

- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
- Apply concepts of production , cost and revenues for effective business decisions
- Students can analyze how to invest their capital and maximize returns
- Evaluate the capital budgeting techniques
- Prepare the accounting statements and evaluate the financial performance of business entity.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Human Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	BUSINESS ETHICS AND CORPORATE GOVERNANCE					SEE	70 M

COURSE OBJECTIVES:
The objectives of this course are
- To make the student understand the principles of business ethics
- To enable them in knowing the ethics in management
- To facilitate the student role in corporate culture
- Impart knowledge about the fair trade practices
- Encourage the student in knowing them about the corporate governance

UNIT -I:
Introduction – Meaning - Nature and Scope – Loyalty and Ethical Behaviour, Values across Cultures; Business Ethics – Ethical Practices inManagement. Types of Ethics –
Characteristics – Factors influencing , Business Ethics – Importance of Business Ethics - Arguments for and against business ethicsBasics of business ethics Corporate Social Responsibility – Issues of Management – Crisis Management

Learning Outcomes:
After completion of this unit student will
- Understand the meaning of loyalty and ethical Behavior
- Explain various types of Ethics
- Know about the factors influencing business ethics
- Understand the corporate social responsibility of management

UNIT –II: ETHICS IN MANAGEMENT
Introduction – Ethics in HRM – Marketing Ethics – Ethical aspects of Financial Management-Technology Ethics and Professional ethics. The Ethical Value System – Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individual Ethics.

Learning Outcomes:
After completion of this unit student will
- Understand the meaning of Marketing Ethics
- Analyze Differentiate between Technical ethics and professional ethics
- Know about the ethical value system
- Understand the Code and culture

UNIT-III: ROLE OF CORPORATE CULTURE IN BUSINESS
Meaning – Functions – Impact of corporate culture – cross cultural issues in ethics,Emotional Honesty – Virtue of humility – Promote happiness – karma yoga – proactive – flexibility and purity of mind. The Ethical Value System – Universalism, Utilitarianism, Distributive Justice, Social Contracts, Individual Freedom of Choice, Professional Codes; Culture and Ethics – Ethical Values in different Cultures, Culture and Individua Ethics.

Learning Outcomes:
After completion of this unit student will

- Understand the corporate culture in business
- Analyze Ethical Value System Know about the ethical value system
- Know Universalism, Utilitarianism, Distributive Justice
- Differentiate Ethical Values in different Cultures

UNIT- IV:
Law and Ethics – Relationship between Law and Ethics, Other Bodies in enforcing Ethical Business Behavior, Social Responsibilities of Business – Environmental Protection, Fair Trade Practices, Fulfilling all Nation Safeguarding Health and wellbeing of Customers.

Learning Outcomes:
After completion of this unit student will

- Understand Law and Ethics
- Analyze Social Responsibilities of Business
- Know Environmental Protection and Fair Trade Practices
- Implementing National Safeguarding Health and wellbeing of Customers

UNIT –V:
CORPORATE GOVERNANCE
Meaning – scope - Issues, need, corporate governance code, transparency & disclosure, role of auditors, board of directors and shareholders; Global issues of governance, accounting and regulatory frame work, corporate scams, committees in India and abroad, corporate socialresponsibility composition of BODs - Cadbury Committee - various committees - reports on corporate governance - Benefits and Limitations of Corporate Governance with living examples.

Learning Outcomes:
After completion of this unit student will

- Understand corporate governance code
- Analyze role of auditors, board of directors and shareholders
- Know accounting and regulatory frame work
- Implementing corporate social responsibility

TEXT BOOKS:

1. Murthy CSV: "Business Ethics and Corporate Governance", HPH
2. Bholananth Dutta, S.K. Podder – "Corporation Governance", VBH.

REFERENCE BOOKS:

1. Dr. K. Nirmala, KarunakaraReaddy : "Business Ethics and Corporate Governance", HPH
2. H.R.Machiraju: "Corporate Governance"
3. K. Venkataramana, "Corporate Governance", SHBP.
4. N.M.Khandelwal : "Indian Ethos and Values for Managers"

COURSE OUTCOMES:
At the end of the course, students will be able to

- Understand business ethics and ethical practices in management.
- Understand the role of ethics in management

- Apply the knowledge in cross cultural ethics
- Analyze law and ethics
- Evaluate corporate governance

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Human Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	ENTERPRISE RESOURCE PLANNING					SEE	70 M

COURSE OBJECTIVES:
The objectives of this course are

- To provide a contemporary and forward-looking on the theory and practice of
- Enterprise Resource Planning
- To enable the students in knowing the Advantages of ERP
- To train the students to develop the basic understanding of how ERP enriches the
- Business organizations in achieving a multidimensional growth.
- Impart knowledge about the historical background of BPR
- To aim at preparing the students, technologically competitive and make them ready to self-upgrade with the higher technical skills.

UNIT-I: Introduction to ERP
Enterprise – An Overview Integrated Management Information, Business Modeling, Integrated Data Model Business Processing Reengineering(BPR), Data Warehousing, Data Mining, On-line Analytical Processing(OLAP), Supply Chain Management (SCM), Customer Relationship Management(CRM),

Learning Outcomes:
After completion of this unit student will

- Understand the concept of ERP
- Explain various Business modeling
- Know the contemporary technology like SCM, CRM
- Understand the OLAP

UNIT-II: Benefits of ERP
Reduction of Lead-Time, On-time Shipment, Reduction in Cycle Time, Improved Resource Utilization, Better Customer Satisfaction, Improved Supplier Performance, Increased Flexibility, Reduced Quality Costs, Improved Information Accuracy and Design-making Capability

Learning Outcomes:
After completion of this unit student will

- Understand the Advantages of ERP
- Explain the challenges associated with ERP System
- Analyze better customer satisfaction
- Differentiate Improved Information Accuracy and Design-making Capability

UNIT-III: ERP Implementation Lifecycle Pre-evaluation Screening, Package Evaluation, Project Planning Phase, Gap Analysis, Reengineering, Configuration, Implementation Team Training, Testing, Going Live, End-user Training, Post-implementation (Maintenance mode)

Learning Outcomes:
After completion of this unit student will

- Understand the implementation of ERP life cycle

- Explain the challenges associated with implementing ERP system
- Analyze the need of re-engineering
- Know the recent trends in team training testing and go-live

UNIT-IV: BPR
Historical background: Nature, significance and rationale of business process reengineering (BPR), Fundamentals of BPR. Major issues in process redesign: Business vision and process objectives, Processes to be redesigned, Measuring existing processes,

Learning Outcomes:
After completion of this unit student will

- Understand the business process reengineering
- Explain the challenges associated with BPR
- Analyze the need of process redesign
- Differentiate between process to be redesign and measuring existing process

UNIT-V: IT in ERP
Role of information technology (IT) and identifying IT levers. Designing and building a prototype of the new process: BPR phases, Relationship between BPR phases. MIS - Management Information System, DSS - Decision Support System, EIS - Executive Information System.

Learning Outcomes:
After completion of this unit student will

- Understand the role of IT
- Explain the challenges in Designing and building a prototype of the new process
- Analyze the need of MIS
- Differentiate between DSS and EIS

TEXT BOOKS:

1. Pankaj Sharma. “Enterprise Resource Planning”. Aph Publishing Corporation, New Delhi, 2004.
2. Alexis Leon, “Enterprise Resource Planning”, IV Edition, Mc.Graw Hill, 2019

REFERENCE BOOKS:

1. Marianne Bradford “Modern ERP”, 3rd edition.
2. “ERP making it happen Thomas f. Wallace and Michael
3. Directing the ERP Implementation Michael w pelphrey

COURSE OUTCOMES:
At the end of the course, students will be able to

- Understand the basic use of ERP Package and its role in integrating business functions.
- Explain the challenges of ERP system in the organization
- Apply the knowledge in implementing ERP system for business
- Evaluate the role of IT in taking decisions with MIS
- Create reengineered business processes with process redesign

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Human Elective -I	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	SUPPLY CHAIN MANAGEMENT					SEE	70 M

COURSE OBJECTIVES:
The objectives of this course are

- To provide Knowledge on logistics and supply chain management
- To enable them in designing the distribution network
- To train the students in knowing the supply chain Analysis
- Impart knowledge on Dimensions of logistic
- To know the recent trends in supply chain management

UNIT-I: Introduction to Supply Chain Management
Supply chain - objectives - importance - decision phases - process view -competitive and supply chain strategies - achieving strategic fit – supply chain drivers - obstacles – framework - facilities -inventory-transportation-information-sourcing-pricing.

Learning Outcomes:
After completion of this unit student will

- Understand the meaning and objectives of supply chain management
- Explain supply chain drivers
- Know the steps involved in SCM frame work
- Understand transportation information and pricing

UNIT-II: Designing the distribution network
Role of distribution - factors influencing distribution - design options - e-business and its impact – distribution networks in practice –network design in the supply chain - role of network -factors affecting the network design decisions modeling for supply chain. Role of transportation - modes and their performance – transportation infrastructure and policies - design options and their trade-offs tailored transportation.

Learning Outcomes:
After completion of this unit student will

- Understand the different distribution network
- Explain the factors influencing network design in the supply chain
- Know the Role of transportation
- Analyze design options and their trade-offs

UNIT-III: Supply Chain Analysis
Sourcing - In-house or Outsource - 3rd and 4th PLs - supplier scoring and assessment, selection - design collaboration - Procurement process - Sourcing planning and analysis. Pricing and revenue management for multiple customers, perishable products, seasonal demand, bulk and spot contracts.

Learning Outcomes:

After completion of this unit student will

- Understand the concept of supply chain Analysis
- Explain design collaboration
- Know procurement process -sourcing planning and analysis
- Understand seasonal demand, bulk and spot contracts

UNIT-IV: Dimensions of Logistics

A macro and micro dimension - logistics interfaces with other areas - approach to analyzing logistics systems - logistics and systems analysis - techniques of logistics system analysis - factors affecting the cost and importance of logistics. Demand Management and Customer Service Outbound to customer logistics systems - Demand Management –Traditional Forecasting - CPFRP - customer service - expected cost of stock outs - channels of distribution.

Learning Outcomes:

After completion of this unit student will

- Understand dimensions of logistics
- Explain logistics interfaces with other areas
- Know techniques of logistics system analysis
- Understand Demand Management

UNIT-V: Recent Trends in Supply Chain Management

Introduction, New Developments in Supply Chain Management, Outsourcing Supply Chain Operations, Co-Maker ship, The Role of E-Commerce in Supply Chain Management, Green Supply Chain Management, Distribution Resource Planning, World Class Supply Chain Management

Learning Outcomes:

After completion of this unit student will

- Understand the recent trend in supply chain management
- Explain The Role of E-Commerce in Supply Management
- Know Green Supply Chain Management
- Understand Distribution Resource Planning

TEXT BOOKS:

1. Sunil Chopra and Peter Meindl, Supply Chain Management – “Strategy, Planning and Operation”, 3rd Edition, Pearson/PHI, 2007.
2. Supply Chain Management by Janat Shah Pearson Publication 2008.

REFERENCE BOOKS:

1. A Logistic approach to Supply Chain Management – Coyle, Bardi, Longley, Cengage Learning, 1/e
2. Donald J Bowersox, Dand J Closs, M Bixby Coluper, “Supply Chain Logistics Management”, 2nd edition, TMH, 2008.
3. Wisner, Keong Leong and Keah-Choon Tan, “Principles of Supply Chain Management A Balanced Approach”, Cengage Learning, 1/e
4. David Simchi-Levi et al, “Designing and Managing the Supply Chain” – Concepts

COURSE OUTCOMES:

At the end of the course, students will be able to

- Understand the strategic role of logistic and supply chain management in the cost reduction and offering best service to the customer
- Understand Advantages of SCM in business
- Apply the knowledge of supply chain Analysis
- Analyze reengineered business processes for successful SCM implementation
- Evaluate Recent trend in supply chain managem.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Practical	L	T	P	C	Exam	3 Hrs
Course Code	:		0	0	3	1.5	CIA	30 M
Course Title	:	GEOTECHNICAL ENGINEERING LAB					SEE	70 M

COURSE OBJECTIVES:
The object of the course is to enable the students to know the various characteristics soils

LABORATORY EXPERIMENTS

1. Specific gravity
2. Atterberg's Limits.
3. Field density-Core cutter and Sand replacement methods
4. Grain size analysis by sieving
5. Hydrometer Analysis Test
6. Permeability of soil - Constant and Variable head tests
7. Compaction test
8. Consolidation test (to be demonstrated)
9. Direct Shear test
10. Triaxial Compression test (UU Test)
11. Unconfined Compression test
12. Vane Shear test
13. Differential free swell (DFS)
14. CBR Test

TEXT BOOKS:
1. K. R. Arora, "Soil Mechanics and Foundation Engg"., Standard Publishers and Distributors, Delhi.
2. C. Venkataramiah, "Geotechnical Engineering", New age International Pvt . Ltd, (2002).

REFERENCE BOOKS:
1. B. C. Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Soil Mechanics and Foundation", Laxmi publications Pvt. Ltd., New Delhi.
2. Gopal Ranjan & A. S. R. Rao, "Basic and Applied Soil Mechanics", New age International Pvt . Ltd, New Delhi.
3. Braja M. Das "Principles of Geotechnical Engineering", Cengage Learning.

COURSE OUTCOMES:
At the end of the course, the student must be able to:
- Identify various soils based on their characteristics.
- Evaluate permeability and seepage of soils.
- Determine plasticity characteristics of various soils.
- Design consolidation process by predicting settlement of soils.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Practical	L	T	P	C	Exam	3 Hrs
Course Code	:		0	0	3	1.5	CIA	30 M
Course Title	:	ENGLISH LANGUAGE SKILLS LAB					SEE	70 M

COURSE OBJECTIVES:
- Students will be exposed to a variety of self instructional, learner friendly modes of language learning
- Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like gre, toefl, and gmat etc.
- Students will learn better pronunciation through stress, intonation and rhythm
- Students will be trained to use language effectively to face interviews, group discussions, public speaking
- Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

UNIT -I:
1. Phonetics for listening comprehension of various accents - 2
2. Formal Presentations using PPT slides without Graphic Elements
3. Paraphrasing

Learning Outcomes:
At the end of the module, the learners will be able to
- Understand different accents spoken by native speakers of English
- Make formal structured presentations on general topics using PPT slides without graphical elements
- Paraphrase short academic texts using suitable strategies and conventions

UNIT -II:
1. Debate – 2 (Following Argument)
2. Listening to short speeches/ short stories for note-making and summarizing
3. E-mail Writing

Learning Outcomes:
At the end of the module, the learners will be able to
- Participate in formal discussions and speak clearly on a specific topic using suitable discourse markers
- Make formal structured presentations on academic topics using ppt slides with relevant graphical elements
- Write formal emails in the standard format

UNIT -III:
1. Listening for Discussions
2. Group Discussions
3. Writing Persuasive/argumentative essays on general topics

Learning Outcomes:
At the end of the module, the learners will be able to
- Follow a discussion to identify the salient points
- Participate in group discussions using appropriate conventions and language strategies
- Produce logically coherent persuasive/argumentative essays

UNIT-IV
1. Reviewing film/ book
2. Group Discussions – reaching consensus in Group Work
3. Resume Writing – Cover Letter – Applying for Internship

Learning Outcomes:
At the end of the module, the learners will be able to
- Judge a film or book
- Express thoughts and ideas with acceptable accuracy and fluency with a view to reach consensus in group discussions
- Prepare a cv and write a cover letter to seek internship/ job

UNIT –V:
1. Writing Project Reports
2. Editing Short Texts
3. Answering FAQs in Interviews

Learning Outcomes:
At the end of the module, the learners will be able to
- Collaborate with a partner to make effective presentations
- Understand the structure and produce an effective project report.
- Edit short texts according to different needs of the work place.

SUGGESTED SOFTWARE:
1. Walden Infotech English Language Communication Skills.
2. iTell- Orell Digital Language Lab
3. Digital Teacher
4. LES(Learn English Select) by British council
5. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
6. *DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.*
7. Lingua TOEFL CBT Insider, by Dreamtech
8. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
9. Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:
The software consisting of the prescribed topics elaborated above should be procured and used.

1. Meenakshi Raman &Sangeeta Sharma, "Technical Communication**"** O U Press 2009.
2. Barron's Books on TOEFL/GRE/GMAT/CAT/IELTS /DELTA/Cambridge University Press.2012.
3. Butterfield Jeff, "Soft Skills for Everyone"**,** Cengage Publications, 2011.
4. "Practice Psychometric Tests": How to familiarize yourself with genuine recruitment tests, 2012.
5. David A McMurrey& Joanne Buckely**"**Handbook for Technical Writing**"** CENGAGE Learning 2008.
6. "A Textbook of English Phonetics for Indian Students", 2nd Edition, T.Balasubramanyam.(Macmillan),2012.
7. "A Handbook for English Laboratories", E. Suresh Kumar, P. Sreehari, Foundation Books, 2011

Note: Links provided by APSHE on LSRW, grammar and vocabulary

COURSE OUTCOMES:

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
- Apply communication skills through various language learning activities
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional settings
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Practical	L	T	P	C	Exam	3 Hrs
Course Code	:		0	0	0	0.5	CIA	50 M
Course Title	:	SOCIALLY RELAVENT PROJECT					SEE	00 M

Areas for Socially Relevant Project in 6th Semester

a) Structural condition assessment of school buildings

b) Water resources management -Audit

c) Survey of waste management systems-Swatch Bharat

d) Survey of modern building materials & properties

e) Survey on Implementation of Government welfare schemes

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VI Semester Civil Engineering)

Course Category	:	Practical	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	0	CIA	30 M
Course Title	:	MANDATORY COURSE: RESEARCH METHODOLOGY					SEE	00 M

COURSE OBJECTIVES:
The objective of this course is

- To understand the basic concepts of research and research problem
- To make the students learn about various types of data collection and sampling design
- To enable them to know the method of statistical evaluation
- To make the students understand various testing tools in research
- To make the student learn how to write a research report
- To create awareness on ethical issues n research

UNIT- I:
Meaning of Research – Objectives of Research – Types of Research – Research Approaches – Guidelines for Selecting and Defining a Research Problem – Research Design – Concepts related to Research Design – Basic Principles of Experimental Design.

Learning Outcomes:
After completion of this unit student will

- Understand the concept of research and its process
- Explain various types of research
- Know the steps involved in research design
- Understand the different research approaches

UNIT -II:
Sampling Design – steps in Sampling Design –Characteristics of a Good Sample Design – Random Sampling Design. Measurement and Scaling Techniques-Errors in Measurement – Tests of Sound Measurement – Scaling and Scale Construction Techniques – Time Series Analysis – Interpolation and Extrapolation. Data Collection Methods – Primary Data – Secondary data – Questionnaire Survey and Interviews.

Learning Outcomes:
After completion of this unit student will

- Understand the concept of sampling and sampling design
- Explain various techniques in measurement and scaling
- Learn various methods of data collection
- Design survey questionnaires for different kinds of research
- Analyze the questionnaires

UNIT- III:
Correlation and Regression Analysis – Method of Least Squares – Regression vs Correlation – Correlation vs Determination – Types of Correlations and Their Applications

Learning Outcomes:
After completion of this unit student will

- Know the association of two variables

- Understand the importance of correlation and regression
- Compare and contrast correlation and regression
- Learn various types of correlation
- Apply the knowledge of C&R Analysis to get the results

UNIT -IV:
Statistical Inference: Tests of Hypothesis – Parametric vs Non-parametric Tests – Hypothesis Testing Procedure – Sampling Theory – Sampling Distribution – Chi-square Test – Analysis of variance and Co-variance – Multivariate Analysis

Learning Outcomes:
After completion of this unit student will

- Know the statistical inference
- Understand the hypothesis testing procedure
- Compare and contrast Parametric and Non-parametric Tests
- Understand the use of chi-square test in investigating the distribution of categorical variables
- Analyze the significance of variance and covariance

UNIT -V
Report Writing and Professional Ethics: Interpretation of Data – Report Writing – Layout of a Research Paper – Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars – Professional Ethics in Research.

Learning Outcomes:
After completion of this unit student will

- Learn about report writing
- Understand how to write research paper
- Explain various techniques of interpretation
- Understand the importance of professional ethics in research
- Design a scientific paper to present in the conferences/seminars

TEXT BOOKS:

1. C.R.Kothari, "Research Methodology:Methods and Techniques",2nd edition, New Age International Publishers.
2. A Step by Step Guide for Beginners, "Research Methodology": Ranjit Kumar, Sage Publications

REFERENCES:

1. P.Narayana Reddy and G.V.R.K.Acharyulu, "Research Methodology and Statistical Tools", 1st Edition, Excel Books,New Delhi.
2. Donald R. "Business Research Methods", Cooper & Pamela S Schindler, 9th edition.
3. S C Gupta, "Fundamentals of Statistics", 7th edition Himalaya Publications

COURSE OUTCOMES:
At the end of the course, students will be able to

- Understand basic concepts and its methodologies
- Demonstrate the knowledge of research processes
- Read. comprehend and explain research articles in their academic discipline

- Analyze various types of testing tools used in research
- Design a research paper without any ethical issues

B.TECH - VII SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:		2	1	0	3	CIA	30 M
Course Title	:	**GEOTECHNICAL ENGINEERING-II**					SEE	70 M

COURSEOBJECTIVES:

- To know the necessity of soil exploration.
- To design the shallow foundations.
- To know and necessity of deep foundations
- To perform the stability analysis of slopes.
- To know the principles and design of earth retaining walls

To use the principles of Soil mechanics to design the foundations, Earth retaining structures and slope stability safely and economically knowledge of the subject is essential.

UNIT I SOIL EXPLORATION
Need–Methods of soil exploration– Boring and Sampling methods-Field tests–Penetration Tests–Plate load test–Pressure meter–planning of Programme and preparation of soil investigation report.

Learning Outcomes:
After completing this Unit,students will be able to

- To learn about soil sampling (undisturbed and disturbed)
- To determine the bearing capacity of shallow foundations

UNIT II SHALLOW FOUNDATIONS:
Types – choice of foundation – Location of depth – Safe Bearing Capacity–Terzaghi`s, Meyerhoff "sand Skempton`s Methods. Allowable bearing pressure: Safe bearing pressure based on N-value–allowable bearing pressure; safe bearing capacity and settlement from plate load test – allowable settlements of structures– Settlement Analysis

Learning Outcomes:
After completing this unit,students will be able to

- To learn about various types of foundations
- To calculate the bearing capacity and settlement of foundations

UNIT III
PILE FOUNDATION: Types of piles – Load carrying capacity of piles based on static pile formulae – Dynamic pile formulae – Pile load tests – Load carrying capacity of pile groups insandsand clays–Settlement of pile groups.

WELL FOUNDATIONS: Types – Different shapes of wells – Components of wells –function sand Design Criteria – Sinking of wells - Tilts and shifts.

LearningOutcomes:

After completing this unit students will be able to

- To understand the behavior of the piles under different loading conditions.
- To design the load carrying capacity of piles.
- To understand the behavior of well foundations.

UNIT– IV: EARTH SLOPE STABILITY

Infinite and finite earth slopes – types of failures – factor of safety of infinite slopes – stability analysis by Swedish arc method, standard method of slices, Bishop's Simplified method – Taylor's Stability Number-Stability of slopes of earthdams under differentconditions**.**

Learning Outcomes:

After completing this unit,students will be able to

- To learn about the failure of slopes.
- To design of infinite and finite slopes using various methods.

UNIT– V EARTH PRESSURE THEORIES:

Rankine's theory of earth pressure – earth pressures in layered soils–Coulomb's earth pressure theory–Rebhann's and Culmann's graphical method .

RETAINING WALLS:Types of retaining walls–stability of retaining walls.

Learning Outcomes:

After completing this unit,students will be able to

- To understand the role earth pressure on the stability of retaining systems.

COURSE OUTCOMES:

- To enable the student to analyse shallow and deep foundations when subjected to various types of loadings.
- To enable the student to analyse slopes,retaining walls and well foundations.

TEXTBOOKS:

1. C.Venkataramaiah," Geotechnical Engineering", New Age Pubilications.
2. Arora,"Soil Mechanics and Foundation Engineering" Standard Publishers and Distributors, Delhi
3. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, Soil Mechanics and Foundations
   Laxmi, publications Pvt .Ltd., NewDelhi

REFERENCE BOOKS:

1. Purushtoma Raj,"Soil Mechanics and Foundation Engineering", Pearson Pubilications
2. Das, B.M.,"Principles of Foundation Engineering", 6thedition (Indian edition) Thomson Engineering (1999)
3. Varghese, P.C.,"Foundation Engineering",Prentice Hall of India., New Delhi.
4. V.N.S.Murthy,"Foundation Engineering", CRC Press, New Delhi.
5. Bowles,J.E.,"Foundation Analysis and Design", 4th Edition, Mc Graw - Hill Publishing company, New york.
6. Manoj Dutta & Gulati S.K"Geotechnical Engineering", Tata Mc.Graw hill Publishers New Delhi.(1988)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:		2	1	0	3	CIA	30 M
Course Title	:	**ESTIMATION AND COSTING**					SEE	70 M

COURSE OBJECTIVES:
- To impart basic knowledge on different types of estimation
- To enrich with specifications and tender procedures.
- To give insights on various types of contract agreements.
- To inculcated at a preparation for abstract estimation
- To teach procedure for valuation of buildings.

UNIT-I: **Estimation**
Methods of estimation-advantages- types of estimates-detailed estimates of residential buildings-single storied and multi-storied buildings-earthwork-foundations-Super structure-Fittings including sanitary and electrical fittings-paintings.

Learning Outcomes:
After completing this unit,students will be able to
- Understand methods of Estimation
- Carry out estimation of quantities for structural components
- Estimate cost while using different types of sanitary and electrical fittings

UNIT-II: Specifications and Tenders
Specifications-Detailed and general specifications-construction specifications-sources- types of specifications-Tender notices-types-corrigendum notice-tender procedures Drafting model tenders.

Learning Outcomes:
After completing this unit ,students will be able to
- Prepare detailed and general specifications for a project
- Understand tender schedule and tender notices
- Draft tender documents for projects

UNIT-III: Contracts
Types of contracts – formation and conditions of contract – problems – contract for labor, material, design and construction – drafting of contract documents –construction contracts-arbitration and legal requirements.

Learning Outcomes:
After completing this unit, students will be able to
- Prepare documents for different types of contracts
- Identify arbitration and legal issues and mitigation methods

UNIT-IV: Rate Analysis and Preparation of Bills
Data-Rate analysis-abstract estimate-report to accompany estimate-measurement book–bills-types

Learning Outcomes:
After completing this unit, students will be able to

- Calculate data for different materials
- Understand procedures for entries in measurement books and its importance
- Prepare abstract estimates based on SSR.

UNIT-V: Valuation
Principles of valuation-Value and Cost-value engineering-value analysis-phases in value engineering-information-function-escalation-evaluation-recommendation-implementation-Audit.

Learning Outcomes:
After completing this unit, students will be able to

- Carryout valuation of buildings.
- Explain Auditing procedures and implementation

COURSE OUTCOMES
On completion of the course, the students will beable to:

- Understand basics on methods and types of estimation.
- Formulate specifications and tender documents.
- Prepare contract agreements
- Determine rate analysis of different items.
- Valuation of buildings.

TEXTBOOKS:

1. Dutta,B.N.,"Estimating and Costing in Civil Engineering (Theory&Practice)", UBS Publishers, 2016
2. B.S.Patil,"Civil Engineering Contracts and Estimates",Universities Press Pvt Ltd, Hyderabad. 4thEdition 2015.

REFERENCE BOOKS:

1. M.Chakraborthi,"Estimation,Costing and Specifications", Laxmi publications.
2. D. D. Kohli & R. C. Kohli, "A Textbook of Estimating and Costing(Civil)", S. Chand and Company Limited, New Delhi
3. Standard Schedule of rates and standard data book by public works department.
4. I.S.1200 (PartsItoXXV,"Method of Measurement of Building and Civil Engineering works – B.I.S.)"1974.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**BRIDGE ENGINEERING**					SEE	70 M

COURSEOBJECTIVES:

- It deals with different types of loads on the bridges as per the I.R.C code provisions.
- It deals with the design procedures of bridges such as deck slab bridge, T–Beam Bridge, Plate girder bridge and Box culvert etc.,based on the I.R.C provisions.
- It gives a good knowledge on different components like bridge bearing, piers and abutments of the bridges.
- It gives good knowledge on design of bridge bearings based on the I.R.C provisions.
- It makes the student to design a bridge independently as per the I.R.C provisions

UNIT– I

INTRODUCTION: Importance of site investigation in Bridge design. Highway Bridge loading standards. Impact factor. Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges.
BRIDGE BEARINGS : General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastomeric pad Bearing.

Learning Outcomes:
After completing this unit, students will be able to

- Understand different types of I.R.C loads on the bridges.
- Understand the different types of bridge bearings and their suitability.

UNIT-II
DECK SLAB BRIDGE: Introduction – Effective width method of Analysis Design of deck slab bridge (Simply supported) subjected to class AA Tracked Vehicleonly.
BOX CULVERT: General aspects. Design loads, Design of Box culvert subjected to IRC class AA tracked vehicle only.

Learning Outcomes:
After completing this unit, students will be able to

- Know the effective width method of analysis of bridge decks
- Know the design of the deck slab bridges
- Understand the different forces acting on the box culverts and its design.

UNIT-III
BEAM & SLAB BRIDGE (T-BEAM BRIDGE) General features – Design of interior panel of slab – Pigeauds method – Design of a T-beam bridge subjected to class AA tracked vehicle only.

Learning Outcomes:
After completing this unit,students will be able to

- Know the pigeauds method of analysis of deck slabs of T beam bridges
- Design theT beam bridges

UNIT– IV

PLATE GIRDER BRIDGE: Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G.

Learning Outcomes:
After completing this unit,students will be able to
- Know the forces acting on the plate girder bridge
- Understand the design of plate girder bridge

UNIT--V
PIERS & ABUTMENTS: General features – Bed Block – Materials piers & Abutments Types of piers – Forces acting on piers – Stability analysis of piers – General features ofAbutments – forces acting on abutments – Stability analysis of abutments – Types of wing walls– Approaches –Types of Bridgefoundations(excluding Design).

Learning Outcomes:
After completing this unit,students will be able to
- Know the forces acting on the piers and abutments and their stability analysis.
- Know the different types of wings walls.

Note: Relevant IRC & Railway Bridge Codes are to be permitted in the examination hall

COURSE OUTCOMES:
At the end ofthe course the student will be able to,
- Understand different types of bridges and loads coming over the bridge as per the I.R.C codal provisions.
- Understand the design procedures of the bridges as per the I.R.C recommendations
- Understand the different forces acting on the piers and abutments and their stability analy sis

TEXTBOOKS:

1. Ponnu Swamy,“Bridge Engineering”,TATA Mc graw Hill Company, NewDelhi.
2. N.Krishnam Raju, “Design of Bridges”, Oxford & IBH, Publishing Company Pvt.ltd.,Delhi.
3. D.J.Victor,“Design of Bridges Structure”
4. Relevant,“IRC & Railway bridge Codes”.

REFERENCE BOOKS:

1. B.C. Punmia, “Design of Steel structures”, Ashok Kumar Jain and Arun Kumar Jain Laxmi Publications, New Delhi.
2. Ramachandra.“Design of Steel structures”
3. B.C. Punmia, “Design of R.C.C. structures”, Ashok Kumar Jain and Arun Kumar Jain, Laxmi Publications, New Delhi.
4. T.R.Jagadish & M.A.Jayaram“Design of Bridges Structure”,Prentice Hall of India

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RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Civil Engineering)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**PRESTRESSED CONCRETE**					SEE	70 M

COURSE OBJECTIVES

These are to

- Analyze PSC beams with straight, concentric, eccentric, bent and parabolic tendons and design beams of rectangular and I sections for flexure.
- Design shear reinforcements, structural elements for shear, torsion and anchorage as per the provisions of BIS.
- Interpret thetransmission mechanism of pre stressing force by bond and compute deflection of beams under loads

UNIT-I INTRODUCTION

Principles of pre-stressing–prestressing systems - pre-tensioning and post tensioning-Advantages and limitations of Prestressed concrete-need for high strength materials. Methods of pre-stressing:Pre-tensioning(Hoyersystem) and Post-tensioning methods (Freyssinet system and Gifford-Udall System).

Learning Outcomes:

After completing this unit,students will be able to

- Understandpretensioning andposttensioning
- Identifydifferenttypeofprestressingsystems.

UNIT–II LOSSES OF PRE-STRESS

Loss of pre-stress in pre-tensioned and post-tensioned members due to elastic shortening,shrinkage and creep of concrete, relaxation of stress in steel, anchorage slip and frictionallosses.

Learning Outcomes:

After completing this unit, students will be able to

- Classify different types of losses in prescreening
- Estimate losses of prestress

UNIT-III FLEXURE AND SHEAR

Analysis of beams for flexure and shear –beams pre-stressed with straight, concentric, eccentric, bent and parabolic tendons- Kern line - Cable profile - design of PSC beams (rectangular and I sections) using IS 1343. Analysis and design of rectangular and I beams for shear. Introduction to Transmission length and End block (no Design and Analytical problems).

Learning Outcomes:

After completing this unit, students will be able to

- Analyze beams for flexure and shear
- Understand prestressing with different types of tendons on beams of varying shape
- Know the end block characteristics and its significance

UNIT–IV Deflections:

Control of deflections-Factors influencing deflections-short term deflections of uncracked beams-prediction of long time deflections.

Learning Outcomes:

After completing this unit,students will be able to

- Distinguish between short term and long term deflections in PSC beams
- Estimate the short and long term deflections of PSC beam.

UNIT–V Composite beams:

Different Types-Propped and Un-propped-stress distribution- Differential shrinkage- Analysis of composite beams.

Learning Outcomes:

After completing this unit,students will be able to

- Identify different types of composite beams
- Analyze PSC composite beams.

COURSE OUTCOMES

At the end of the course the student will be able to:

- Understand the concepts of pre-stressing and methods of prestressing.
- Compute losses of pre-stress in pre-stressed concrete members.
- Design PSC beams under flexure and shear.
- Estimate the short and long term deflections of PSC beams.
- Apply prestressing concepts for composite beams.

TEXTBOOKS:

1. N.KrishnaRaju,“Prestressed Concrete”,Tata Mc.Graw Hill Publications.
2. PraveenNagrajan,“Prestressed ConcreteDesign”,Pearson publications,2013.

REFERENCE BOOKS:

1. T.Y.Lin&NedH.Burns,“Design of Prestressed Concrete Structures”,JohnWiley&Sons.
2. Ramamrutham,“PrestressedConcrete”,Dhanpat rai Publications.
3. Rajagopalan,“Prestressedconcrete”,Narosa Publishing House.
4. BIS code on “prestressedconcrete”, IS:1343to be permitted into the examination Hall.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**EXPANSIVE SOILS**					SEE	70 M

COURSE OBJECTIVES:
These are to

- Familiarize Students with Nature of Soils and soil Structure
- Equip student with concepts of Swelling and methods of determination
- Understand foundation practices in expansive soils
- Familiarize different materials and techniques for stabilization
- Understand procedure to improve shear strength of expansive soils

UNIT– I: Clay Mineralogy
Nature of Soils-Clay mineral structure- Diffused double layer theory-Cation exchange– Soil water-Soil Structure-Soil water interaction

Learning Outcomes:
After completing this unit,students will be able to
- Understand mineralogical structure of soil.
- Know the effects of soil water interaction

UNIT-IISwelling Characteristics
Swelling- Factors effecting Swelling- Swelling Potential- Swell Pressure- Methods of Determination-Factors effecting Swelling potential and swell pressure-Heave-Factors effecting Heave-Methodsof determination of heave.

Learning Outcomes:
After completing this unit, students will be able to
- Understand swelling and its effects
- Understand heave and its effects

UNIT-III: Foundation Practices in Expansive Clays
Sand Cushion-Belled Piers-C N S layer technique-UnderreamedPilefoundation-ConstructionTechniques-DesignSpecifications-Load-carrying capacity in compressive and uplift of single and multi underreamed piles in clays and sands-Granular pile Anchors.

Learning Outcomes:
After completing this unit,students will be able to
- Understand about inconveniences with expansive soils
- Design foundation on expansive soils.

UNIT-IV
Lime Soil columns and Lime Slurry pressure injection-Stabilization with admixtures-Propounding-Vertical and Horizontal Moisturebarriers.

Learning Outcomes:

After completing this unit, students will be able to

- Know the stability concepts with various admixtures.

UNIT V

Shear strength of expansive soils- Katti's concept of bilinear envelope- Stress –state variables in partly saturated soils- Frelend's strength parameters- Determination of matrix suction by filter paper method-axis translation technique and field suction measurement.

Learning Outcomes:

After completing this unit,students will be able to

- Determine shear strength of expansive soils by different techniques

COURSE OUTCOMES:

At the end of this course the student will be able to

- Demonstrate behavior of expansive soils.
- Explain need of foundation practice on expansive soils.
- Perform methods of stabilization of expansive soils.
- Select additives and methodology for stabilization.
- Apply the gained knowledge for suitable performance.

TEXTBOOKS:

1. F.C.Chen,"Foundation on ExpansiveSoils",Elsevier Scientific Publishing Company, Newyork J.D.Nelson and D.I.Miller,"Expansivesoils-
2. Problems and Practice in Foundation and pavement Engineering", JohnWiley & Sons Inc

REFERENCE BOOKS:

1. D.G.Fredlund and H.Rhardjo,“Soil Mechanics for UnsaturatedSoils”,WILEY Inter Science Publication, John Wiley & Sons, Inc
2. D.R.Katti,A.R.Katti,“Behavior of Saturated Expansive Soils and Control Methods”,Taylor and Francis
3. Malcolm D Bolton,“Guide to Soil Mechanics”,UniversitiesPress,2003.
4. Manfred R. Haussmann,“ Engineering Principles of Ground Modification”, Mc Graw Hill Pub. Co.,New,York,1990

Codes:

IS:2720(PartXV)-1977Measurement of Swelling Pressure of Soils.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**ROCK MECHANICS**					SEE	70 M

COURSE OBJECTIVES:
To give details of Mechanics of rock failure and other aspects of stability of underground andopen cost workings including mechanics of subsidence, design of slopes and foundations resting on mass.

UNIT I
Physico-mechanical properties of rocks, Elastic and time dependent behavior, Rock mass classification.

Learning Outcomes:
After completing this unit,students will be able to
- Understand the physical and mechanics properties of rock with time
- Classify the various types rocks

UNIT II
Theories of rock failure, Stress analysis, Insitu stress and stress distribution around mineopenings. Ground failure and pressure on supports, Stability of wide openings, Design of supports in mine workings.

Learning Outcomes:
After completing this unit,students will be able to

- Understand the behaviour of stress and strain characteristics of rocks
- Design the support systems for mining works

UNIT-III
Subsidence:Causes and impacts of subsidence, Mechanics of surface subsidence,discontinuous and continuous subsidence. Monitoring, prediction, control and management of subsidence.

Learning Outcomes:
After completing this unit, students will be able to
- Understand the gradual caving in or sinking of rocks.
- Predict the subsidence

UNIT-IV
Plane failure analysis. Wedge failure analysis analytical, Stereographic methods. Buckling and toppling failures, Rock falls, Landslides.

Learning Outcomes:
After completing this unit,students will be able to
- Understand the various types of failure in rock mechanics
- Learn about the design of rock slopes against planar and wedge failures

UNIT-V
Foundations: Bearing capacity, settlement and stress distribution in intact and layered rocks.Foundations of dams. Deep foundations. Tension foundations, Codal provisions. Foundation improvement.Use of

appropriate software packages.

Learning Outcomes:

After completing this unit, students will be able to

- Calculate the bearing capacity of foundations resting on rocks
- Compare the various codal provisions regarding bearing capacity

COURSE OUTCOMES:

Upon the successful completion of this course, the students will be able to:

- Know the physical properties of rocks and their classification
- Study various aspects of ground control problems in underground
- Know open cost mines with a better understandings of scope for application of various numerical methods andmodel studies ingeo-mechanics.

TEXTBOOKS:

1. Jager. J C & Cook NGW, “Fundamentals of Rock Mechanics”, Blackwell Publishers
2. Jumikis Alfreds. R,“Rock Mechanics”, Trans Tech Publishers

REFERENCE BOOKS:

1. Peng.Syd.S.“Coal Mining Ground Control West Virginia University”
2. Brady, BHG & Brown.ET,“Rock mechanics for under groundmining”,George Allen & Unwio Ltd,1992.

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(VII Semester Civil Engineering)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**INDUSTRIAL WASTE & WASTE WATER ENGINEERING**					SEE	70 M

COURSEOBJECTIVES:

- To teach Health and Environment Concern in waste water management
- To teach material balance and design aspects of there actors used in waste water treatment.
- To impart knowledge on selection of treatment methods for industrial waste water
- To teach common methods of treatment in different industries
- To provide knowledge on operational problems of common effluent treatment plant

UNIT–I

IndustrialwaterQuantityandQualityrequirements:
Boiler and cooling waters–Process water for Textiles, Food processing, Brewery Industries, powerplants, fertilizers, sugarmills Selection of source based on quality, quantity and economics.Use of Municipal wastewater in Industries – Adsorption, Reverse Osmosis, IonExchange, Ultrafiltration, Freezing, Elutriation, Removal of Colour, Odour and Taste.

Learning Outcomes:
After completing this unit,students will be able to

- Learn the procedures for assessment of quality of Industrial water
- Suggest different processes of handling waste water

UNIT–II

Basic theories of Industrial Waste water Management: Industrial waste survey –Measurement of industrial waste water Flow-generation rates–Industrial waste water sampling and preservation of samples for analysis -Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction – Neutralization and Equalization, Segregation and proportioning- recycling, reuse and resources recovery

Learning Outcomes:
After completing this unit,students will be able to

- Know the quantity of measurement of Industrial waste water
- Know about the characterization of waste water
- Suggest techniques for treatment of wastewater.

UNIT–III

Industrial wastewater disposal management**:** Discharges into Streams, Lakes and oceans and associatedproblems, Land treatment-Common Effluent Treatment Plants:advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method

Learning Outcomes:

After completing this unit,students will be able to

- Understand options for waste water disposal.
- Explain functioning of common effluent treatment plants

UNIT– IV

Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers,Textiles,Paper and Pulp industries, Oil Refineries,Coal andGas based Power Plants

Learning Outcomes:

After completing this unit, students will be able to

- Understand the characteristics of waste water from Steel plants and refineries
- Suggest suitable waste water treatment techniques

UNIT– V

Process and Treatment of specific Industries -2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills,Distillers,Dairy and FoodProcessing industries, Pharmaceutical Plants

Learning Outcomes:

After completing this unit,students will be able to

- Understand the character of waste water from tanneries and distilleries
- Suggest suitable waste water treatment techniques

COURSE OUTCOMES:

Upon the successful completion of this course, the students will be able to:

- Design treatment methods for any industrial waste water.
- Examine the manufacturing process of various industries.
- Assess need for common effluent treatment plant for an industry
- Test and analyse BOD,COD,TSS and MPN in waste water.

TEXT BOOKS:

1. S.G.Murali Krishna,"Industrial Water and Waste water Management".

REFERENCE BOOKS:

1. A.D.Patwardhan,Industrial Waste water treatment, PHI Learning, Delhi
2. Met calf and Eddy Inc., Waste water Engineering, Tata Mc Graw Hill co.,New Delhi.
3. G.L.Karia &R.A.ChristianWaste water Treatment-Concepts and Design Approach, Prentice Hall of India.

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(VII Semester Civil Engineering)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**REMOTE SENSING & GIS**					SEE	70 M

COURSE OBJECTIVES:

These are to

- Introduce the basic principles of Remote Sensing and GIS techniques.
- Teach various types of satellite sensors and platforms
- Impart concepts of visual and digital image analyses
- Teach concepts of principles of spatial analysis
- Teach about the application of RS and GIS in Civil engineering

UNIT– IIntroduction to photogrammetry

Principles & types of aerial photograph, geometry of vertical aerial photograph, Scale & Height measurement on single vertical aerial photograph ,Height measurement based on relief displacement, Fundamentals of stereoscopy, fiducially points, parallax measurement using fiducially line.

Learning Outcomes:

After completing this unit,students will be able to

- Understand concepts of photogrammetry
- Estimate heights and distances.

UNIT– IIRemote sensing

Basic concepts and foundation of remote sensing – elements involved in remote sensing,electro magnetic spectrum, remote sensing terminology and units. Energy resources, energy interactions with earth surface features and atmosphere, resolution, sensors and satellite visual interpretation techniques, basic elements, converging evidence, interpretation for terrain evaluation, spectral properties of water bodies,introduction to digital data analysis.

Learning Outcomes:

After completing this unit,students will be able to

- Understand advantages of remote sensing
- Demonstrate concepts of remote sensing.

UNIT– IIIGeographic information system:

Introduction, GIS definition and terminology, GIS categories, components of GIS, fundamental operations of GIS, Atheoretical framework for GIS.Data collection and input overview, data input and output. Keyboard entry and coordinate geometry procedure, manual digitizing and scanning, Raster GIS,Vector GIS–File management, Spatial data–Layer based GIS, Feature based GIS mapping.

Learning Outcomes:

After completing this unit,students will be able to

- Understand concepts of GIS.
- Explain data collection and data interpretation
- Develop terrain characteristics using Mapping

UNIT– IVGIS spatial analysis

Computational Analysis Methods (CAM), Visual Analysis Methods (VAM), Data storage-vector data storage, attribute data storage, overview of the data manipulation and analysis.Integrated analysis of the spatial and attribute data.

Learning Outcomes:

After completing this unit,students will be able to

- Know applications of GIS and data interpretation.

UNIT– VWater resources applications:

Land use/Land cover in water resources, Surface water mapping and inventory –Watershed management for sustainable development and Watershed characteristics-Reservoir sedimentation, Fluvial Geomorphology - Ground Water Targeting, Identification of sites forartificial Recharge structures – Inland water quality survey and management, water depth estimation and bathymetry.

Learning Outcomes:

After completing this unit, students will be able to

- Know applications of RS & GIS in water resources applications.
- Study technological problems like reservoir sedimentation ground water identification

COURSE OUTCOMES

At the end of the course the student will be able to

- Comparing with ground, air and satellite based sensor platforms.
- Interpret the aerial photographs and satellite imageries.
- Create and input spatial data for GIS application.
- Apply RS and GIS concepts in water resources engineering.
- Applications of various satellite data.

TEXTBOOKS:

1. B.Bhatta,“Remote Sensing and GIS”,Oxford University Press, New Delhi.

2. Satheesh Gopi, Advanced surveying: Total station GIS and remote sensing, Pearson publication.

REFERENCE BOOKS:

1. George Joseph,“Fundamentals of remote sensing”,Universities press,Hyderabad.
2. C. P. Lo Albert, K.W. Yonng, “Concepts & Techniques of GIS”, Prentice Hall (India) Publications.
3. M.Anji Reddy“Remote sensing and GIS”,B.S.Publications,NewDelhi.
4. L.R.A.Narayana, “Remote Sensing and its applications”,University Press 1999.

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(VII Semester Civil Engineering)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**TRAFFIC ENGINEERING**					SEE	70 M

COURSE OBJECTIVES:

The course will address the following:

- It will enable the student to understand the various characteristics of traffic system
- It will make the student to have the knowledge of intersections and their design
- It will impart the knowledge of design of interchanges and parking facilities

UNIT-I

Characteristics of Traffic System: Human-vehicle-environmen tsystem, Fundamental parameters of traffic and relationships; Microscopic and macroscopic characteristics

Traffic Data Collection studies: Traffic study components, types of data; Volume studies;Speed studies; Travel time and delay studies; Intersection studies, Pedestrian studies; Parkingstudies, Vehicle detection methods; Advanced methods: GPS, Instrumented Vehicles, ImageProcessing,Bluetooth, Infrared methods.

Learning Outcomes:

After completing this unit,students will be able to

- To enable the student to know about the traffic characteristics.
- It makes the student familiar with traffic data collection studies.

UNIT-II

Highway Capacity Analysis: Capacity and level of service concepts; Factors affecting capacity and LOS; Free way and multi-lane analysis; Capacity of Urban marterials; Signalised intersections; Un-signalised intersections; US Highway Capacity Manual (HCM) and IRCstandards, Indo-HCM standards.

Learning Outcomes:

After completing this unit,students will be able to

- It makes the student to get familiar with highway capacity analysis.

UNIT-III

Design of unsignalised intersections: At grade intersections types and their suitability, factors affecting design, data requirement, parameters selection, intersection controls, estimation ofconflict points, uncontrolled intercession analysis, sight distance requirements, round abouts and design methodologies, capacity of roundabouts, mini roundabouts.

UNIT IV

Design of signalized intersections: Warrants for signalization, saturation flowrate and capacity,estimation of amber time, design of all aspects of signal timings, LOS studies, estimation of queue length and control delay, signal coordination, channelization and its objectives, channelizing devices, design considerations, typical channelizing examples.

Learning Outcomes:

After completing this unit,students will be able to

- It makes the student to design the unsignalized and signalized intersections.

UNIT IV

Design of Interchanges: Necessities of interchanges,classification and types of common interchanges, layouts of interchange,interchange warrants, interchange design elements

Learning Outcomes:

After completing this unit,students will be able to

- It makes the student to know the types of interchanges and design of interchanges.

UNIT V

Design of parking facilities: Parking and influencing factors, type of parking system, parking angles and aisle width, on-street parking design, design parameters, parking surveys and demand estimation, various parking layouts and vehicle circulation,design of offstreet parking facilities, types and layouts, design examples.

Learning Outcomes:

After completing this unit,students will be able to

- It allows the student to understand parking facilities.
- It also allows the student to make parking surveys and design parameters to be considered in parking design.

COURSE OUTCOMES:

- Upon the successful completion of thiscourse, the students will be able to:
- Conduct traffic studies and estimate basic characteristics of traffic stream.
- Analyze the traffic data and interpret the results.
- Design the geometric elements for better traffic system.
- Analyze and design uncontrolled and signalized intersection with collected data.

TEXTBOOKS:

1. L.R.Kadiyali,"Traffic Engineering and Transportation Planning",Khanna Publishers,2011.
2. Roger P.Roess,ElenaS.Prassas and William R.Mc Shane, "TrafficEngineering", Prentice Hall, 4th Edition, 2010.
3. Adolf D.May,"Traffic Flow Fundamentals",Prentice Hall,1990.
4. Chakroborty Partha,DasAnimesh,"Principles of Transportation Engineering", PHI Learning Pvt. Ltd., 1st Edition, 2009.
5. C.Jotin Khisty http://www.amazon.com/"Transportation-Engineering-Introduction" 3rd Edition 6. B. Kent Lall, Transportation Engineering: An Introduction, Prentice Hall; 3rd Edition, 2003.

REFERENCE BOOKS:

1. Fred L.Mannering,Scott S.Washburn, Kilareski Walter P., "Principles of Highway Engineering and Traffic Analysis", WileyIndia Pvt Ltd.,4th Edition,2011.
2. L.R.Kadiyali, Traffic Engineering and Transportation Planning, Khanna Publishers,2011.
3. Louis J.Pignataro and Edmund J.Cantilli, Traffic Engineering: Theory and Practice; Prentice hall,Inc., 1973.
4. MikeSlinn,Paul Matthews, Peter Guest, "Traffic Engineering Design: Principles and Practice, Butterworth" -heinemann, 2nd Edition, 2005.
5. Nicholas J.Garber,LesterA.Hoel,NicholasJ.Garber,LesterA.Hoel,"Principles of Traffic and Highway Engineering", Cengage Learning India,2nd Edition, 2010.
6. TRB Highway Capacity Manual,"Transportation Research Board", Washington, D.C., 2010.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**URBAN TRANSPORT PLANNING**					SEE	70 M

COURSE OBJECTIVES:
- To make the student to know the travelcharacteristics.
- To make the student to know the transportation planning process.
- To make the students understand,trip generation models.
- To introduce the concept of Traffic assignment and Mode Split.
- To make the students to understand the concept of Economic Evaluation of Transportation plans.

UNIT-IConcept Of Travel Demand
Travel characteristics - Origin, Destination, Route, Mode, Purpose; Travel Demand as a function of Independent Variables; Assumptions in demand Estimation relation between Land use and Travel; Four Step Process of Transportation Planning.

Learning Outcomes:
After completing this unit, students will be able to
- To know about the travel characteristics.

UNIT-IITransportation Planning Process
General concept of Trip; Trip Generation; Trip Distribution, Traffic assignment and mode split, Aggregate and Disaggregate Models. Data collection and Sequential and Sequential Recursive Models. Date Collection and Inverntories;Definition of Study Area; Zoning Principles; Types and Sources of Date, Home Interview Surveys; RoadSide Interview Surveys; Goods.Taxi, IPT Surveys; Sampling Techniques; Expansion Factors and Accuracy Check; Desire Line Diagram and use.

Learning Outcomes:
After completing this unit, students will be able to
- Identify the principles of transportation planning.
- Know about the sampling techniques.

UNIT-IIITrip Generation Models
Factors Governing Trip Generation and Attraction; Multiple Linear Regression Models, Category Analysis, Trip Distribution Models Methods of Trip Distribution; Growth Factor Models Uniform Growth Factor Method; Average Growth Factor Method; Factor Method; Furnes Method; Limitation of Growth Factor Models Concept of Gravity Model.

Learning Outcomes:
After completing this unit, students will be able to
- Know about the steps involved in different trip generation models.

UNIT-IVTraffic assignment and Mode Split
Purpose of Assignment and General Principles; Assignment Techniques - All - or- nothing. Assignment; Multiple route assignment, Capacity restraint method. Minimum path trees; Diversion Curves. Factors

affecting mode split; probit,logit and discriminant Analysis.

Learning Outcomes:
After completing this unit, students will be able to

- Know traffic assignment and mode split in the traffic analysis.
- Know about the factors affecting the mode split.

UNIT– V

Economic Evaluation of Transportation plans; Costs And Benefits Of Transportation Projects; Vehicle Operating Cost;Time saving Accident Costs .Methods of Economic Evaluation - Benefit Cost Ratio Method; Net Present Value Method; Internal Rate Of Return Method.

Learning Outcomes:
After completing this unit, students will be able to

- Know cost and benefits of transportation projects .
- Know different methods of economice valuation of transportation projects.

COURSE OUTCOMES
After completing this unit, students will be able to

- Understand the concept of travel demand.
- Understand the different types of transportation planning processes**.**
- Understand the different types of trip generation models**.**
- Understand necessity of traffic assignment and mode split.
- Understand the economic evaluation of transportation projects.

REFERENCE BOOKS:

1. L.R.Kadiyalli;“Traffic Engineering and Transporation Planning”, Khanna Publishers, Delhi.
2. Papa CostasC.S.;“Fundamentals of Transportation Engineering”,Prentice Hall, India.
3. Khistry C.J.”Transportation Engineering”,An Introduction Prentic Hall

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**WATER RESOURCES SYSTEM ANALYSIS**					SEE	70 M

COURSE OBJECTIVES:
These are to

- Teach Concepts of systems techniques in water resources engineering
- Teach Linear Optimization concepts
- Demonstrate the Development system approach to reservoir operation
- Planning water allocation to different crops
- Expertise on River operation policies

UNIT I
Concept of System and System Analysis- Definition and Types of Systems-Basic Principles of Systems Approach and Analysis. Systems Techniques in Water Resources.

Learning Outcomes:
After completing this unit,students will be able to

- To Understand the concepts of water resource system.

UNIT II
Introduction to Optimization-Linear and Dynamic Programming-Simulation-Combined Simulation and Optimization.Economics of Water Resources Projects-Cost Benefit Analysis
- Cost Allocation among various projects in a Multi-purpose Project.

Learning Outcomes:
After completing this unit,students will be able to

- Know about theoptimization of water resource projects.
- Carry out cost analysis on different projects

UNIT III
Systems Approach to Reservoir-DeterministicFlows-Reservoir Sizing and Reservoir Operations. Basic Concepts of Random Flows Reliability.

Learning Outcomes:
After completing this unit, students will be able to

- To learn the different types of operations in water resource system.

UNIT IV
Application of Linear Programming toWater Resources Systems-Irrigation Water Allocation for Single and Multiple Crops. Reservoir Operation for Irrigation and Hydro power Generation.

Learning Outcomes:
After completing this unit, students will be able to

- To understand applications of linear programming on applications of water resource systemfor crops.

UNIT V

Applications of Dynamic Programming to Water Resources Systems - Optimal Crop WaterApplication - Steady State Reservoir Operating Policy for Irrigation. Real Time Reservoir Operation for Irrigation.

Learning Outcomes:

After completing this unit, students will be able to

- To develop knowledge on dynamic programming on applications of water resource system for crops.

COURSE OUTCOMES:

At the end of this course,the students will be able to:

- Apply basic principles of system approach.
- Judging Economics of water resources of multipurpose projects.
- Apply optimization principles to single and multi crop applications.
- Designing reservoir operation leading to optimum crop water application.

TEXTBOOKS:

1. Loucks,D.P.andEelcoVanBeek,"Water Resources systems planning and management":An Introduction to methods, models and applications. UNESCO.(2005).
2. Vedula,S.and Mujumdar,P.P., "Water resources Systems: Modeling techniques and analysis ", Tata McGrawHill, NewDelhi.(2005).

REFERENCE BOOKS :

1. Mays,L.W.andTung,Y.K.,"Hydro systems Engineering and Management", McGrawHill, USA.(1992).
2. Simonovic, S.P., "Managing water resources: Methods and tools for a systems approach",UNESCO Publishing, France.(2009).
3. R.K.Sharma & T.K.Sharma ,"A Textbook Of Irrigation Engineering ",S.Chand and Company Limited, New Delhi

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(VII Semester Civil Engineering)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**RIVER BASIN MANAGEMENT**					SEE	70 M

COURSE OBJECTIVES:

These are to

- Teach the basic concepts of river basin management
- Demonstrate the various types flows and catchment process
- Explain various monitoring systems and regulations in river basin management
- Teach river basin management techniques

UNIT–IIntroduction:

Basic Concepts of River Basin Management (RBM) - Integrated River Basin Management(IRBM)-River Basin Organizations(RBOs)-Types .Theories and Principles of IRBM – Need for RBM & Need for Irrigation - Objectives and Benefits of IRBM- Key Activities and Challenges in IRBM - Various Guiding Principles of IRBM - Scenarios in Developed and Developing Countries.

Learning Outcomes:

After completing this Unit,students will be able to

- Learn basic concepts of river basin management.
- Identify activities and challenges of IRBM.

UNIT–IIRiver Systems:

Recapitulation of Basic Principles of Hydrology – River Basins and Catchments – Hydrologic , Geo-morphological, Physical & Chemical Processes. Stream Corridors, Stream Order Model-Functions of River Systems - Provisioning, Regulating, Cultural and Supporting Services -Low Base Flows - Ecological Stresses to Rivers - Human Interventions and Impacts - Man’s Attitude towards Nature and Development.Engineered River Systems.

Learning Outcomes:

After completing this Unit,students will be able to

- Understand river basin systems.
- Explain functions of river system.
- Identify ecological stress on rivers and necessity of engineering river systems.

UNIT–IIITools and Methods of IRBM:

Monitoring and Water Resources Information System-Monitoring, Acquisition and Processing of Water Resources Data –Statistical Tools - Decision Support Systems .Governance Issues – Water Governance – Its Importance – Fundamental Requirements for Good TBM - Rules, Regulations and Laws - Various Acts Enforced by Government of India for River Basin Management and Development.

Learning Outcomes:

After completing this Unit,students will be able to

- To learn tools and methods of river basin management.

UNIT–IVRiver Basin PlanningAnd Management-I(Strategies)
Water Resources Planning and Management of - Need, Various Aspects and Approaches of Planning and Management - Planning Process - Operational Management - Instruments ofOperational Management - Water Quality Management - Water Charges and Cost Recovery –Issues related toWater Right and Water Allocation.

Learning Outcomes:
After completing this Unit,students will be able to

- To Understand river basin planning and strategic management..

UNIT–VRiver Basin Planning and Management–II(Technologies)
River Restoration: Disturbances to River Systems - River Restoration Planning and Design.Implementation, Monitoring and Adoptive Management - Sediment Management in Rivers-Preliminary Sedimentation Aspects,Sediment In flow Reduction-Recovery, Increase or Reallocation of Storage Volume-Pressure Flushing, Empty Flushing, Dredging, Dry Excavation and Structural Modifications.

Learning Outcomes:
After completing this Unit,students will be able to

- To understand river basin planning and technical management.

COURSE OUTCOMES:
At the end of the course , student is able to

- Summarise the concepts of riverbasin management.
- Implement the techniques in river basin management.
- Compare method sand tools in river basin management
- Check the river basin to obtain most possible benefits.
- Planning and management of river basin.

TEXTBOOKS:

1. A Handbook for Integrated Water Resources Management in Basins Published by Global Water Partnership and International Network of Basin Organizations(INBO)
2. Lawrence K.Wangand ChihTed Yang, “Modern Water Resources Engineering ”Edited Humana Press

REFERENCE BOOKS:

1. Santosh Kumar Garg “Irrigation Engineering and Hydraulic Structure”, Khanna Publishers.
2. Chow V.T.,D.R Maidment and L.W.Mays,“Applied hydrology”,Tata Mc Graw Hill Education Pvt. Ltd, (2011), New Delhi.
3. Mays L.W.,“Water Resources Engineering”, Wiley India Pvt.Ltd,(2013).
4. Integrated River Basin Management- www.university water spectrum partnership.org.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	OPEN ELECTIVE III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**RENEWABLE ENERGY SYSTEMS**					SEE	70 M

COURSE OBJECTIVES:
At the end of the course the student will be able to

- Identify various sources of Energy and the need of Renewable Energy Systems.
- Understand the concepts of Solar Radiation,Wind energy and its applications.
- Distinguish between solar thermaland solar PV systems
- Interpret the concept of geothermal energy and its applications.
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

UNIT-ISOLAR ENERGY
Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. Flat plate collectors,concentrating collectors,storage of solar energy-thermal storage.

Learning Outcomes:
At the end of the course the student will be able to

- To understand about solar thermal parameters.
- To distinguish between flat plate and concentrated solar collectors.
- To know about thermal storage requirements.
- To know about measurement of solar radiation.

UNIT– IIPV Energy Systems
Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems.

Learning Outcomes:
Aftercompleting this Unit,students will be able to

- Understand the concept of PVeffectin crystalline silicon and their characteristics.
- Understand other PV technologies.
- To know about electrical characteristics of PVcells & modules.
- To know about grid connected PV systems.

UNIT-IIIWind Energy
Principle of wind energy conversion; Basic components of wind energy conversion systems;wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations.

Learning Outcomes:
After completing this Unit, students will be able to

- To understand basics of wind energy conversion and system.
- To distinguish between VAWT and HAWT systems.

- To understand about design considerations.
- To know about sites election considerations of WECS.

UNIT-IVGeothermal Energy

Estimation and nature of geothermalenergy, geothermal sources and resources like hydrothermal ,geo-pressured hot dry rock ,magma . Advantages, disadvantages and application of geothermalenergy, prospects of geothermal energy in India.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the Geothermal energy and its mechanism of production and its applications .
- Analyze the concept of producing Geothermal energies.
- To learn about disadvantages and advantages of GeoThermal Energy Systems.
- To know about various applications of GTES.

UNIT-VMiscellaneous Energy Technologies

Ocean Energy:Tidal Energy-Principle of working, performance and limitations.Wave Energy-Principle of working, performance and limitations.

Biomass Energy: Biomass conversion technologies, Biogas generation plants Classification, advantages and disadvantages, constructional details, site selection, digester design consideration

Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations.

Learning Outcomes:

After completing this Unit, students will be able to

- Analyze the operation of tidal energy.
- Analyze the operation of wave energy.
- Analyze the operation of biomass energy.
- Understand the principle, working and performance of fuel cell technology.
- Apply these technologies to generate power for us a geat remote centres.

COURSE OUTCOMES:

Upon the successful completion of this course, the students will be able to:

- To distinguish between various alternate sources of energy for different suitable application requirements.
- To differentiate between solar thermal and PVsystem energygenerationstrategies.
- To understand about wind energy system.
- To get exposed to the basics of Geo Thermal Energy Systems.
- To know about various diversified energy scenarios of ocean, biomass and fuel cells.

TEXT BOOKS:

1. Stephen Peake, "Renewable Energy Power for a Sustainable Future", Oxford International Edition, 2018.
2. G.D.Rai,"Non-Conventional Energy Sources",4th Edition,Khanna Publishers, 2000.

REFERENCE BOOKS:

1. S.P.Sukhatme,"SolarEnergy",3rd Edition,Tata Mc GrawHill Education Pvt.Ltd,2008.
2. BHKhan,"Non-Conventional Energy Resources", 2nd Edition, Tata McGrawHill Education Pvt Ltd, 2011.
3. S.Hasan Saeed and D.K.Sharma,"Non-Conventional Energy Resources", 3rd Edition, S.K.Kataria

&Sons, 2012.

4. G.N.Tiwariand M.K.Ghosal, “Renewable Energy Resource: Basic Principles and Applications”, Narosa Publishing House,2004.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	OPEN ELECTIVE III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**ELECTRIC VEHICLE ENGINEERING**					SEE	70 M

COURSE OBJECTIVES:
After completing this Unit,students will be able to

- To get exposed to new technologies of battery electric vehicles,fuel cell electric vehicles.
- To get exposed to EVsystem configuration and parameters.
- To know about electromobility and environmental issuesof EVs.
- To understand about basic EVpropulsion and dynamics.
- To understand about fuel cell technologies for EV and HVEs.
- To know about basic battery charging and control strategies used in electric vehicles.

UNIT-IIntroduction to EV Systems and Parameters

Past,Present and Future EV, EV Concept, EV Technology, State-of-the Art EVs, EV configuration, EV system, Fixed and Variable gearing, single and multiple motor drive, in-wheel drives,EVparameters: Weight, size, force and energy,performance parameters.

Learning Outcomes:
After completing this Unit,students will be able to

- To know about past, present and latest technologies of EV.
- To understand about configurations of EVsystems.
- To distinguish between EV parameters and performance parameters of EV systems.
- To distinguish between single and multiple motor drive EVs.
- To understand about in-wheel EV.

UNIT-IIEV and Energy Sources
Electro mobility and the environment, history of Electric power trains, carbon emissions fromfuels, green houses and pollutants, comparison of conventional, battery, hybrid and fuel cell electric systems

Learning Outcomes:
After completing this Unit, students will be able to

- To know about various types of EVsources.
- To understand about e-mobility
- To know about environmental aspects of EV
- To distinguish between conventional and recent technology developments in EVsystems.

UNIT-IIIEV Propulsion and Dynamics
Choice of electric propulsion system, block diagram, concept of EV Motors, single and multimotor configurations, fixed and variable geared transmission, In-wheel motor configuration, classification, Electric motors used in current vehicle applications, Recent EV Motors, Vehicle load factors, vehicle acceleration.

Learning Outcomes:
After completing this Unit,students will be able to

- To know about what is meant by propulsion system.
- To understand about single and multimotor EVconfigurations.
- To get exposed to current and recent applications of EV.
- To understand about load factors in vehicle dynamics.
- To know what is meant acceleration in EV.

UNIT-IVFuel Cells

Introduction of fuel cells, basic operation, model, voltage, power and efficiency, power plant system – characteristics, sizing, Example of fuel cell electric vehicle.

Introduction to HEV,brake specific fuel consumption, comparison of series, series-parallel hybrid systems, examples.

Learning Outcomes:

After completing this Unit,students will be able to

- To know about fuel cell technology of EV.
- To know about basic operation of FCEV.
- To know about characteristics and sizing of EVwith suitable example.
- To get exposed to concept of Hybrid Electric Vehicle using fuel cells.
- To know about the comparison of various hybrid EVsystems.

UNIT-VBattery Charging and Control

Battery charging: Basic requirements, charger architecture, charger functions, wireless charging, power factor correction.

Control: Introduction, modelling of electro mechanical system, feedback controller design approach, PI controllers designing, torque-loop, speed control loop compensation, acceleration of battery electric vehicle.

Learning Outcomes:

After completing this Unit,students will be able to

- To understand about basic requirements of battery charging and its architecture.
- To know about charger functions.
- To get exposed to wireless charging principle.
- To understand about block diagram,modeling of electro mechanical systems of EV.
- To be able to design various compensation requirements.

COURSE OUTCOMES:

Upon the successful completion of this course, the students will be able to:

- To understand and differentiate between conventional andlatest trends in Electric Vehicles.
- To know about various configurations in parameters of EV system.
- To know about propulsion and dynamic aspects of EV.
- To understand about fuel cell technologies in EV and HEVsystems.
- To understand about battery charging andcontrols requiredof EVs.

TEXT BOOKS:

1. C.C Chan, K.T Chau: “Modern Electric Vehicle Technology”, Oxford University PressInc., New York 2001.
2. James Larminie,John Lowry,“Electric Vehicle Technology Explained”,Wiley,2003.

REFERENCE BOOKS:

1. Iqbal Husain,,"Electric and Hybrid Vehicles Design Fundamentals",CRC Press2005.
2. Ali Emadi,"Advanced Electric DriveVehicles",CRC Press,2015.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Open Elective III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**FINITE ELEMENT METHODS**					SEE	70 M

COURSE OBJECTIVES:

- Familiarize basic principles of finite element analysis procedure.
- Explain theory and characteristics of finite elements that represent engineering structures.
- Apply finite element solutions to structural,thermal,dynamic problem.
- Learn to model complex geometry problems and solution techniques.

UNIT– I

Introduction to finite element methods for solving field problems, Stress and equilibrium, Boundary conditions, Strain-Displacement relations, Stress- strain relations for 2D and 3D Elastic problems. Potential energy and equilibrium, The Rayleigh-Ritzmethod, Formulation of Finite Element Equations.

One dimensional problems: Finite element modeling coordinates and shape functions. Assembly of global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions.

Learning Outcomes:

Atthe end of the unit, the student will be able to

- Understand the concept of nodes and elements.(l2)
- Understand the general steps of finite element methods.(l2)
- Understand the role and significance of shape functions in finite element formulations(l2)
- Formulate and solve axially loaded bar problems.(l6)

UNIT-II

Analysis of trusses: Stiffness Matrix for plane truss element. Stress Calculations and Problems.

Analysis of beams: Element Stiffness Matrix for two noded, two degrees of freedom per node beam element and simple problems.

LearningOutcomes:

At the end of the unit, the student will be able to

- Explain the use of the basic finite elements for structural applications using truss and beam.(l2)
- Formulate and analyze truss and beam problems.(l6)

UNIT-III

Finite element modeling of two dimensional stress analysis-constant strain triangles-quadrilateral element-treatment of boundary conditions.Estimation of load Vector,Stresses.Finite element modeling of Axi-symmetric solids subjected to axi-symmetric loading with triangular elements. Two dimensional four noded Iso parametric elements and problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the formulation of two – dimensional elements (Triangular and Quadrilateral Elements).(L2)
- Apply the formulation techniques to solve two–dimensional problems using triangle and

quadrilateral elements. (L3)
- Formulate and solve axisymmetric problems.(L6)

UNIT IV

Steady state heat transfer analysis: One dimensional analysis of slab and fin, two dimensional analysis of thin plate. Analysis of auniform shaft subjected to torsion loading.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the application and use of the Finite Element Methods for heat transfer problems.(L2)
- Formulate and solve heat transfer problems.(L6)

UNITV

Dynamic analysis: Formulation of finite element model,element –mass matrices, evaluation of Eigen values and Eigen vectors for a stepped bar truss.

3D Problems: Finite Element formulation-Tetra hedron element-Stiffness matrix.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand problems involving dynamics using Finite Element Methods.
- Evaluate the Eigen values and EigenVectors forsteeped bar.
- Develop the stiffness matrix for tetrahedron element.

COURSE OUTCOMES:

Upon successful completion of this course you should be able to

- Understand the concepts behind variational methods and weighted residual methods in FEM.
- Identify the application and characteristics of FEA elements such as bars,beams,and isoparametric elements, and 3-D element.
- Develop element characteristic equation procedure and generation of global stiffness equationwill be applied.
- Able to apply Suitable boundary conditions to a global structural equation,and reduce it to a solvable form.
- Able to identify how the finite element method expands beyond the structural domain,for problems involving dynamics, heat transfer and fluid flow.

TEXT BOOKS:

1. Chandraputla, Ashok&Belegundu, “Introduction to Finite Element in Engineering”, Prentice Hall.
2. S.S.Rao,“The Finite Element Methods in Engineering”,2ndEdition,Elsevier Butterworth-Heinemann2011.

REFERENCE BOOKS:

1. JNReddy,“An introduction to the Finite Element Method”,McGraw–Hill, NewYork, 1993.
2. RD Cook, DS Malkusand ME Plesha, “Concepts and Applications of Finite Element Analysis”,3rdEdition, John Wiley, New York,1989.
3. KJ Bathe,“Finite Element Procedures in Engineering Analysis”,Prentice-Hall, Englewood Cliffs,1982.
4. TJR Hughes,“the Finite Element Method,Prentice”,Hall, Englewood Cliffs,NJ,1986.
5. C Zienkiewicz and RLTaylor,“the Finite Element Method”,3rdEdition. McGraw-Hill, 1989.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Open Elective III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**PRODUCT MARKETING**					SEE	70 M

COURSE OBJECTIVES:

- Introduce the basic concepts of Product marketing.
- Familiarize with market information systems and research.
- Understand the nature and importance of industrial market.
- Discuss the major stages in new product development.
- Identify the factors affecting pricing decisions.

UNIT I:Introduction (7Hours)
Historical development of marketing management, Definition of Marketing, Core marketing concepts, Marketing Management philosophies, Micro and Macro Environment,Characteristics affecting Consumer behaviour, Types of buying decisions, buying decision process, Classification of consumer products, Market Segmentation Concept of Marketing Myopia. Importance of marketingin the Indian Socio economic system.

LearningOutcomes:
At the end of this student, the student will be able to

- Define Marketing.(L1)
- Discuss marketing philosophies.(L2)
- Sketch the buying decision process.(L3)
- Understand the importance of marketing in the Indian socio economic system.(L2)

UNIT II:Marketing of Industrial Products (6Hours)
Components of marketing information system–benefits & uses marketing research system, marketing research procedure, Demand Estimation research, Test marketing, Segmentation Research - Cluster analysis, Discriminate analysis. Sales forecasting: objective and subjective methods. Nature and importance of the Industrial market, classification of industrial products, participants in the industrial buying process, major factors influencing industrial buying behavior, characteristics of industrial market demand. Determinants of industrial market demand Buying power of Industrial users, buying motives of Industrials users, the industrial buying process, buying patterns of industrial users.

Learning Outcomes:
At the end of this student, the student will be able to

- Identify the components of marketing information system.(L2)
- List the advantages and uses of marketing research system.(L1)
- Demonstrate sales forecasting.(L3)
- Explain the major factors influencing industrial buying behaviour.(L2)

UNIT III:Product Management and Branding (7Hours)
The concept of a product, features of a product, classification of products, product policies –product planning and development, product line, product mix – factors influencing change in product mix, product mix strategies, meaning of"New–product;major stages in new–product development product life cycle. Branding:Reasons for branding ,functions of branding features of types of brands, kinds of brand name.

LearningOutcomes:
At the end of this student, the student will be able to

- Indentify the factors influencing change in product mix. (L2)
- Sketch various stages in product life cycle.(L2)
- Recall the features of a product and product policies.(L1)
- Demonstrate on features, functions and reasons of branding.(L3)

UNITIV:Pricing And Pacakaging (7Hours)
Importance of Price, pricing objectives ,factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions Labeling: Types, functions advantages and disadvantages,Packaging**:**Meaning, growth of packaging, function of packaging,kinds of packaging.

Learning Outcomes:
At the end of this student, the student will be able to

- List the factors affecting pricing decisions.(L1)
- Explain the procedure for price determination.(L2)
- Employ Pricing strategies and decisions.(L3)
- Understand the functions of labeling and packaging.(L2)

UNITV:Product Promotion (6Hours)
Importance of Price, pricing objectives,factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions. Advertising and sales promotion**:** Objectives of advertisement function of advertising, classification of advertisement copy, advertisement media– kinds of media, advantages of advertising. Objectives of sales promotion, advantages sales promotion. Personal Selling**:** Objectives of personal selling, qualities of good sales man, types ofsales man, major steps in effective selling

Learning Outcomes:
At the end of this student, the student will be able to

- Discuss the procedures for price determination.(L2)
- Explain the objectives of advertisement function of advertising.(L2)
- List the advantages and disadvantages of advertising.(L1)
- Describe the major steps in effecting selling.(L2)

COURSE OUTCOMES:
At the end of the course,the student will be able to

- Understand basic marketing management concepts and the irrelevance to business development.(L2)
- Prepare a questionnaire for market research.(L5)
- Design marketing research plan for business organizations.(L5)
- Optimize marketing mix to get competitive advantage.(L4)

TEXT BOOKS:

1. Philip Kotler,"Principles of Marketing", Prentice–Hall.
2. Philip Kotler,"Marketing Management",Prentice –Hall.

REFERENCE BOOKS:

1. Wiliam JStanton,“Fundamentals of Marketing”, McGrawHill.
2. R.S.N.Pillai and Mrs.Bagavathi,“Marketing”, S.Chand & Co.Ltd.
3. Rajagopal,“Marketing Management Text & Cases”,Vikas Publishing House.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Civil Engineering)

Course Category	:	Open Elective III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**INTRODUCTION TO MICROCONTROLLERS & APPLICATIONS**					SEE	70 M

COURSEOBJECTIVES:

This course will enable students to:

- Describe the Architecture of 8051 Microcontroller and Interfacing of 8051 to external memory.
- Write 8051Assembly level programs using 8051 instruction set.
- Describe the Interrupt system,operation of Timers/Counters and Serial port of 8051.
- Interface simple switches, simple LEDs, ADC0804, LCD and Stepper Motor to 8051.

UNIT– I 8051 Microcontroller:

Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture-Registers, Pin diagram, I/O ports functions, Internal Memory organization.External Memory (ROM& RAM)interfacing.

Learning Outcomes:

At the end of this student,the student will be able to

- Understand the importance of Microcontroller and acquire the knowledge of Architecture of 8051 Microcontroller. (L1)
- Analyze interface required memoryof RAM & ROM.(L3)

UNIT– II

Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions,Branch instructions, Bit manipulation instructions. Simple Assembly language program examples to use these instructions.

Learning Outcomes:

At the end of this student, the student will be able to

- Explain different types instruction set of 8051.(L1)
- Develop the 8051Assembly level programs using 8051 instruction set.(L3)

UNIT– III

8051 Stack,Stack and Subroutine instructions.Simple Assembly language program examples to use subroutine instructions.8051 Timers and Counters – Operation and Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode-2 on a port pin.

Learning Outcomes:

At the end of this student, the student will be ableto

- Describe Stack and Subroutine of 8051.(L1)
- DesignTimer/counters using of 8051.(L4)

UNIT–IV

8051 Serial Communication- Basics of Serial Data Communication, RS- 232 standard, 9 pin RS232 signals, Simple Serial Port programming in Assembly and C to transmit a message and to receive data serially.

8051 Interrupts. 8051 Assembly language programming to generate an external interrupt using a switch.

Learning Outcomes:

At the end of this student, the student will be able to

- Acquire knowledge of Serial Communication and develop serial port programming.(L1)
- Developan ALP to generate an external interrupt using a switch.(L3)

UNIT V

8051 C programming to generate a square waveform on a port pin using a Timer interrupt.Interfacing 8051 to ADC-0804, DAC, LCD and Interfacing with relays and opto isolators,Stepper Motor Interfacing, DC motor interfacing, PWM generation using 8051.

Learning Outcomes:

At the end of this student, the student will be able to

- Apply and Interface simple switches, simple LEDs, ADC 0804 and LCD to using 8051I/O ports. (L2)
- Design Stepper Motor and f motor interfacing of 8051.(L4)

COURSE OUTCOMES:

- Understand the importance of Microcontroller and Acquire the knowledge of Architecture of 8051 Microcontroller.
- Apply and Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to using 8051 I/Oports.
- Develop the 8051Assembly level programs using 8051instruction set.
- Design the Interruptsystem,operation of Timers/Counters and Serial port of 8051.

TEXT BOOKS:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and RollinD. McKinlay; "The 8051 Microcontroller and Embedded Systems – using assembly and C", PHI, 2006 / Pearson,2006.
2. KennethJ.Ayala,"The 8051 Microcontroller", 3rd Edition,Thomson/CengageLearning.

REFERENCE BOOKS:

1. Manish K Patel, "The 8051 Microcontroller Based Embedded Systems", McGraw Hill,2014,ISBN: 978-93-329-0125-4.
2. Raj Kamal, "Microcontrollers: Architecture, Programming, Interfacing and System Design",Pearson Education, 2005.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Open Elective III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**PRINCIPLES OF DIGITAL SIGNAL PROCESSING**					SEE	70 M

COURSE OBJECTIVES:
- To explain about signals and perform various operations on it.
- To understand discrete time signals and systems.
- To solve Laplace transforms and z-transforms for various signals.
- To find Discrete Fourier Transform of asequence by using Fast Fourier Transform.
- To design and realize IIR and FIR filters.

UNIT-I:INTRODUCTION TO SIGNALS
Classification of Signals: Analog, Discrete, Digital, Deterministic & Random, Periodic &Aperiodic, Even & Odd, Energy & Power signals. Basic operations on signals: Time shifting,Time scaling,Time reversal,Amplitude scaling and Signal addition. Elementary Signals:Unitstep, Unit ramp, Unit parabolic, Impulse, Sinusoidal function, Exponential function, Gate function,Triangular function, Sinc functionand Signum function.

Learning Outcomes:
At the end of this student, the student will be able to
- Define basic signals and its operations,Classify discrete time signals and systems.(L1)
- Understand various basic operations on signals(L1)

UNIT– II:DISCRETE TIME SIGNALS AND SYSTEMS
Discrete Time Signals: Elementary discrete time signals, Classification of discrete time signals: power and energy signals, even and odd signals. Simple manipulations of discrete timesignals: Shifting and scaling of discrete-time signals.
Discrete Time Systems: Input-Output description of systems, Block diagram representation of discrete time systems, Linear Constant Coefficient Difference Equations, Classification of discrete time systems: linear and nonlinear, time-invariant and variant systems, causal and non causal, stable and unstable systems.

Learning Outcomes:
At the end of this student, the student will be able to
- Define basic signals and its operations, Classify discrete time signals and systems.(L1)
- Understand various basic operations on signals.(L1)

UNIT-III:LAPLACE TRANSFORMS AND Z-TRANSFORMS
LaplaceTransforms: Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of Region of Convergence(ROC), Constraints on ROC for various classes of signals, Properties of Laplace transforms.
Z-Transforms: Concept of Z-transform of a discrete sequence, Region of convergence in Z-Transform, constraints on ROC for various classes of signals, inverse Z-transform, properties of Z-Transforms.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the basic concepts of Laplace and Z transforms.(L1)
- Apply the transform techniques to solve the problems .(L2)

UNIT– IV:FAST FOURIER TRANSFORMS

Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Radix-2 Fast Fourier Transforms(FFT), Decimation in Time and Decimation in Frequency FFT Algorithms :radix-2DIT-FFT, DIF-FFT,and Inverse FFT:IDFT-FFT.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the importance of DTFT,DFT,FFT and the ir inverse transforms with respect to signals and systems .(L1)
- Analyze the Decimation in time and frequency algorithms.(L3)

UNIT– V: IIR AND FIR DIGITAL FILTERS

IIR DIGITAL FILTERS: Analog filters approximations: Butterworth and Chebyshev, Design of IIR digital filters from analog filters. Realization of IIR filters: Direct form-I, Directform-II, cascade form and parallel form.

FIR DIGITAL FILTERS: Characteristics of FIR digital filters, frequency response. Design of FIR digital filters using window techniques: Rectangular window, Triangular or Bartlett window,Hamming window,Hanning window,Blackman window. Realization of FIR filters:Linear phase and Lattice structures.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the importance of IIR and FIR digital Filters.(L1)
- Realize IIR filters and analyze various windowing techniques in FIR filters .(L2)
- Design IIR and FIR filters.(L4)

COURSE OUTCOMES:

- Define basic signals and its operations,Classify discrete time signals and systems.
- Solve Laplace Transformandz-Transform for various signals,Calculate DFT of a given sequence by using Fast Fourier Transform.
- Analyze the continuous and discrete signals and systems.
- Design and realize IIR and FIR filters from the given specifications.

TEXT BOOKS:

1. B.P.Lathi,“Signals, Systems and Communications”,BS Publications,2008.
2. John G.Proakis,Dimitris G.Manolakis, “Digital signal processing, principles, Algorithms and applications”, 4thedition ,Pearson Education/PHI,2007.
3. A.V.Oppen heim and R.W.Schaffer,“Discrete Time Signal Processing”,2ndedition.,PHI.

REFERENCE BOOKS:

1. A.V.Oppenheim,A.S.Willsky and S.H.Nawab,“Signals and Systems”, PHI, 2ndEdition , 2013.
2. A.AnandKumar,“Signals and Systems”, PHIPublications, ThirdEdition,2013
3. P.Ramesh Babu.“Digital Signal Processing”.

4. Andreas Antoniou,“Digital signal processing”,Tata McGrawHill,2006.
5. R S Kaler, M Kulkarni,,Umesh Gupta,“A Textbook on Digital Signal processing”–IK International Publishing House Pvt. Ltd.
6. M H Hayes,Schaum’soutlines,“Digital Signal Processing”,Tata Mc-GrawHill,2007.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	OPEN ELECTIVE-III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**FUNDAMENTALS OF GAME DEVELOPMENT**					SEE	70 M

COURSE OBJECTIVES:
This course is designed to:
- Get familiarized with the various components in a game and game engine.
- Explore the leading open source game engine components.
- Elaborate on gamephysics.
- Introduce to the game animation.
- Expose to network-based gaming issues.

Unit I
Introduction to Game
What is a Game? The Birth of Games, The Rise of Arcade Games, The Crash and Recovery,The ConsoleWars,Online Games and Beyond.

The Game Industry: Game Industry Overview,Game Concept Basics, Pitch Documentation , pitching a Game to a Publisher, Managing the developer-Publisher Relationship, LegalAgreements, Licenses, Console Manufacturers ApprovalL

Roles on the Team: Production, Art, Engineering, Design, Quality Assurance Testing, Team Organization, Corporate.

Learning Outcomes:
After completing this Unit, students will be able to
- Demonstrate online games and beyond.[L2]
- Outline the process carried out in the Game Industry.[L2]
- Inspect the roles on theTeam.[L4]

Unit II
TeamsProject Leadership,Picking Leads,Team Building,Team Buy-in and Motivation**.**
Effective Communication: Written Communication, Oral Communication, Non verbal Communication, Establishing Communication Norms,Communication Challenges.
Game Production Overview: Production Cycle, Preproduction, Production, Testing, Post production.

Learning Outcomes:
After completing this Unit,students will be able to Build a team and pick a leader. [L6]
- Develop Effective communication.[L3]
- Outline the Game Production cycle[L2]

Unit III
Game Concept
Introduction, Beginning the Process ,Defining the Concept,Game Programming Basics, Prototyping, Risk Analysis, Pitch Idea, Project Kickoff.

Characters, setting, and Story: Story Development, Gameplay, Characters, Setting, Dialogue, Cinematics, Story Documentation.

Game Requirements: Define Game Features, Define Milestones and Deliverables, Evaluate Technology, Define Tools and Pipeline ,Documentation, Approval, Game Requirements Outline

Learning Outcomes:
After completing this Unit,students will be able to

- Design a game. [L6]
- Demonstrate the game play.[L2]
- Identify the Game requirements.[L3]

Unit IV
Game Plan: Dependencies, Schedules, Budgets, Staffing, Outsourcing, Middleware, Game Plan Outline.
Production Cycle: Design Production Cycle, Art Production Cycle, Engineering Production Cycle,Working Together.
Voiceover and Music: Planning for Voiceover, choosing a Sound Studio, Casting Actors,Recording Voiceover, Voiceover Checklist, Planning for Music, Working with a Composer,Licensing Music.

Learning Outcomes:
After completing this Unit,students will be able to
- Outline the Gameplan. [L2]
- Define the production cycle.[L1]
- Make use of voiceover and music in game development. [L3]

Unit–V:
Localization
Creating International Content, Localization - Friendly Code, Level of Localization, Localization Plan, Testing, Localization Checklist.

Testing and Code Releasing: Testing Schedule, Test Plans, Testing Pipeline, Testing Cycle, External Testing, Determining Code Release, Code Release Checklist ,GoldMasters, Postmortems.

Marketing and Public Relations: Software Age Ratings,Working with Marketing,Packaging, Demos, Marketing Assets, Game Builds, Working with Public Relations, Asset Deliverable Checklist.

Learning Outcomes:
After completing this Unit,students will be able to

- Explain the importance of localization.[L2]
- Summarize Testing and codere leasing.[L2]
- Illustrate Marketing and public relations.[L2]

COURSE OUTCOMES:
Upon completion of the course,the students should be able to:
- Design games for commercialization.(L6)
- Predict the trends in game development.(L5)
- Design Game Plan and production cycle .(L6)
- Dramatize the game playing environment.(L4)

TEXT BOOKS:

1. Heather Maxwell Chandler and Rafael Chandler,“Fundamentals of Game Development”, Jones

&Bartlett Learning, 2011.

REFERENCE BOOKS:

1. Flint Dilleand John Zuur Platten, The Ultimate guide to Video Game Writing, Loan Eagle publisher, 2008.
2. Adams,Fundamentals of Game Design,3rd edition, Pearson Education India,2015.

R19 Regulations

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester Civil Engineering)

Course Category	:	Open Elective III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**CYBER SECURITY**					SEE	70 M

COURSE OBJECTIVES:

This course is designed to:

- Understand essential building blocks and basic concepts of cyber security.
- ExploreWeb security and Network security.
- Explain the measures for securing the networks and cloud.
- Understand privacy principles and policies.
- Describe the legal issues and ethics in computer security.

UNIT- I

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication , Access Control,and Cryptography ,Authentication, Access Control, Cryptography.

Programs and Programming: Unintentional(Non-malicious) Programming Oversights, Malicious Code—Malware, Counter measures.

Learning Outcomes:

After completing this Unit,students will be able to

- ExplainVulnerabilities,threats and.Counter measures for computer security.[L2]
- Interpret the design of the malicious code.[L2]

UNIT-II

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks.

Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

Learning Outcomes:

After completing this Unit,students will be able to

- Outline the attacks on browser,Web and email. [L2]
- Explain the security aspects of Operating Systems. [L3]

UNIT-III

Network Security:Network Concepts,Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service Strategic Defenses:Security Countermeasures,Cryptographyin Network Security,Firewalls,Intrusion,Detection and Prevention Systems, Network Management.

Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

Learning Outcomes:
After completing this Unit, students will be able to
- Identify the network security threats and attacks.[L3]
- Design the Counter measures to defend the network security attacks.[L6]
- Analyze the security tools and techniques for Cloud computing [L4]

UNITIV
Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy,Data Mining, Privacy on the Web,Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed.
Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

Learning Outcomes:
After completing this Unit,students will be able to
- Interpret the need for Privacy and its impacts of Emerging Technologies.[L2]
- Explain how to handle incidents and deal with Disaster.[L2]

UNITV
Legal Issues and Ethics: Protecting Programs and Data, Information and the Law,Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics, Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

Learning Outcomes:
After completing this Unit,students will be able to
- Adapt legal issues and ethics in computer security.[L6]
- Elaborate on the Emerging topics. [L6]

COURSE OUTCOMES:
Upon completion of the course, the students should be able to:
- Illustrate the broadest of technical, social & political aspects of Cyber Security and security management methods to maintain security protection .(L2)
- Assess the vulnerabilities and threats posed by criminals,terrorist and nation States to national infrastructure.(L5)
- Identify the nature of secure software development and operating systems. (L3)
- Demonstrate the role security management in cyber security defense.(I2)
- Adapt the legal and social issues at play in developing solutions.(L6)

TEXT BOOKS:
1. P fleeger,C.P.,Security in Computing,PrenticeHall,2010,5th edition.
2. Schneier,Bruce.Applied Cryptography,Second Edition,JohnWiley&Sons,1996.

REFERENCE BOOKS:
1) Rhodes-Ousley, Mark. Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts and Practice, McGraw-Hill,2013.
2) Whitman, Michael E.and Herbert J.Mattord.Road map to Information Security for IT and Info

secManagers. Boston, MA: Course Technology,2011.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Open Elective III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**CORPORATE GOVERNANCE IN FOOD INDUSTRIES**					SEE	70 M

PREAMBLE

This text focuses on corporate governance, business ethics and emerging trends in food industries.

COURSE OBJECTIVES

- To understand the concepts of corporate governance in viewof food industry

UNIT I

Corporate Governance- A Conceptual Foundation: Concept, nature, issues and importance of corporate governance, origin and development of corporate governance, concept of corporate management,Different models of corporate governance, corporate governance in family business, corporate governance failure with examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Concept,nature,issues and importance of corporate governance.
- Origin and development of corporate governance,concept of corporate management
- Different models of corporate governance.
- Corporate governance in family business, corporate governance failure with examples.

UNIT– II

Role Players:Role of various players viz.Role of shareholders their rights and responsibilities, Role of board of directors in corporate governance- executive and non executive directors, independent and nominee directors,Role of Auditors,audit committee, media.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Role of share holders their rights and responsibilities.
- Role of board of directors incorporate governance-executive and non executive directors, independent and nominee directors.
- Role of Auditors,audit committee,media.

UNIT– III

Corporate governance in India and the Global Scenario: Corporate Governance practices/codes in India, UK, Japan, USA. Contributions of CII-recommendations on corporate governance by different committees in India, SEBI guidelines, Kumar Manglam Birla Committee, Naresh Chandra committee Report, OECD Principles, Cadbury Committee.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Corporate Governance practices/codes in India,UK,Japan,USA.
- Contributions of CII-recommendations on corporate governance by different committees in India, SEBI guidelines,
- Have detail study of committees like Kumar Manglam Birla Committee, Naresh Chandra committee Report, OECD Principles, Cadbury Committee

UNIT– IV
Emerging trends:Emerging Trends and latest developments in Corporate Governance.Corporate Governance initiative in India and Abroad, Corporate Governance Rating- Role of rating agencies incorporate governance.ICRA Corporate governance rating method for examining the quality and effectiveness of corporate governance.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Emerging Trends and latest developments in Corporate Governance.
- Corporate Governance initiative in India and Abroad,
- Corporate Governance Rating-Role of rating agencies in corporate governance
- ICRA Corporate governance rating method for examining the quality and effectiveness of corporate governance.

UNIT– V
Business ethics and corporate governance. Social responsibility and corporate governance.Corporate governance and value creation.Political economy of corporate governance.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Business ethics and corporate governance.
- Social responsibility and corporate governance.
- Corporate governance and value creation.
- Political economy of corporate governance.

COURSE OUTCOMES:
By the end of the course,the students will

- Attain knowledge on system of corporate governance in food industries.
- Get to know about businesss ethics and values.

TEXT BOOKS

1. Subhash Chandra Das, “Corporate Governance in India”, PHI Pvt. Ltd., NewDelhi(2008),
2. Dennis Campbell, “Susan Woodley Trendsand Developments In CorporateGovernance”.(2004)

REFERENCE BOOKS:

1. JayatiSarkar.“Corporate Governance in India”.Sage Publications,NewDelhi,2012.

2. Vasudha, Joshi “Corporate Governance The Indian Scenario”.Foundations Books Pvt.Ltd.New Delhi.2012,

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Open Elective III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**PROCESS TECHNOLOGY FOR CONVENIENCE & RTE FOODS**					SEE	70 M

PREAMBLE
This text focuses on various aspects and technologies involved in processing of convenience and Read-to-eat foods.

COURSE OBJECTIVES:
- To understand the importance and demand for convenience foods in present day scenario
- To learn the various technical aspects of convenience and Read-to-eat foods.

UNIT I
Overview of grain-based snacks: whole grains – roasted, toasted, puffed, popped and flakes Coated grains-salted, spiced and sweetened Flour based snack–batter and dough based products;savoury and farsans;formulated chips and wafers, papads.

Learning Outcomes:
At the end of unit, students will be able to understand thefollowing
- Role of cereal based ingredients in snacks industries.
- Various technologies and equipments involved in Snacks industries.

UNIT II
Technology for fruit and vegetable based snacks: chips, wafers, papads etc. Technology of ready to eat fruits and vegetable based food products like, sauces, fruit bars, glazed candy etc.Technology of ready to eat canned value added fruits/vegetables and mixes and ready to serve beverages etc.

Learning Outcomes:
At the end of unit, students will be able to understand the following
- Role of Fruits and vegetables inconvenience products.
- Processing of various Fruit and vegetable based products.

UNIT III
Technology of ready- to- eat baked food products, drying, toasting roasting and flaking, coating, chipping. Extruded snack foods: Formulation and processing technology, colouring ,flavouring and packaging. Technology for coated nuts–salted, spiced and sweetened products-chikkis, Singbhujia.

Learning Outcomes:
At the end of unit, students will be able to understand the following
- Various methods involved in processing of ready to eat baked products.
- Various methods involved in processing of extruded snack foods.
- Technology involved in processing different coated nuts.

UNITIV
Technology for ready-to-cook food products- different puddings and curried vegetables etc. Technology for ready-to-cook and ready to eat meat and meat food products. Technology for preparation of instant cooked

rice, carrot and other cereals based food products.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Technology involved in processing different ready to cook food products
- Technology involved in processing differen tready to cook and ready to eat meat and meat products
- Technology involved in processing different instant cooked cereal products

UNIT– V

Technologyofreadytoeatinstantpremixesbasedoncereals,pulsesetc.TechnologyforRTEpuffedsnack-sandpuffing,hotairpuffing,explosionpuffing,gunpuffingetc.TechnologyforpreparationoftraditionalIndian dairy products.

LearningOutcomes:

At the end of unit, students will be able to understand the following

- Technology involved in processing different ready to eat instant premixes based on cereals and pulses and etc.
- Technology involved in processing different RTE puffed snacks.
- Technology involved in processing different traditional dairy products.

COURSE OUTCOMES:

By end of the course students will understand

- Technology for processing ready to eat and ready cook different products and equipment used for manufacturing of RTE products.

TEXT BOOKS

1. Edmund WL."Snack Foods Processing".AVI Publ.
2. Kamaliya M.K and KamaliyaK.B.2001.Vol.1and2, "Baking Science and Industries", M.K.Kamaliya Publisher, Anand.

REFERENCE BOOKS:

1. FrameND."Technology of Extrusion Cooking".BlackieAcademic1994. .
2. Gordon BR."Snack Food",AVI Publ,1997.
3. SamuelAM. "Snack Food Technology",AVI Publ.1976.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Open Elective III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**NUMERICAL METHODS FOR ENGINEERS**					SEE	70 M

(Common for ECE,CSE,IT&CIVIL)

COURSE OBJECTIVES:
This course aims at providing the student with the knowledge on various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations.

UNIT I :Solution of Algebraic & Transcendental Equations:
Introduction-Bisection method-Iterative method-Regula falsi method-Newton Raphson method.System of Algebraic equations:Gauss Jordan method-Gauss Siedal method.

Learning Outcomes:
Students will be able to
- Calculate the roots of equation using Bisection method and Iterative method.
- Calculate the roots of equation using Regula falsi method and Newton Raphson method.
- Solve the system of algebraic equations using Gauss Jordan method and Gauss Siedal method.

UNIT-II: Curve Fitting
Principle of Least squares- Fitting of curves- Fitting of linear, quadratic and exponential curves.

Learning Outcomes:
Students will be able to
- Understand curve fitting.
- Understand fitting of several types of curves.

UNIT-III:Interpolation
Finite differences-Newton's forward and backward interpolation formulae – Lagrange's formulae.Gauss forward and backward formula,Stirling'sformula, Bessel's formula.

Learning Outcomes:
Students will be able to
- Understand the concept of interpolation.
- Deriveinterpolating polynomial using newton's forward and backward formulae.
- Derive interpolating polynomial using lagrange's formulae.
- Derive interpolating polynomial using gauss forward and backwardformulae.

UNIT-IV: Numerical Integration
Numerical Integration:Trapezoidalrule–Simpson's1/3Rule–Simpson's3/8Rule

Learning Outcomes:
Students will be able to
- Solve integral equations using Simson's1/3andSimson's3/8rule.
- Solve integral equations using Trapezoidal rule.

UNIT-V:Solution of Initial value problems to Ordinary differential equations
Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successiveApproximations-Modified Euler's Method-Runge-Kutta Methods.

Learning Outcomes:
Students will be able to

- Solve initial value problems to ordinary differential equations using Taylor's method.
- Solve initial value problems to ordinary differential equations using Euler's method and RungeKutta methods.

COURSE OUTCOMES:
After the completion of course,students will be able to

- Apply numerical methods to solve algebraic and transcendental equations.
- Understand fitting of several kinds of curves.
- Derive interpolating polynomials using interpolation formulae.
- Solve differential and integral equations numerically.

TEXTBOOKS:

1. B.S.Grewal,"Higher Engineering Mathematics", Khanna publishers.
2. Ronald E. "Probability and Statistics for Engineers and Scientists",Walpole,PNIE.
3. ErwinKreyszig,"Advanced Engineering Mathematics",WileyIndia

REFERENCEBOOKS:

1. B.V.Ramana, "Higher Engineering Mathematics",McGraw Hill publishers.
2. Alan Jeffrey,"Advanced Engineering Mathematics", Elsevier.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Open Elective III	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**CHEMISTRYOFNANOMATERIALSANDAPPLICATIONS**					SEE	70 M

COURSE OBJECTIVES:

- To understand synthetic principles of Nanomaterials by various methods.
- And also characterisae the synthetic nanomaterials by various instrumental methods.
- To enumerate the applications of nanomaterials in engineering.

Unit I

Introduction: Scope of nanoscience and nanotecnology, nanoscience in nature, classification of nanostructured materials, importance of nanomaterials.

SyntheticMethods: Bottom-Upapproach**:-**Sol-gelsynthesis,microemulsion sorreversemicelles, co-precipitation method, solvothermal synthesis,hydrothermal synthesis,microwave heating synthesis and sonochemical synthesis.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Classify the nano structure materials.(L2)
- Describe scope of nano science and technology.(L2)
- Explain different synthetic methods of nanomaterials.(L2)
- Identify the synthetic methods of nanomaterial which is suitable for preparation ofparticularmaterial .(L3)

UNIT II

Top-Downapproach:-Inert gas condensation, arc dischargemethod,aerosol synthesis, plasma arc technique, ion sputtering, laser ablation, laser pyrolysis, and chemical vapour deposition method, electro deposition method, highenergy ballmilling.

Learning Outcomes:
At the end of unit, students will be able to understand the following

- Describe the top down approach .(L2)
- Explain aerosol synthesis and plasma arc technique.(L2)
- Differentiate chemical vapour deposition method and electrode position method.(L2)
- Discuss about high energy ballmilling. (L3)

UNIT III

Techniques for characterization: Diffraction technique, spectroscopy techniques, electron microscopy techniques for the characterization of nanomaterials ,BET method for surface area analysis,dynamic light scattering forparticle sizedetermination.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Discuss different technique for characterization of nanomaterial.(L3)
- Explain electron microscopy techniques for characterization of nanomaterial (L3)
- Describe BETmethod for surface area analysis(L2)
- Apply different spectroscopic techniques for characterization(L3)

UNIT IV

Studies of Nano-structured Materials**:** Synthesis, properties and applications of the following nanomaterials,fullerenes,carbonnanotubes,core-shellnanoparticles,nanoshells,self-assembled monolayers,and monolayer protected metal nanoparticles ,nanocrystalline materials,magnetic nanoparticles and important properties in relation to nanomagnetic materials,thermoelectric materials,non-linear opticalmaterials, liquid crystals.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- Explain synthesis and properties and applications of nanomaterials(L2)
- Discuss about fullerenes and carbon nanotubes(L3)
- Differentiate nanomagnetic materials and thermo electric materials(L2)
- Describe liquid crystals(L2)

UNIT.V

Engineering Applications of Nanomaterials

Learning Outcomes:

At the end of this unit,the students will be able to

- Illustrate applications of nanomaterials(L2)
- Discuss the magnetic applications of nanomaterials(L3)
- List the applications of non-linear optical materials(L1)
- Describe the applications fullerenes, carbonnanotubes(L2)

COURSE OUTCOMES:

At the end of the course,the student will be able to:

- Understand the state of art synthesis of nano materials.
- Characterize nanomaterials using ion beam,scanning probe. methodologies,position sensitive atom probe and spectroscopic ellipsometry.
- Analyze nanoscale structure in metals,polymers and ceramics.
- Analyze structure-property relationship in coarser scale structures.
- Understand structures of carbonnanotubes.

TEXT BOOKS:

1. NANO:TheEssentials :T Pradeep,MaGraw-Hill, 2007.
2. Textbook of Nanoscience and nanotechnology**:**B SMurty,P Shankar,Baldev Rai, B B Rath and James Murday, Univ. Press, 2012.

REFERENCE BOOKS:

1. Concepts of Nanochemistry;Ludovico Cademrtiri and GeoffreyA.Ozin & Geoffrey
2. A.Ozin, Wiley-VCH, 2011.
3. Nanostructures & Nanomaterials; Synthesis, Properties & Applications:
4. GuozhongCao, Imperial CollegePress,2007.
5. Nanomaterials **Chemistry**,C.N.R.Rao,Achim Muller,K.Cheetham,Wiley-VCH,2007.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Humanities Elective-II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**ORGANISATIONAL BEHAVIOUR**					SEE	70 M

COURSE OBJECTIVES:
The objectives of this course are
- To make the student understand about the organizational behavior.
- To enable them to develop selfmotivation,leadership and management.
- To facilitate them to become powerful leaders.
- Impart knowledge about group dynamics.
- To make them understand the importance of change and development.

UNIT-I
Organizational Behavior - Introduction to OB - Meaning and definition, scope – Organizing Process – Making organizing effective - Understanding Individual Behavior – Attitude -Perception-Learning - Personality Types

Learning Outcomes:
After completion of this unit student will
- Understand the concept of Organizational Behavior.
- Contrast and compare Individual & Group Behavior and attitude.
- Analyze Perceptions.
- Evaluate personality types.

UNIT-II
Motivation and Leading- Theories of Motivation- Maslow's Hierarchy of Needs-Hertzberg's Two Factor Theory-Leading-Leading Vs Managing

Learning Outcomes:
After completion of this unit student will
- Understand the concept of Motivation.
- Understand theTheories of motivation.
- Explain how employees are motivated according toMaslow's Needs Hierarchy.
- Compare and contrast leading and managing.

UNIT-III
Leadership and Organizational Culture and Climate - Leadership - Traits Theory–ManagerialGrid - Transactional Vs Transformational Leadership - Qualities of good Leader – Conflict Management-Evaluating Leader –Women and Corporate leadership.

Learning Outcomes:
After completion of this unit student will
- Know the concept of Leadership.
- Contrast and compare Traitstheory and ManagerialGrid.
- Know the difference between Transactional and Transformational Leadership.
- Evaluate the qualities of goodleaders.

- Emergeas the good leader.

UNIT IV

Group Dynamics-Types of groups- Determinants of group behavior- Group process–Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making –Team building -Conflict in theorganization– Conflict resolution

Learning Outcomes:

After completion of this unit student will

- Know the concept of Group Dynamics.
- Contrast and compare Group behavior and group development.
- Analyze Group decision making.
- Know how to resolve conflicts in the organization.

UNIT-V

Organizational Change and Development - Organizational Culture - Changing the Culture –Change Management – Work Stress Management - Organizational management – Managerial implicationsof organization's change and development

Learning Outcomes:

After completion of this unit student will

- Know the importance of organizational change and development.
- Apply change management in the organization.
- Analyze work stress management.
- Evaluate Managerial implications of organization.

COURSE OUTCOMES:

At the end of the course, students will be able to

- Understand the nature and concepts of Organisational behavior.
- Apply theories of motivation to analyse the performance problems
- Analyse the different theories of leadership.
- Evaluate group dynamics.
- Develop as powerful leader.

TEXT BOOKS:

1. Luthans, Fred,"Organisational Behaviour" , McGraw-Hill, 12 Th edition 2011 2. P Subba Rao,Organisational Behaviour, Himalya Publishing House2017

REFERENCES BOOKS:

1. Mc Shane,"Organizational Behaviour",TMH 2009
2. Nelson,"Organisational Behaviour",Thomson,2009.
3. Robbins,P.Stephen,TimothyA.Judge,"Organisational Behaviour", Pearson 2009.
4. Aswathappa,"Organisational Behaviour",Himalaya, 2009

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Humanities Elective-II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**MANAGEMENT SCIENCE**					SEE	70 M

COURSEOBJECTIVES:
The objectives of this course are

- To provide fundamental knowledge on Management, Administration,Organization& its concepts.
- To make the studentsunderstand the role of management in Production.
- To impart the concept of HRM in order to have an idea on Recruitment,Selection,Training & Development ,jobevaluation and Meritrating concepts.
- To create awareness on identify Strategic Management areas & the PERT/CPM forbetter Project Management.
- To make the students aware of the contemporary issues in management.

UNIT-I
Introduction to Management
Management - Concept and meaning - Nature-Functions - Management as a Science and Artandboth.Schools of Management Thought- Taylor's Scientific Theory-Henry Fayol'sprinciples-Eltan Mayo's Humanrelations-Systems Theory

Organisational Designs-Lineorganization - Line & Staff Organization - Functional Organization - Matrix Organization –Project Organization-Committee form of Organization-Social responsibilities of Management.

Learning Outcomes:
At the end of theUnit, the learners will be able to

- Understand the concept of management and organization.
- Apply the concepts & principles of management in reallife industry.
- Analyze the organization chart & structure for an enterprise.
- Evaluate and interpret the theories and the modern organization theory.

UNIT-II
Operations Management
Principles and Types of Plant Layout-Methods of Production (Job,batch and Mass Production),WorkStudy-Statistical Quality Control-Deming's contribution to Quality.

Material Management - Objectives - Inventory-Functions - Types, Inventory Techniques -EOQ-ABC Analysis-PurchaseProcedure and Stores Management-**Marketing Management -**Concept-Meaning-Nature-Functions of Marketing-Marketing Mix-Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on ProductLifeCycle.

Learning Outcomes:
At the end of the Unit, the learners will be able to

- Understand the coreconcepts of Management Science and Operations Management.
- Apply the knowledge of Quality Control,Work-study principles in reallife industry.
- Evaluate Materials departments & Determine EOQ.
- Analyze Marketing Mix Strategies for an enterprise.
- Create and design advertising and sales promotion.

UNIT-IIIHuman Resources Management (HRM)

HRM - Definition and Meaning – Nature - Managerial and Operative functions - Evolution of HRM - Job Analysis - Human Resource Planning(HRP) - Employee Recruitment-Sources of Recruitment - Employee Selection -Process and Tests in Employee Selection -EmployeeTraining and Development- On-the- job & Off-the-jobtraining methods- PerformanceAppraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction -Wage and Salary Administration

Learning Outcomes:

At the end of the Unit,the learners will

- Understand the concepts of HR Min Recruitment ,Selection, Training & Development .
- Apply Managerial and operative Functions.
- Analyze the need of training.
- Evaluate performance appraisal.
- Design the basic structure of salaries and wages.

UNIT-IV

Strategic & Project Management

Definition & Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process –Environmental Scanning-Stepsin Strategy Formulation and Implementation-SWOTAnalysis

Project Management - Network Analysis - Programme Evaluation and Review Technique(PERT)-Critical Path Method(CPM) Identifying CriticalPath- Probability of Completing the project within given time - Project Cost- Analysis - Project Crashing (Simpleproblems).

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand Mission,Objectives,Goals & strategies for an enterprise.
- Apply SWOT Analysis to strengthen the project.
- Analyze Strategy formulation and implementation.
- Evaluate PERTandCPM Techniques.
- Creative in completing the projects within given time.

UNIT-V Contemporary Issues in Management

The concept of Management Information System(MIS) - Materials Requirement Planning(MRP) - Customer Relations Management(CRM) - Total Quality Management (TQM) - SixSigma Concept - Supply Chain Management(SCM) - Enterprise Resource Planning (ERP) -Performance Management - Business Process Outsourcing (BPO) - Business Process Re-engineeringand Bench Marking-Balanced ScoreCard-Knowledge Management.

Learning Outcomes:

At the end of the Unit,the learners will be able to

- Understand modern management techniques.
- Apply Knowledge in Understanding in modern.
- Analyze CRM,MRP,TQM.
- Evaluate Six Sigma concept and SCM.

COURSE OUTCOMES:

At the endof the course,students will be able to

- Understand the concepts & principles of management and designs of organization in a practical world.
- Apply the knowledge of work-study principles & Quality control techniques in industry.
- Analyse the concepts of HRM in recruitment ,selection and training & development.
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate Time & Cost of project & to analyse the business through SWOT.
- Create Modern technology in management science.

TEXT BOOKS:

1. A.R Aryasri,"Management Science",TMH, 2013
2. Stoner,Freeman,Gilbert, Management, Pearson Education,New Delhi,2012.

REFERENCES:

1. Koontz & Weihrich,"Essentials of Management",6th edition, TMH, 2005.
2. Thomas N.Duening &JohnM.Ivancevich,"Management Principles and Guidelines",Biztantra.
3. Kanishka Bedi,"Production and Operations Management",Oxford UniversityPress,2004.
4. SamuelC.Certo,"Modern Management",9th edition,PHI,2005

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Humanities Elective-II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**BUSINESS ENVIRONMENT**					SEE	70 M

COURSE OBJECTIVES:
The objectives of this course are
- To make the student understand about the business environment.
- To enable them in knowing the importance of fiscal and monitory policy.
- To facilitate them in understanding the export policy of the country.
- Impart knowledge about the functioning and role of WTO.
- Encourage the student in knowing the structure of stockmarkets.

UNIT I
An Overview of Business Environment – Types of Environment - Internal & External –Micro and Macro environment-Competitive structure of industries-Environmental analysis-Scope of business - Characteristics of business - Process & limitations of environmental analysis.

Learning Outcomes:
After completion of this unit student will
- Understand the concept of Business environment.
- Explain various types of business environment.
- Know about the environmental analysis of business.
- Understand the business process.

UNIT– II
FISCAL POLICY - Public Revenues - Public Expenditure - Public debt – Development activities financed by public expenditure-Evaluation of recent fiscal policy of Government of India-Highlights of Budget-**MONETARYPOLICY**-Demand and Supply of Money–RBI-Objectives of monetary and credit policy-Recent trends –Role of Finance Commission.

Learning Outcomes:
After completion of this unit student will
- Understand the concept of public revenue and public Expenditure.
- Explain the functions of RBI and its role.
- Analyze the Monitory policy in India.
- Know the recent trends and the role of Finance Commission in the development of our country.
- Differentiate between Fiscal and Monitory Policy.

UNIT III
INDIA'STRADEPOLICY-Magnitude and direction of Indian International Trade-Bilateral and Multilateral Trade Agreements-EXIM policy and role of EXIM bank-
BALANCE OF PAYMENTS – Structure & Major components - Causes for Disequilibrium in Balanceof Payments-Correction measures.

Learning Outcomes:
After completion of this unit student will

- Understand the role of Indian international trade.
- Understand and explain the need for Export and EXIM Policies.
- Analyze causes for Disequilibrium and correction measure.
- Differentiate between Bilateral and Multilateral Trade Agreements.

UNIT IV

WORLD TRADE ORGANIZATION- Nature and Scope –Organization and Structure-Role and functions of WTO in promoting world trade-Agreements in the Uruguay Round–TRIPS,TRIMS,and GATT-Disputes Settlement Mechanism-Dumping and Anti-dumping Measures.

Learning Outcomes:

After completion of this unit student will

- Understand the role of WTO in trade.
- Analyze Agreements on trade by WTO.
- Understand the Dispute Settlement Mechanism.
- Compare and contrast the Dumping and Anti-dumping measures.

UNIT V

MONEY MARKETS AND CAPITAL MARKETS - Features and components of Indianfinancial systems - Objectives, features and structure of money markets and capital markets -Reforms and recent development – SEBI - Stock Exchanges - Investor protection and role of SEBI.

Learning Outcomes:

After completion of this unit student will

- Understand the components of Indian financial system.
- Know the structure of Money markets and Capita lmarkets.
- Analyze theStock Markets.
- Apply the knowledge infuture investments.
- Understand the role of SEBI in investor protection.

COURSE OUTCOMES:

At the end of the course, students will be able to

- Understand various types of business environment.
- Understand the role of WTO
- Apply the knowledge of Money markets in future investment
- Analyze India's Trade Policy
- Evaluate fiscal and monitory policy
- Develop a personal synthesis and approach for identifying business opportunities.

TEXT BOOKS:

1. Francis Cherunilam (2009), "International Business": Text and Cases, Prentice Hall of India.
2. K. Aswathappa, "Essentials of Business Environment": Texts and Cases & Exercises 13th Revised Edition.HPH 2016.

REFERENCE BOOKS:

1. K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black (2009), International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.

3. Chari.S.N (2009), International Business,Wiley India.
4. E.Bhattacharya (2009),International Business, Excel Publications, New Delhi.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Humanities Elective-II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**STRATEGIC MANAGEMENT**					SEE	70 M

COURSE OBJECTIVES:

The objectives of this course are

- To introduce the concepts of strategic management and understand its nature in competitive and organization all and scape.
- To provide an understanding of internal and external analysis of a firm/individual.
- To provide understanding of strategy formulation process and frame work.
- Impart knowledge of Corporate culture.
- Encourage the student in understanding SWOT analysis BCG Matrix

UNIT I: Introduction of Strategic Management

Meaning, nature, importance and relevance. The Strategic Management Process: – Corporate, Business and Functional Levels of strategy.Vision, mission and purpose –Business definition, objectives and goals – Stakeholders inbusinessand their roles in strategic management.Balance score card.

Learning Outcomes:

After completion of this unit student will be able

- Understand the meaning and importance of strategic management.
- Explain Strategic Management Process and Corporate,Business.
- Know about the Business definition, objectives and goals.
- Understand Stakeholders their roles in strategic management.

UNIT-IIExternal and Internal Analysis:

The Strategically relevant components of a Company’s External Environment Analysis, Industry Analysis - Porter’s Five Forces model – Industrydiving forces – Key Success Factors. Analyzing a company’s resources and competitive position

Learning Outcomes:

After completion of this unit student will be able

- Understand the component sofa Company’s environment.
- Explain External Environment Analysis,Industry Analysis.
- Know how to analyze industry competition through the Porter’s Five Forces model.
- Analyze Key SuccessFactors in a company’s competitive position.

UNIT:III

Competitive Strategies: Generic Competitive Strategies: Low cost, Differentiation, Focus.Grand Strategies:Stability,Growth(DiversificationStrategies,Vertical Integration Strategies,Mergers,Acquisition &Takeover Strategies,Strategic Alliances & Collaborative Partnerships),Retrenchment ,Outsourcing Strategies.Tailoring strategy to fit specific industry -Life Cycle Analysis - Emerging, Growing,Mature & Declining Industries.

Learning Outcomes:

After completion of this unit student will

- Understand the Competitive Strategies.
- Explain Stability,Growth Mergers,Acquisition &Takeover Strategies.
- Know about the Retrenchment,Outsourcing Strategies.
- Differentiate Life Cycle Analysis,Mature & Declining Industries.

UNIT-IV

Strategy Implementation and control - Strategy implementation; Organization Structure –Matching structure and strategy.Behavioral issues in implementation–Corporate culture–McKinsey's7s Framework.Functional issues–Functional plans and policies–Financial,Marketing,Operations, Personnel,IT.

Learning Outcomes:

After completion of this unit student will

- Understand the Organization Structure.
- Explain Matching structure and strategy.
- Know about theCorporate culture.
- Analyze Functional plans and policies.

Unit-V

Strategy Evaluation: Strategy Evaluation–Operations Control and Strategic Control-Relationship between a Company's Strategy and its Business Model.-SWOT analysis–Value Chain Analysis –Benchmarking-Portfolio Analysis:BCG Matrix– GE9 CellModel.

Learning Outcomes:

After completion of this unit student will

- Understand the Operations Control and Strategic Control.
- Explain Company's Strategy and its Business Model.
- Know about theSWOT analysis.
- Analyze BCG Matrixand GE9 Cell Model.

COURSE OUTCOMES:

At the end of the course,students will be able to

- Understand the relevance and importance of strategic management.
- Explain industry driving forces.
- Analyze the competitive strategy.
- Evaluate Strategy implementation and control.
- Create SWOT Analysis.

TEXT BOOKS:

1. ArthurA.ThompsonJr.,A J Strick land III, John E Gamble,"Crafting and Executing Strategy",18th edition, Tata Mc Graw Hill, 2012.
2. Subba Rao P,"Business Policy and Strategic Management"–HPH

REFERENCE BOOKS:

1. Robert A.Pitts & David Lei,"Strategic Management: Building and Sustaining Competitive Advantage" 4th edition, C engage Learning.
2. Hunger,J.David,"Essentials of Strategic Management" 5thedition,Pearson.
3. Ashwathappa,"Business Environment for Strategic Management",HPH.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Humanities Elective-II	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**E-BUSINESS**					SEE	70 M

COURSE OBJECTIVES:

- To provide knowledge on emerging concept on E-Business related aspect.
- To understand various electronic markets models which are trending in India.
- To give detailed information about electronic payment systems net banking.
- To exact awareness on internet advertising, market research strategies and supply chain management.
- To understand about various internet protocols – security related concept.

UNIT I

Electronic Business: Definition of Electronic Business - Functions of Electronic Commerce(EC) - Advantages of E-Commerce – E-Commerce and E-Business Internet Services Online Shopping-Commerce Opportunities for Industries.

Learning Outcomes:
After completion of this unit student will be

- Understand the concept of E-Business
- Contrast and compare E-Commerce E-Business
- Analyze Advantages of E-Commerce
- Evaluate opportunities of E-commerce for industry

UNIT II

Electronic Markets and Business Models: E-Shops-E-Malls E-Groceries - Portals – Vertical Portals – Horizontal Portals – Advantages of Portals – Business Models – Business to Business (B2B) - Business to Customers (B2C) -Business to Government (B2G) –Auctions - B2B Portals in India

Learning Outcomes:
After completion of this unit student will

- Understand the concept of business models
- Contrast and compare Vertical portal and Horizontal portals
- Analyze Advantages of portals
- Explain the B2B,B2C and B2G model

UNIT III

Electronic Payment Systems: Digital Payment Requirements-Designing E-payment System-Electronic Fund Transfer(EFT)-Electronic Data Interchange(EDT)-Credit Cards-Debit Cards-E-Cash-Electronic Cheques-Smart Cards-Net Banking-Digital Signature.

Learning Outcomes:
After completion of this unit student will be

- Understand the Electronic payment system
- Contrast and compare EFT and EDT
- Analyze debit card and credit card
- Explain the on Digital signature

UNIT IV

E-Security: Internet Protocols - Security on the Internet –Network and Website Security –Firewalls–Encryption –Access Control –Secure Electronic transactions.

Learning Outcomes:

After completion of this unit student will be

- Understand E-Security
- Contrast and compare security and network
- Analyze Encryption
- Evaluate electronic transitions

UNIT V

E-Marketing: Online Marketing–Advantages of Online Marketing–Internet Advertisement - Advertisement Methods – Conducting Online Online Market Research–Data mining and Marketing Research Marketing Strategy On the Web–E-Customer Relationship Management (e-CRM)–E-Supply Chain Management.(e-SCM)–New Trends in Supply Chain Management.

Learning Outcomes:

After completion of this unit student will be able to

- Understand the concept of online marketing.
- Analyze advantages of online marketing.
- Compare the e-CRM and e-SCM.
- Explain the new trends in supply chain management.

COURSE OUTCOMES:

- They will be able to identify the priority of E-Commerce in the present globalised world.
- Will be able to understand E-market-Models which are practicing by the organization
- Will be able to recognize various E-payment systems & importance of net banking.
- By knowing E-advertisement, market research strategies, they can identify the importance of customer role.
- By understanding about E security, they can ensure better access control to secure the information.

TEXT BOOKS:

1. C.S.VMurthy "E-Commerce",Himalaya publication house,2002.
2. P.T.SJoseph,"E-Commerce",4th Edition,PrenticeHallofIndia2011

REFERENCE BOOKS:

1. Kamalesh K Bajaj, DebjaniNa,"E-Commerce", 2nd Edition Tata Mc Grew Hills 2005
2. Dave Chaffey – "E-Commerce E-Management", 2nd Edition,Pearson,2012.
3. HenryChan,"E-Commerce Fundamentals and Application", Raymond Lee, Tharm Wiley India
4. 2007
5. S.Jaiswall"E-Commerce",Galgotia Publication Pvt Ltd 2003.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Practical	L	T	P	C	Exam	3 Hrs
Course Code	:		0	0	3	1.5	CIA	30 M
Course Title	:	**CONCRETE TECHNOLOGY LAB**					SEE	70 M

COURSE OBJECTIVES:

- To find the various physical characteristics of cement,coarse and fine aggregates
- To find the various properties of green and hardened concrete.

List of Experiments:

1. Grading Curve of Coarse & Fine aggregates.
2. Bulking of Fine aggregate.
3. Specific gravity of Fine and coarse aggregate.
4. Specific gravity,fineness,Initial and final setting times of Cement.
5. Soundness and Compressive Strength test of Cement.
6. Slump, compaction factor and Vee-Bee time tests on concrete.
7. Compressive and split tensile strength of concrete.
8. Non destructive tests on concrete (any two).

COURSE OUTCOMES:

At the end of the course,the student will be able

- To find the characteristics of fine and coarse aggregates.
- To evaluate the properties of the binding materials for their suitability in building .construction.
- To understand the workability behaviour of concrete through various tests.
- To evaluate the strength of hardened concrete through destructive and non-destructive tests.

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RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VII Semester Civil Engineering)

Course Category	:	Practical	L	T	P	C	Exam	3 Hrs
Course Code	:		0	0	3	1.5	CIA	30 M
Course Title	:	**COMPUTER AIDED DESIGN LAB**					SEE	70 M

COURSE OBJECTIVES:
To make the student familiar with civil engineering softwares related to design and drawing

CAD SOFTWARE: STAADPRO or Equivalent

EXCERCISIES:
1. 2-D Frame Analysis and Design
2. Steel Tabular Truss Analysis and Design
3. 3-D Frame Analysis and Design
4. Retaining Wall Analysis and Design
5. Simple tower Analysis and Design
6. One Way Slab Analysis & Design
7. Two Way Slab Analysis & Design
8. Column Analysis & Design

TEXT BOOKS:
1. Computer Aided Design Lab Manual by Dr.M.N.Sesha Prakash And Dr.C.S.Suresh

COURSE OUTCOMES:
At the end of the course,the student will be able to
1. Design various civil engineering structural elements.

B.TECH - VIII SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VIII Semester Civil Engineering)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:		2	1	0	3	CIA	30 M
Course Title	:	DESIGN OF REINFORCED CONCRETE STRUCTURES					SEE	70 M

COURSEOBJECTIVES:
Theseare tointroducefundamentalsof elasticityandsteps involvedinFEM.
- Todescribeelementstiffnessmatrixformulationfor1Dand2D cases.
- Toimpartiso parametricformulationconcepts.
- Toteachformulation ofstiffnessmatrix foraxi-symmetricproblems.
- Todemonstratenumericalsolutiontechniquesusedin FEM.

UNIT-I: Introduction
ConceptsofFEM–Stepsinvolved–merits&demerits–energyprinciples –Discretization – Rayleigh –Ritz method of functional approximation. Principles of Elasticity:Equilibriumequations–straindisplacement relationshipsinmatrixform – Constitutiverelationships for plane stress, plane strain and Axi-symmetric bodies of revolution with axi-symmetricloading.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Updatebasicconceptsof theoryofelasticity
- UnderstandstagesinvolvedinFEM

UNIT-II: One Dimensional & Two Dimensional Elements
Stiffness matrix for bar element – shapefunctions–1D and2D elements–types ofelementsforplanestressandplane strainanalysis –Displacementmodels–generalizedcoordinates–shapefunctions–convergentandcompatibility requirements – Geometric invariance – Natural coordinate system – area andvolumecoordinates

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Studytypesofelementsandtheirdegreesoffreedom
- Developstiffnessmatricesfor1D and2D elements.

UNIT-III: Elementstiffnessmatrix
Generationofelementstiffnessandnodalloadmatricesfor3-nodetriangularelementandfour -nodedrectangular elements.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Developstiffnessmatricesfor3nodedtriangularelementandfournodedrectangularelement.

UNIT-IV: Iso-parametricFormulation
Iso-parametricelementsfor2Danalysis–formulationofCSTelement,4– nodedand8-noded iso-parametric quadrilateral elements –Lagrangian and Serendipity elements.AXI-SYMMETRIC ANALYSIS:Basic

principles-Formulation of 4-noded iso-parametric axi-symmetricelement.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Studytypesofelementsandtheirdegreesoffreedom
- Developstiffnessmatricesfor2Dandaxisymmetricsolutiontechniques.

UNIT-V: Solutiontechniques
Numerical Integration, Static condensation, assembly of elements and solution techniques forstatic loads.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- ApplynumericalsolutiontechniquesinFEM.

TEXTBOOKS:
1. TirupathiRChandraputla,“FiniteElementAnalysisforEngineeringandTechnology”,UniversitiesPres s Pvt Ltd, Hyderabad. 2003.
2. C.S.KrishnaMurthy,“FiniteElementanalysis-Theory&Programming”,TataMc.GrawHill Publishers.

REFERENCE BOOKS:
1. H.V.Lakshminaryana,“Finiteelementanalysisandproceduresinengineering”,3rdedition,Universities press, Hyderabad.
2. RobertD.Cook,MichaelEPlesha,ConceptsandapplicationsofFiniteElementAnalysis,John Wiley & sons Publications
3. S.Rajasekharan,“FiniteelementanalysisinEngineeringDesign”,S.ChandPublications,New Delhi.

COURSE OUTCOMES:
Uponcompletionofthecourse, thestudent willbe able to
- Developfinite elementformulations of1D&2D problems.
- SolvecomplexproblemsusingFEM.
- Formulateisoparametric elementswithdifferentirregularboundaries.
- Implementsolutiontechniquesforhigherorderproblemsinpractice.
- Applyconceptsforcarryingoutresearch.
- Applyconceptsformodelingofnon-linearmaterialsandgeometry.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VIII Semester Civil Engineering)

Course Category	:	Professional Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**ADVANCED R.C.C STRUCTURAL DESIGN**					SEE	70 M

COURSE OBJECTIVES:
- Todesignanddetailing ofreinforcementofaninteriorpanel of aflatslab
- Todesignacircularbunkerwiththedetailingofreinforcement
- Todesignaconcrete chimneywithdetailingofreinforcement.
- Todesigndifferentelementsofthecircularandrectangularshapewatertanks.
- Todesignanddetailingofthereinforcementinthevariousmembersofthecantileverandcounter fort retaining walls.

UNIT-I:
Designofaflatslab (Interiorpanelonly)

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Toknowthe componentsof interiorslabpanel
- Tounderstandthedesignprocedureanddetailingofreinforcementofinteriorpaneloftheflat slab

UNIT-II:
Designofconcrete bunkersofcircularshape–(excluding staging) – Introductionto silos

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Toknowandunderstandthe componentsof bunker
- Tohaveaclearviewofthedesignprocedureanddetailingofreinforcementofbunker

UNIT-III:
Designofconcretechimney(excludingseismicloads)

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Tohavea comprehensiveunderstandingofvariousforcesactingonthechimney.
- Todesigntheconcretechimney.

UNIT-IV:
Designofcircularandrectangularwatertank restingontheground

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Tohaveagood understandingof design of watertanksresting on the ground.

UNIT-V:
Designofcantileverandcounterforteretainingwallwithhorizontalbackfillonly.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Toknowtheapplicationsofcantileverandcounterforteretainingwalls.
- Toperform thestability analysisof theretaining walls
- Todesignand detailingofthecantileverandcounterforte retainingwalls

FINALEXAMINATION
QUESTIONPAPERPATTERN:Thequestionpapershallconsistsoftwoparts.Firstpartwillbewith20markswith 10numberofquestionswitheachcarrying2marks.Secondpartconsistsoftwo designquestions ofeither ortypefromtheabovefiveunits carrying50marks.
NOTE:RelevantISCodesmaybepermittedintheexaminationhall.

TEXT BOOKS:
1. Krishnam Raju, "Structural Design and drawing (RCC and steel)" Universites .Press , NewDelhi
2. Dr.B.C.Punmia,AshokKumarJain,ArunKumarJain,R.C.C"Structures",LaxmiPublications,New Delhi
3. Varghese,"Advanced RCC",PHIPublications,NewDelhi.
4. M.L.Gambhir"DesignofRCCstructures",P.H.I.Publications,NewDelhi.

REFERENCEBOOKS:-
1. Sushilkumar,"R.C.CDesignsstandard"publishinghouse.
2. N.C.SinhaandS.K.Roy,"FundamentalsofRCC",S.ChandPublications,NewDelhi.

COURSE OUTCOMES:
Uponcompletionofthecourse, thestudent willbe able to
- Designanddetailtheflatslabs
- Designanddetail bunkersandsilos
- Designanddetailconcretechimney
- Designanddetail watertanksresting ontheground
- Designanddetailcantileverandcounterforteretainingwalls

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Professional Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**ADVANCEDSTEELSTRUCTURES**					SEE	70 M

COURSE OBJECTIVES:
Theobjectiveofthiscourseis:

- Toimpartknowledgeonadvancedtopicsofsteelstructures.
- Toteach conceptsof steelbridges.
- Toinsiststhe studentstoobserveandpractical constructionofall steelstructures.
- Toteachthedesignconceptsofsteelwater tanks.
- Todemonstratethefunctionsofsteel towers.

UNIT–I: BRIDGES
Classification-loadings-decktypeweldedplategirderbridges.

LearningOutcomes:
Aftercompletionofthisunit studentwill

- Tounderstandthefunctionsofbridgesandloading standards
- Todesignthedecktype plategirder bridge.

UNIT–II: BEARINGS
Types of bearings-plate bearing- rocker bearing- roller bearing-knuckle pinbearing.

LearningOutcomes:
Aftercompletionofthisunit studentwill

- Tounderstandthefunctionsofbearings
- Tounderstandthetypesofbearings.

UNIT–III: WATERTANKS
Introduction-designofelevatedcircularandrectangularwatertanks

LearningOutcomes:
Aftercompletionofthisunit studentwill

- Toidentifydifferentcomponentsofwater tanks.
- To understand the loads on water tanks.
- To design water tanks.

UNIT–IV: PLATIC ANALYSIS
Introduction to plastic theory- conditions of plastic analysis- theoremof plastic analysis-shape factor – finding the collapse load for simple beams and single baysinglestorey frames.

LearningOutcomes:
Aftercompletion ofthisunitstudent will

- Tounderstandthesteelplasticbehavior

- Tocalculatethecollapse load forbeamsandframes.

UNIT–V: STEEL FRAMES
Finding the moments in frames subjected to horizontal forces by portalmethodand cantilever method

LearningOutcomes:
Aftercompletionofthisunit studentwill

- Tofindthemagnitudeof bendingmomentsin steelframes.

TEXTBOOKS:

1. S.K.Duggal,"LimitstateDesignofsteelstructures",McgrawhillPublishers
2. Ramchandra and Veerendra gahlote, "Limit state design of steel structures", Scientificpublishers.

REFERENCEBOOKS:

1. N.Subramanyam"Designofsteelstructures",Oxforduniversitypress
2. L.S.JayagopalandD.Tensing,"Designofsteelstructures",Vikaspublishers.
3. Edwin H.Gaylord, Jr., Charles N.Geylord and James E. Stallmeyer "Desing of steelstructures" 3rd edition—Tata McGraw hill Edition.

COURSE OUTCOMES:
Uponthesuccessfulcompletion ofthis course, the students willbe able to:

- Completeanalysisanddesignofadvancedsteelstructures.
- Ableto design plategirder bridges andbridgebearings
- Ableto designsteel water tanksand ableto find thebending momentin frames

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Professional Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**ADVANCEDFOUNDATIONENGINEERING**					SEE	70 M

COURSE OBJECTIVES:

- To impart how Meyerhof's general bearing capacity equations are important overTerzaghi'sbearing capacity equation.
- To teach special methods of computation of settlements and the corrections to beapplied to settlements and to understand the advanced concepts of design of pilefoundations.
- Tothrowlight onpile andmat foundationdesigns.
- To teach the difference between isolated and combined footings, the determination ofbearingcapacity of matsand proportioning offootings.

UNIT-I:

BearingcapacityofFoundationsusinggeneralbearingcapacityequation–Meyerhof's,BrinchHansen's and Vesic's methods- Bearing capacity of Layered Soils: Strong layer over weaklayer,Weaklayeronstronglayer–Bearingcapacityoffoundationsonatopofslope–Bearingcapacityof foundations at theedgeof theslope.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Understandbearingcapacityofsoils
- Determinethebearing capacityofsoils.

UNIT-II:

Settlementanalysis:Immediatesettlementoffootingsrestingongranularsoils–Schmertmann& Hartman method – De Beer and Martens method - Immediate settlement in clays – Janbu'smethod – correction for consolidation settlement using Skempton and Bjerrum's method –Correctionforconstruction period.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Understandsettlementanalysisbyvariousmethods.
- Studycorrectionsforconstructionperiod

UNIT-III:

Mat foundations – Purpose and types of isolated and combined footings – Mats/ Rafts –Proportioning of footings – Ultimate bearing capacity of mat foundations – allowable bearingcapacityofmatsfoundedinclaysandgranularsoils–compensatedrafts-annularfoundations.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Listoutvarious typesoffootings
- Designmatfoundation

UNIT-IV:

Earth-retaining structures – cantilever sheet piles – anchored bulkheads – fixed and free earthsupport methods–designof anchors–braced excavations–functionof differentcomponents – forcesinties–Basalheavingstabilityagainstbottomheave.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Explainneedandimportanceof earthretainingstructures
- Designofearthretainingstructuresaccordingtostabilityconcepts.

UNIT-V:

Pile foundations – single pile versus group of piles – load-carrying capacity of pile groups –negative skin friction (NSF) -settlement of pile groups in sands and clays – laterally loadedpiles in granular soils – Reese and Matlock method – laterally loaded piles in cohesive soils –Davissonand Gill method– Broms'analysis.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Explainconditions foradoptingpilefoundations
- Designpilesandpilecapsindifferentsoils.

TEXT BOOKS:

1. J.E.Bowles"FoundationAnalysisandDesign",JohnWiley
2. V.N.S.Murthy,"SoilMechanicsandFoundationEngineering",CBSPublishers

REFERENCE BOOKS:

1. W.C.Teng,"FoundationDesign",PrenticeHallPublishers
2. C.Venkataramiah,"GeotechnicalEngineering", NewageInternationalPvt.Ltd,(2002).
3. Bowles, J.E., "Foundation Analysis and Design", 4^{th} Edition, McGraw-Hill PublishingCompany,Newyork. (1988)
4. Poulos,H.G.,andDavis,E.H.,Pile"Foundation AnalysisandDesign",JohnWiley,1980.

COURSE OUTCOMES:

Uponsuccessfulcompletionofthiscourse,studentwillbeableto

- Computethesafebearingcapacityof footingssubjected toverticaland inclinedloads.
- Understandtheadvancedmethodsofsettlementcomputationsandproportionfoundationfootings.
- Judging the methodsof computingthe pull-outcapacity andnegative skinfrictionof pilesandcomputethe settlements of pilegroups in clays.
- Evaluatetheproblemsposedbyexpansivesoilsandthedifferentfoundationpracticesdevised.
- Judgingthedifferencebetweenisolatedfootingsandcombinedfootingsandmatfoundations.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Professional Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**SOILSTRUCTURE INTERACTION**					SEE	70 M

Purpose to understand the mechanism of soils, their interactive behavior, analysis, itsinfluencesinthedesignparametersthrough designcharts andsoftwarepackages.

INSTRUCTIONALOBJECTIVES

- Tounderstand the soilbehavior and themethods to analyzethemodels
- Tosolve theproblems for beamand plateon elastic medium.
- To analyzethepileforits settlement and load distribution.

UNITI: SOIL-FOUNDATIONINTERACTION

Introduction to soil - Foundation interaction problems, Soil behavior, Foundation behavior,Interface,behavior,Scopeofsoil-foundationinteractionanalysis,soilresponsemodels,Winkler, Elastic continuum, Two parameter elastic models, Elastic plastic behavior, Timedependentbehavior.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Understandthebehavior ofthefoundations.
- Understandthemodelsforsoilstructureinteractions.

UNITII: BEAM ON ELASTIC FOUNDATION - SOIL MODELS

Infinite beam, Two parameters,Isotropic elastic half space, Analysis of beams of finite length, Classification of finite beamsinrelation to theirstiffness.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Designshallowfoundations,assuming itasafinitebeam.
- Calculatethebendingmoments andshear forces.

UNITIII: PLATE ON ELASTIC MEDIUM

Infinite plate, Winkler, Two parameters, Isotropicelastic medium, Thin and thick plates, Analysis of finite plates, rectangular and circularplates,Numerical analysis of finite plates, simple solutions.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Designshallowfoundations, assumingit asaplateresting onelastic meduim.
- Calculatethebendingmomentsand shear forces.

UNITIV: ELASTIC ANALYSIS OF PILE

Elastic analysis of single pile, Theoretical solutions forsettlementandloaddistribution,Analysisofpilegroup,Interactionanalysis,Loaddistributioningroups with rigid cap.

LearningOutcomes:
Aftercompletionof thisunit studentwill

- Tounderstand thebehavior ofpilefoundations supported byelastic medium.

UNITV: LATERALLYLOADEDPILE
Load deflection prediction for laterally loaded piles, sub-grade reaction and elastic analysis,Interactionanalysis, andpileraft system, solutionsthrough influencecharts.

LearningOutcomes:
Aftercompletionofthisunit studentwill

- Tounderstandthe behavioroflateralloaded pilessupportedby elasticmedium.

REFERENCE BOOKS:

1. Hemsley.J.A,“ElasticAnalysisofRaftFoundations”,ThomasTelford,1998.
2. McCarthy,D.F, “EssentialsofSoilMechanicsandFoundations”,basicgeotechnics(6thEdition),PrenticeHall, 2002.
3. Selvadurai.A.P.S,“ElasticAnalysisofSoilFoundationInteraction”,Elsevier,1979.
4. Poulos.H.GandDavis.E.H,“PileFoundationAnalysisandDesign”,JohnWiley,1980.
5. Scott.R.F,“FoundationAnalysis”,PrenticeHall,1981.
6. “StructureSoilInteraction” -StateofArtReport,InstitutionofstructuralEngineers,1978.
7. ACI 336, “Suggested Analysis and Design Procedures for Combined Footings and Mats”,AmericanConcreteInstitute, Dehit, 1988

COURSE OUTCOMES:
Uponsuccessfulcompletionofthiscourse,studentwillbeableto

- Understandthefoundationbehavior
- Analyzethebeamsresting onelasticfoundation.
- Behaviorofplatesonelasticfoundation.
- Havetheknowledgeofdesignoflaterallyloadedpiles.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Professional Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**ENVIRONMENTALIMPACT ASSESSMENT**					SEE	70 M

COURSE OBJECTIVES:

- Toimpartknowledgeondifferentconceptsof Environmental ImpactAssessment
- Toteachproceduresofriskassessment
- Toteach theEIAmethodologies andthe criterion forselection ofEIAmethods
- Toteachtheproceduresforenvironmentalclearancesandaudit

UNIT–I: Conceptsand methodologiesofEIA

InitialenvironmentalExamination,ElementsofEIA,-factorsaffectingE-I-AImpactevaluationandanalysis,preparationofEnvironmentalBasemap,Classificationofenvironmentalparameters-CriteriafortheselectionofEIAMethodology,EIAmethods,Ad-hoc methods, matrix methods, Network method Environmental Media Quality Index method,overlaymethods andcost/benefit Analysis.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- UnderstandtheelementsofEIA.
- Explainthecriteriaforselectionof EIAmethodology

UNIT– II: ImpactofDevelopmentalActivities andLandUse

Introduction and Methodology for the assessment of soil and ground water, Delineation ofstudy area, Identification of actives. Procurement of relevant soil quality, Impact prediction,AssessmentofImpactsignificance,IdentificationandIncorporationofmitigationmeasures.EI A in surface water, Air and Biological environment: Methodology for the assessment ofImpactsonsurfacewaterenvironment,Airpollutionsources,GeneralizedapproachforassessmentofAir pollution Impact.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Studythefactorscausing impactofdevelopmentactivities
- Decidemitigationmeasures ofpollution onenvironment

UNIT–III: AssessmentofImpactonVegetation,WildlifeandRiskAssessment

Introduction - Assessment of Impact of development Activities on Vegetation and wildlife,environmentalImpactofDeforestation–Causesandeffectsofdeforestation-Riskassessmentand treatment of uncertainty-key stages in performing an Environmental Risk Assessment-advantagesof Environmental Risk Assessment

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Understandeffectofdevelopmentactivitiesonenvironment.

- Knowthedesign proceduresfor assessmentofenvironmentalrisk

UNIT– IV: Environmentalaudit
Introduction - Environmental Audit & Environmental legislation objectives of EnvironmentalAudit, Types of environmental Audit, Audit protocol, stages of Environmental Audit, onsiteactivities,evaluation ofAudit dataandpreparation ofAudit report.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Learn abouttheprocessofenvironmentalauditing.
- Understandproceduresforpreparationofenvironmentalauditreport

UNIT– V: EnvironmentalActsandNotifications
TheEnvironmentalprotectionAct,ThewaterpreservationAct,TheAir(Prevention&ControlofpollutionAct),WildlifeAct-ProvisionsintheEIAnotification,procedureforenvironmental clearance, procedure for conducting environmental impact assessment report-evaluation of EIA report. Environmental legislation objectives, evaluation of Audit data andpreparationofAuditreport. PostAudit activities,Concept of ISO andISO 14000.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Understandtheimportanceofenvironmentalprotectionacts
- Explainactsand notificationsinEnvironmentallegislation

TEXT BOOKS:
1. CanterLarryW.,“EnvironmentalImpactAssessment”,McGraw-HilleducationEdi (1996)
2. Y.Anjaneyulu,“EnvironmentalImpactAssessmentMethodologies”,B.S.Publication,Hyderabad.

REFERENCE BOOKS:
1. Peavy,H.S,Rowe,D.R,Tchobanoglous,“EnvironmentalEngineering”,G.Mc-GrawHillInternational Editions, New York 1985
2. J.GlynnandGaryW.HeinKe,“EnvironmentalScienceandEngineering”,PrenticeHallPublishers
3. SureshK.Dhaneja,“EnvironmentalScienceandEngineering”,S.K.,Katania&SonsPublication,New Delhi.
4. H.S.Bhatia,“EnvironmentalPollutionandControl”,GalgotiaPublication(P)Ltd,Delhi

COURSE OUTCOMES:
Atthe endofthecourse,thestudents willbe ableto:
- PrepareEMP,EIS, andEIAreport.
- Identifytherisks andimpacts of aproject.
- Choosean appropriate EIAmethodology.
- EvaluationtheEIAreport.
- Estimatethecost benefitratioof aproject.
- Know the role of stakeholder and public hearing in the preparation of EIA.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Professional Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**ENVIRONMENTALECONOMICS**					SEE	70 M

COURSE OBJECTIVES:

- Toimpartknowledgeonsustainabledevelopment andeconomicsof energy
- Toteachregardingenvironmentaldegradationandeconomicanalysisofdegradation
- Toinculcate theknowledgeof economics of pollutionand their management
- Todemonstratetheunderstandingofcostbenefitanalysisofenvironmentalresources
- Tomakethe studentstounderstand principlesof economics ofbiodiversity

UNIT–I:

Sustainable Development: Introduction to sustainable development - Economy-Environmentinter-linkages - Meaning ofsustainable development - Limits to growth and the environmentalKuznets curve – Thesustainability debate - Issues of energy and the economics of energy –Nonrenewable energy,scarcity, optimal resources, backstop technology, property research,externalities,and theconversion ofuncertainty.

LearningOutcomes:

Aftercompletion ofthisunitstudent will

- Understandtheimportanceofsustainabledevelopment,environmentallinkagesetc.,
- Understandtheissuesof energyandtheireconomics

UNIT–II:

Environmental Degradation: Economic significance and causes of environmentaldegradation - The concepts of policy failure,externality and market failure - Economicanalysisof environmental degradation – Equi –marginalprinciple.

LearningOutcomes:

Aftercompletionofthisunitstudentwill

- Tounderstandtheprinciplesofenvironmentaldegradationanditseconomicanalysis

UNIT–III:

Economics of Pollution: Economics of Pollution - Economics of optimal pollution,regulation, monitoring andenforcement - Managing pollution using existing markets:Bargaining solutions – Managingpollution through market intervention: Taxes, subsidies andpermits.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Tounderstandthebasicsofeconomicsofpollutionanditseconomics

UNIT–IV:

Cost – Benefit Analysis: Economic value of environmental resources and environmentaldamage - Concept of TotalEconomic Value - Alternative approaches to valuation – Cost-benefitanalysis and discounting.

LearningOutcomes:
Aftercompletionofthisunit studentwill

- Toknowaboutthecostbenefit analysisand discounting

UNIT– V:
Economics of biodiversity: Economics of biodiversity conservation - Valuing individualspeciesanddiversityofspecies-Policyresponsesatnational andinternationallevels. EconomicsofClimateChange–strenReport

LearningOutcomes:
Aftercompletionofthisunit studentwill

- Tounderstandtheimportanceofbiodiversityandeconomicsofclimate changes

REFERENCEBOOKS:

1. D.W.Pearce,A.MarkandyaandE.B.Barbier“BlueprintforaGreenEconomy”,Earthscan,London.(1989),
2. R.K.Turner,D.W.PearceandI.Bateman“EnvironmentalEconomics:AnElementaryIntroduction”,HarvesterWheatsheaft, London.(1994),
3. D.W.PearceandR.K.Turner“EconomicsofNaturalResourcesandtheEnvironment”,HarvesterWheatsheaf, London. (1990),
4. Michael S. Common and Michael Stuart“Environmental and ResourceEconomics: AnIntroduction”,2nd Edition, Harlow: Longman.(1996),
5. Roger Perman, Michael Common, Yue Ma and James McGilvray “NaturalResourceandEnvironmental Economics”,3rd Edition, Pearson Education.(2003),
6. N.Hanley,J.Shogren andB.White“AnIntroductiontoEnvironmentalEconomics”,OxfordUniversity Press.(2001),

COURSE OUTCOMES:

- Afterthecompletionofthecourse, thestudents willbe ableto know
- Theinformationonsustainabledevelopmentandeconomicsof energy.
- The information regarding environmental degradation and economic analysis of degradation.
- Theidentification ofeconomics ofpollution andtheir management
- Thecostbenefitanalysisofenvironmentalresources
- Theprinciplesofeconomicsofbiodiversity

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VIII Semester Civil Engineering)

Course Category	:	Professional Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**DOCKSAND HARBOR ENGINEERING**					SEE	70 M

COURSE OBJECTIVES:
Thecourse will address thefollowing:
- ToteachWaterTransportationinIndia
- Toimpartknowledgeonwaterwaves andeffectsonharbourandstructuredesign
- ToDevelopfacilities thatarerequiredforsettingup ofaport
- ToPlanportsforeffectivecargohandlingandeconomical considerations

UNIT– I: WaterTransportation
Scope, Merits, Developments of Water Transportation in India, Inland Waterways, River,Canal, Inland water Transportation, Development of Port & Harbors, Harbor Classification,SiteSelection– Classification ofports .

LearningOutcomes:
Aftercompletionofthisunit studentwill
- ClassifyHarborsandPorts.
- Explaindevelopmentof portsandharbors

UNIT– II: Natural Phenomena
Wind, Ties, Water waves, Wave Decay & Ports, Wave DiffractionBreaking,Reflection,LittoralDrift,SedimentationTransport,EffectsonHarborandStructureDesign

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Understandeffectsofnaturalforces
- Understandconditions forthedesignofharbors

UNIT– III: HarborInfrastructure
Types of Break Waters, Jetty, Dock Fenders, Wharves, Dolphin Mooring Accessories, RepairFacilities, Wet Docks, Lift Docks, Dry Docks, Gates for Graving Docks, Floating Docks,Slipways,Locks and Gates

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Understandcomponentsofharbor.
- DifferentiatebetweenDocks andOtherComponents.

UNIT– IV: PortFacility
TransitShed,Warehouses,CargoHandling,ContainerHandling,InlandPotFacility,Navigational

Aids,Types,RequirementsofSignals,Lighthouses,Beanlights,Buoys,Dredging & Coastal protection, Types of Dredges, Choices, Usage of Dredge Material, SeaWall Protection, SeaWallRevetments,Bulkhead.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Knowledgeonfacilities tobedevelopedinportfornavigation.
- Understandingimportanceofdredging.

UNIT– V: Planningof Ports
Regional and Intercontinental Transportation Development, Forecasting Cargo & PassengerDemand, Regional Connectivity, Cargo Handling, Capacity Of Port, Economic Evaluation OfPortProjects, Impact OfPort Activities.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Studytheconnectivityof ports.
- Understandcargohandlingfacilities.

TEXTBOOKS
1. C.Venkataramaiah.,"TransportationEngineering(Vol–II)",UniversitiesPressPvtLtd,Hyderabad.
2. Bindra,S.P,"ACourseinDocksandHarborEngineering",DhanpatRaiandSons,NewDelhi,India, 1992.

REFERENCES
1. R.SrinivasaKumar,"TransportationEngineering:Railways,Airports,DocksandHarbors",Universities PressPvtLtd, Hyderabad.2014.
2. AlozoDef.Quinn,"DesignandConstructionofPortsandMarineStructures",McGraw-HillBook Company, New York
3. SrinivasanR.,"Docks&TunnelEngineering",CharotarPublishingHouse,Anand.
4. V.N.VaziraniandS.P.Chandola,"DocksandHarbourEngineering"– TextbookofTransportEngineering Vol. II,KhannaPublishers,New Delhi.

COURSE OUTCOMES:
Uponthesuccessfulcompletion ofthis course, the students willbe able to:
- EnhancetheknowledgeonDocksandHarbourEngineeringforwatertransportationinthecontext of regional and intercontinentaltransportation.
- KnowtechniquesofplanninganddesigningtheInfrastructuresrequiredforHarbourandPort area.
- Analyzecargoandpassengerdemandforecastingcargohandlingcapacityofportsandeconomicevaluation of portproject.
- Understandenvironmentalandotherimpactimpendedduetowatertransportationandportactivities.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Professional Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**TRAFFIC ANALYSIS**					SEE	70 M

COURSEOBJECTIVES:

- To teach the application of statistical distributions for Traffic Data Analysis.
- Tointroducequeuingtheoryanditsapplicationstotraffic.
- To make the students understand, types of pedestrian crossing facilities and warrantsassociated.
- To introduce the concept of shock wave theory and its applications in bottle neckanalysis.
- Tomakethe studentsto understandthe conceptof simulationand stepsinvolved.

UNIT-I:TrafficFlowDescription

TypesOfStatisticalDistributions;DiscreteAndContinuousDistributions; CountingAndIntervalDistributionsUsedInTraffic Analysis;Poisson'sDistribution For Vehicle Arrivals; Headway Distributions – Exponential Distribution; ShiftedExponentialDistribution;ErlangDistribution;CompositeDistribution.NumericalExercises.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Applythestatisticaldistribution forgiventrafficsituation.
- Comprehendthedifferencebetweenthevariousdistribution.

UNIT-II: QueuingTheory

M/M/1& D/D/ISystem: IntroductionToQueuingTheory;NotationUsedFor DescribingAQueueSystem;AnalysisOfM/M/1System;AssumptionsAndDerivationOfSystem StateEquations;ApplicationOfM/M/1AnalysisFor ParkingGaragesAndTollPlazas-NumericalExamples. QueuingTheory-
D/D/1System:TrafficInterruptionsLikeAccidentsOrBottlenecks;AnalysisOfD/D/1SystemFor Delay Characteristics;Traffic SignalAnalysisAs D/D/1System;Computation OfDelays AndQueueDissipation Time– NumericalExamples.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- ApplydifferentQueuingsystemstotrafficanalysis.
- DifferentiatebetweenvariousQueuingsystems.

UNIT-III: Pedestrian Delays And Gaps

Pedestrian Gap Acceptance And Delays; Concept Of Blocks,Anti-Blocks,GapsAndNon-Gaps;Underwood'sAnalysisFor PedestrianDelays;WarrantsFor PedestrianCrossingFacilities–MinimumVehicular VolumeWarrant,MinimumPedestrian VolumeWarrant, Maximum PedestrianVolumeWarrant.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- UnderstandpedestrianGapacceptancebehavior.
- Analyzethepedestrian flowbasedonwarrants.

UNIT-IV: ShockwaveTheory
ConceptofShockwave;Causes for Traffic InterruptionsandShockwaves; Flow-Density DiagramuseinShockwaveAnalysis;Use ofTime-SpaceDiagram for Shockwave Description;Bottleneck situationsandShockwaves;TrafficSignalandShockwaveTheory;Numericalexamplesforapplicationof ShockwaveTheory.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Understandtheconceptofshockwavetheory.
- Analyzebottlenecksusingshockwavetheory.

UNIT-V: TrafficSimulation
Introductiontosimulation;needforsimulationmodeling;stepsin simulation;intervalorientedandeventorientedsimulation;useofrandomnumbersinsimulation; random number generation methods; computing headways and arrival timesbasedonrandomnumbers;basicconceptsofsimulationmodelingapplicationforsignalisedintersections, pedestriancrossings and transit scheduling.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Appreciatethestepsinsimulationprocess.
- ApplySimulationtechniquesfortrafficanalysis.

TEXT BOOKS:
1. AMonograph,“TrafficFlowTheory”:TRBSpecialReport165
2. C.S.Papacostas,“FundamentalsOfTransportationEngineering”,PrenticeHall IndiaPublication.

REFERENCE BOOKS:
1. F.L.Mannering &W.P.Kilareski, Principles Of Highway Engineering And TrafficAnalysis,John Wiley Publishers.
2. A.D.May,“TrafficFlowFundamentals”,PrenticeHallIndiaPublication
3. Mcshane&Rogers, “FundamentalsOfTrafficEngineering”,pearsonsPublishers.

COURSE OUTCOMES:
Atthe endofthecourse,thestudents willbeableto:
- Understandandappreciatetheapplicationofstatisticaldistributionfortrafficanalysis.
- Applyqueueingtheoryfortrafficanalysisandtounderstandvariousqueueingsystems.
- Analyzepedestriangapacceptancebehaviorandtoapplyunderwood’s warrants.
- Understandshockwavetheoryandtoanalyzethebottlenecksituationusingshock wave theory.
- Learnsimulationtechniquebasics andtoapplythem fortrafficanalysis.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Professional Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**DESIGNANDDRAWINGOFIRRIGATIONSTRUCTURES**					SEE	70 M

COURSE OBJECTIVES:

Toknowthe designand drawing aspectsof

- Slopingglacisweir.
- Tanksluicewithtowerhead
- TypeIIISyphon aqueduct.
- Surplusweir.
- Trapezoidalnotchfall.
- Canalregulator.

Final Examination pattern: Any two questions of the above six designs may be asked out ofwhich the candidate has to answer one question. The duration of examination will be threehours.

TEXT BOOKS:

1. C.SatyanarayanaMurthy,“Designofminorirrigationandcanalstructures”,WileyeasternLtd.
2. S.K.Garg,“IrrigationengineeringandHydraulicstructuresStandard”

COURSE OUTCOMES:

- Oncompletion ofthecourse, the students willbeable to:
- Designanddraw theplanandcross sectionof Slopingglacis weir.
- Designand drawtheplan and crosssection ofTanksluicewithtower head
- Designand drawtheplan and cross sectionof TypeIIISyphon aqueduct.
- Designanddraw theplanandcross sectionof Surplus weir.
- Designanddraw theplanandcross sectionof Trapezoidal notchfall.
- Designanddraw theplanandcrosssection of Canalregulator.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Professional Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**WATERSHEDMANAGEMENT**					SEE	70 M

COURSE OBJECTIVES:
Thiscourse

- DemonstratesPrinciples ofWatershedManagement
- ExplainsRiverbasinWatershedManagementPractices
- Impartsknowledgeonconservationofwateranditsreuses
- Teachesthesustainablewatershed approach
- Inculcatestheknowledge ofrainwaterharvestingandGISapplications

UNITI:
Principles of Watershed Management: Basics concepts, Hydrology and water availability,Surfacewater,Groundwater,Conjunctiveuse,Humaninfluencesinthewaterresourcessystem,Waterdemand,Integrated waterresourcessystem

LearningOutcomes:
Aftercompletionofthisunit studentwill

- Demonstratesroleofprinciplesofwatershedmanagement
- Givesaninsightintothewaterdemandandhumaninfluencesonwaterresourcesetc.,

UNITII:
River basin Watershed Management Practices in Arid and Semi-arid Regions, Watershedmanagement through wells, Management of water supply - Case studies, short term and longtermstrategicplanning

LearningOutcomes:
Aftercompletionofthisunit studentwill

- Givestheknowledgeof watershedmanagementindifferentregions
- Givesan insightinto thecasestudies,short andlong termstrategicplanning

UNITIII:
Conservation of Water: Perspective on recycle and reuse, Waste water reclamation SocialAspects of Watershed Management: Community participation, Private sector participation,Institutionalissues,Socio-economy,Integrateddevelopment,Waterlegislationandimplementations,Casestudies

LearningOutcomes:
Aftercompletionofthisunit studentwill

- Givestheknowledgeof conservationof water
- Givesaninsightintotheaspectsofwatershedmanagement,waterlegislationandimplementations.

UNITIV:
SustainableWatershedApproach:Sustainableintegratedwatershedmanagement,naturalresourcesmanagement,agriculturalpractices,integratedfarming,Soilerosionandconservation

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Givestheknowledgeonsustainablewatershedmanagementapproach
- Givesaninsightintotheagriculturalpractices,soilerosionand conservation

UNITV:
Water Harvesting: Rainwater management - conservation, storage and effective utilisation ofrainwater, Structures for rainwater harvesting, roof catchment system, check dams, aquiferstorage Applications of Geographical Information System and Remote Sensing in WatershedManagement,Role ofDecision Support System inWatershed Management

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Givestheknowledgeofrainwaterharvesting management
- GivesaninsightintotheroleofGIS inthewatershedmanagement

TEXT BOOKS:
1.Murthy,J.V.S.,"WatershedManagementin India",WileyEastern,NewDelhi,1994.

REFERENCE BOOKS:
1. Murty,J.V.S.,"WatershedManagement",NewAgeIntl.,NewDelhi1998.
2. Allam,G.I.Y.,"DecisionSupportSystemforIntegratedWatershedManagement",ColoradoStateUniversity, 1994.
3. VirSingh,R.,"WatershedPlanningandManagement",YashPublishingHouse,Bikaner,2000.
4. AmericanSocietyofCivilEngineers,WatershedManagement,AmericanSoc.ofCivilEngineers,New York, 1975

COURSE OUTCOMES:
Attheend ofthis course,thestudents willbeable to:
- Knowthe basicprinciples ofwatershed management.
- Knowtheriverbasinmanagementpractices
- Understandbetterdifferentapproachesforconservationofwater.
- Identify sustainable watershed approach for resources management, prevention of soilerosionetc.,
- Different methods of rainwater harvesting management systems and role of GIS.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Professional Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**SUSTAINABLEWATERRESOURCESDEVELOPMENT**					SEE	70 M

COURSE OBJECTIVES:

Thiscourse

- DemonstratesRoleofwaterinNationalDevelopment
- ExplainsWaterResourcesSystemsAnalysis
- ImpartsonEvaluationandmonitoringofwaterqualityandmanagementofwaterdistributionnetworks
- Teachesdifferentmethodsforwaterbalancing
- VisualizesInterstateWaterDisputeActs

UNITI: Introduction

WaterResourcesPotential,DemandandDevelopment-RoleofwaterinNationalDevelopment - Assessment of Water Resources of the country - River Basins - Hydro-meteorological andHydrological Data. Assessment of Utilizable flows- Conventional and non-conventionalmethods - Estimation of Water need- National Water Policy. Conjunctive use of surface andgroundwater.FutureWaterRequirements -Scopeof development.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Demonstrateroleofwaterinnationaldevelopment
- Assesswater resourcesincountry
- Estimatefuturewaterneed

UNITII:

Water Resources Planning and Project Formulation- Water Resources Planning - Single andMultipurpose Projects-Project Formulation, Comparisonof Alternatives- CostBenefitAnalysis. Cost Allocation among various purposes. Water Resources Systems Analysis -OptimizationApproaches.

LearningOutcomes:

Aftercompletionofthisunit studentwill Understandtheplanningrequirementsofairrigationproject.

- Comparealternativemethodsbasedoncost aspects
- Optimizationofapproaches

UNITIII:

EnvironmentalAspectsofIntegratedwaterResourcesDevelopment-Evaluationandmonitoring of water quality and management of water distribution networks for Irrigation,Flood control and Power generation - Catchment Treatment and Watershed Management.CommandAreaDevelopment-Resettlement and Rehabilitation.

LearningOutcomes:

Aftercompletionofthisunit studentwill

- Evaluateand monitorwaterquality
- Designdistributionnetworksfor irrigationfloodcontrol andpowergeneration

UNITIV:
ManagementStrategiesforExcessandDeficitWaterBalances
Flood Control & Management - Various methods of Control - Administrative Planning -Management Programs and Flood Cushioning -Structural Methods. Non-structural Methods -Flood forecasting & Warning, Flood plain zoning and Flood proofing. Drought Prone AreaDevelopment-Soil Conservation Methods.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Understandthewatermanagement strategies
- Explainfloodforecastingandplanning
- Developproceduretomeetrequirements indroughtpronearea

UNITV:
Riparian Rights and Inter Basin Linking of Rivers- Indian Scenario - Various Proposals andtheir Status- Dr. K. L. Rao's Proposal, Capt. Dastur's Garland Canal, National PerspectivePlan, NWDA Link and Peninsular Rivers Development Component- Overall Benefits andMajor constraints. Water Laws of India- Regulating Authorities- Interstate Water DisputeActs-RiverWaterTributes-Cauvery, KrishnaGodavari and Vamsadahra Tribunals.

LearningOutcomes:
Aftercompletionofthisunit studentwill
- Understandimportanceofinterlinkingofrivers
- Explainwaterlaws of India
- Studyinterstatewaterdisputesand arriveatfeasiblesolutions

TEXT BOOKS:
1. SKSharma,"ATextbookOfIrrigationEngineeringandHydraulicStructures", S.ChandandCompanyLimited,NewDelhi
2. R.L.Linsley&J.B.Fragini,"WaterResourceEngineering":MCgrohly

REFERENCE BOOKS:
1. P.N.Modi,"IrrigationandWaterResources&WaterPower",StandardBookHouse.
2. A.S.Gordman,"PrinciplesofWaterResourceengineering":
3. S.K.Garg,"IrrigationengineeringandHydraulicstructures",StandardBookHouse.
4. Punmia&Lal,"Irrigationandwaterpowerengineering",LaxmiPublicationspvt.Ltd.,NewDelhi.

COURSE OUTCOMES:
Attheend ofthis course,thestudents willbeable to:
- EstimateWaterneed.
- DevelopWaterResourcesPlanning.
- Explainroll of Regulating Authorities.
- DesignCatchmentTreatmentandWatershedManagement.
- UnderstandRightsandInter BasinLinkingofRivers.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**IoTAPPLICATIONSINELECTRICALENGINEERING**					SEE	70 M

COURSE OBJECTIVES:

- Tolearnaboutafew applicationsofInternetof Things
- TodistinguishbetweenmotionlessandmotiondetectorsasIoTapplications
- ToknowaboutMicroElectroMechanicalSystems(MEMS)fundamentalsindesignandfabrication process
- TounderstandaboutapplicationsofIoTinsmartgrid
- Tointroducethenew conceptofInternetof Energyforvariousapplications

UNIT-I: Sensors

Definitions, Terminology, Classification, Temperature sensors, Thermoresistive, Resistance,temperature detectors, Silicon resistive thermistors, Semiconductor, Piezoelectric, Humidityand moisture sensors. Capacitive, Electrical conductivity, Thermal conductivity, time domainreflectometer, Pressure and Force sensors: Piezoresistive, Capacitive, force, strain and tactilesensors,Strain gauge, Piezoelectric

LearningOutcomes:

Aftercompletingthis Unit,students willbeableto

- Toknowaboutbasicprinciplesofsensorsandtheirclassification
- Tolearnaboutvarious motionlesssensors
- TounderstandaboutPiezoelectricsensorapplicationstodetecttemperature,pressureetc.
- TounderstandaboutCapacitivesensorstodetecttemperature,force andpressureetc.
- Toknowabout conceptsoftactile sensors,forafewapplications

UNIT-II: OccupancyandMotiondetectors

Capacitive occupancy, Inductive and magnetic, potentiometric - Position, displacement andlevelsensors,Potentiometric,Capacitive,Inductive,magneticvelocityandaccelerationsensors,Capacitive,Piezoresistive,piezoelectriccables,Flowsensors,Electromagnetic,Acousticsensors - Resistivemicrophones, Piezoelectric, Photoresistors.

LearningOutcomes:

Aftercompleting thisUnit, studentswill beable to

- ToknowaboutCapacitiveoccupancy
- TounderstandaboutMotiondetectors
- TodistinguishbetweenPotentiometric,inductiveandcapacitivesensorsforafew applications
- Tolearnaboutafewvelocityandaccelerationsensors
- Toknowaboutvarious flowsensors

UNIT-III: MEMS

Basic concepts of MEMS design, Beam/diaphragm mechanics, electrostatic actuation andfabrication, Process design of MEMS based sensors and actuators, Touch sensor, Pressuresensor,RFMEMS switches, Electricand Magneticfield sensors

LearningOutcomes:
Aftercompletingthis Unit,students willbeableto
- Tounderstandaboutthe basicconceptofMEMS
- Toknowaboutelectrostaticactuation
- Tolearnaboutprocess designofMEMS basedsensors
- TolearnaboutprocessdesignofMEMSbasedactuators
- TodistinguishbetweenRFswitcheswithrespecttoelectricandmagnetic sensors

UNIT-IV: IoTforSmartgrid
Drivingfactors,Generationlevel,Transmissionlevel,Distributionlevel,Applications,Meteringandmonitoringapplications,Standardizationandinteroperability,Smarthome

LearningOutcomes:
Aftercompletingthis Unit,students willbeableto
- Togetexposure fundamentalapplicationsof IoTtoSmartgrid
- Tolearnaboutdrivingfactorsof IoT inGeneration level
- Tolearnaboutdrivingfactorsof IoTinTransmission level
- Tolearnaboutdrivingfactorsof IoTinDistribution level
- Todistinguishbetweenmeteringlevelandmonitoringapplications
- Togetintroducedtothe conceptofSmarthome

UNIT-V: IoE:
Concept of Internet of Energy, Evaluation of IoE concept, Vision and motivation ofIoE, Architecture, Energy routines, information sensing and processing issues, Energyinternetas smart grid

LearningOutcomes:
Aftercompleting thisUnit, students willbeable to
- Togetexposedthe newconceptof internetofenergy
- Tolearnabout architectureofIoE
- Toknowaboutenergy routines
- Tolearnaboutinformationsensingandprocessingissues
- Tounderstandthe useofenergyinternetas smartgrid

TEXT BOOKS:
1. JonS.Wilson,“SensorTechnologyHandbook”, NewnesPublisher,2004
2. TaiRanHsu,“MEMSandMicrosystems:Designandmanufacture”,1stEdition,McGrawhillEducation, 2017
3. ErsanKabalciandYasinKabalci,“FromSmartgridtoInternetofEnergy”,1stEdition,AcademicPress, 2019

REFERENCEBOOKS:
1. RajKumarBuyyaandAmirVahidDastjerdi,“InternetofThings:PrinciplesandParadigms”,Kindle Edition, MorganKaufmann Publisher, 2016
2. YenKhengTanandMarkWong,“EnergyHarvestingSystemsforIoTApplications”:Generation,Storag

eandPower Management, 1stEdition, CRCPress,2019
3. RMDSundaramShriram,K.VasudevanandAbhishekS.Nagarajan,“InternetofThings”,Wiley, 2019

COURSE OUTCOMES:
- Togetexposedtorecenttrendsinfewapplicationsof IoTinElectricalEngineering
- Tounderstandabout usageof varioustypes ofmotionless sensors
- Tounderstandaboutusageofvarioustypes ofmotiondetectors
- Togetexposedtovariousapplications of IoTinsmartgrid
- Togetexposedtofuture workingenvironmentwithEnergy internet

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**SMART ELECTRIC GRID**					SEE	70 M

COURSE OBJECTIVES:

- Tolearnaboutrecent trendsingrids assmartgrid
- Tounderstandaboutsmartgridarchitectureandtechnologies
- Toknowabout smart substations
- Tolearnaboutsmart transmissionsystems
- Tolearnabout smartdistributionsystems

UNIT-I:

IntroductiontoSmartGrid: WorkingdefinitionsofSmartGridandAssociatedConcepts–SmartGridFunctions–Traditional Power Grid and Smart Grid – New Technologies for Smart Grid – Advantages –IndianSmart Grid – KeyChallenges forSmartGrid

Smart Grid Architecture: Components and Architecture of Smart Grid Design – Review oftheproposedarchitecturesforSmartGrid.ThefundamentalcomponentsofSmartGriddesigns – TransmissionAutomation –DistributionAutomation –Renewable Integration

LearningOutcomes:

AftercompletingthisUnit,students willbeableto

- TounderstandbasicdefinitionsandarchitectureofSmart grid
- Tolearnabout newtechnologiesforsmartgrid
- Toknowaboutfundamental componentsof smart grid
- Tounderstandkeychallengesofsmartgrid
- TounderstandtheneedforintegrationofRenewableenergysources

UNIT-II: SmartgridTechnologies

Characteristics of Smart grid, Micro grids, Definitions, Drives, benefits, types of Micro grid,buildingblocks,Renewableenergyresources,needsinsmartgrid,integrationimpact,integration standards, Load frequency control, reactive power control, case studies and testbeds

LearningOutcomes:

Aftercompletingthis Unit,students willbeableto Toknowaboutbasiccharacteristicfeaturesof smartgridtechnologies

- Tounderstandaboutdefinition,types,buildingblocksofMicrogrids
- To know aboutintegration requirements,standardsof renewableenergysourcesin Microgrids
- TounderstandLoadfrequencyandreactivepowercontrolofMicrogrid
- Tounderstand aboutMicrogrid throughacasestudy

UNIT-III: SmartSubstations

Protection,Monitoringandcontroldevices,sensors,SCADA,Masterstations,Remoteterminalunit,interoperabilityandIEC61850,Processlevel,Baylevel,Stationlevel,Benefits,roleof substations in smart grid,Volt/VAR control equipment inside substation

LearningOutcomes:

Aftercompletingthis Unit,students willbeableto

- Toknowabout protection,monitor andcontrol devicesin Smartsubstations
- Toknowabout theimportanceof SCADAin substations
- TounderstandaboutinteroperabilityandIEC61850
- Toknowabout roleof substations in Smartgrid
- TounderstandaboutVolt/VARcontrolequipmentinsidesubstation

UNIT-IV: SmartTransmission

EnergyManagementsystems,History,currenttechnology,EMSforthesmartgrid,WideAreaMonitoring Systems (WAMS), protection & Control (WAMPC), needs in smart grid, Role ofWAMPCsmartgrid,Driversandbenefits,Roleoftransmissionsystemsinsmartgrid,SynchroPhasorMeasurement Units(PMUs)

LearningOutcomes:

Aftercompletingthis Unit,students willbeableto

- ToknowaboutEnergy ManagementSystemsinsmarttransmissionsystems
- Tounderstand aboutWAMPC
- Toknowabout roleof transmissionsystemsin Smartgrid
- ToknowaboutSynchro PhasorMeasurementunits

UNIT-V: SmartDistributionSystems

DMS, DSCADA, trends in DSCADA and control, current and advanced DMSs, Voltagefluctuations,effectofvoltageoncustomerload,Drivers,objectivesandbenefits,voltage-VARcontrol,VARcontrolequipmentondistributionfeeders,implementationandoptimization, FDIR-FaultDetectionIsolationandServicerestoration(FDIR),faults,objectivesandbenefits,equipment,implementation

LearningOutcomes:

Aftercompletingthis Unit,studentswillbeableto

- Toknowabout DSCADAin Smart DistributionSystems
- Todistinguishbetweencurrentand advancedDMSs
- Toknowaboutoccurrenceofvoltage fluctuations
- TounderstandaboutVARcontrol andequipmentondistributionfeeders
- ToknowaboutFDIRobjectivesandbenefits

TEXT BOOKS:

1. Stuart Borlase, “Smart Grids - Infrastructure, Technology and Solutions”, 1stedition,CRCPress, 2013
2. Gil Masters, “Renewable and Efficient Electric Power System”, 2nd edition, Wiley–IEEEPress, 2013.

REFERENCEBOOKS:

1. A.G.PhadkeandJ.S.Thorp,“SynchronizedPhasorMeasurementsandtheirApplications”,SpringerEdition, 2e, 2017.
2. T.Ackermann,“WindPowerinPowerSystems”,Hoboken,NJ,USA,JohnWiley,2e,2012.

COURSE OUTCOMES:

- Tobeable tounderstandtrendsin Smartgrids
- Tounderstandtheneedsand rolesofSmartsubstations
- TounderstandtheneedsandrolesofSmartTransmissionsystems
- Tounderstandtheneedsandroles ofSmartDistributionsystems
- TodistinguishbetweenSCADAandDSCADAsystemsinpracticalworkingenvironment

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**ENERGY CONSERVATION AND MANAGEMENT**					SEE	70 M

COURSEOBJECTIVES:
- Familiarizepresent energyscenario,andenergyauditingmethods.
- Explaincomponentsofelectricalsystems,lightingsystemsandimprovementsinperformance.
- Demonstratedifferentthermalsystems,efficiencyanalysis,andenergyconservationmethods.
- Trainonenergyconservationinmajor utilities.
- Instructprinciplesof energymanagementandenergypricing.

UNITI: Introduction
Energy–Power–Past&PresentScenarioOfWorld;NationalEnergyConsumption Data – Environmental Aspects Associated With Energy Utilization –EnergyAuditing: Need, Types, Methodology And Barriers. Role Of Energy Managers. InstrumentsForEnergy Auditing.

LearningOutcomes
Atthe end ofthis unit, thestudent will beable to
- Infer energy consumption patterns and environmental aspects of energy utilization.(l2)
- Outlineenergyauditingrequirements,toolsandmethods. (l2)
- Identifythefunctionof energymanager.(l3)

UNITII: Electrical Systems
Components Of EB Billing – HT And LT Supply, Transformers, CableSizing, Concept Of Capacitors, Power Factor Improvement, Harmonics, Electric Motors –Motor Efficiency Computation, Energy Efficient Motors, Illumination – Lux, Lumens, TypesOfLighting, Efficacy, LEDLighting And ScopeOfEconomyInIllumination.

LearningOutcomes
Atthe end ofthis unit, thestudent will beable to
- Outlinecomponentsofelectricitybilling, transmissionanddistribution.(l2)
- Analyze performancecharacteristicsof transformers, capacitors, andelectric motors.(l4)
- Examinepower factorimprovements,andelectricmotorefficiency.(l4)
- Evaluatelightingsystems.(L4)

UNITIII: Thermal Systems
Stoichiometry, Boilers, Furnaces and Thermic Fluid Heaters – EfficiencyComputation and Encon Measures. Steam: Distribution & Usage: Steam Traps, CondensateRecovery, Flash Steam Utilization,Insulators & Refractories.

LearningOutcomes
Atthe end ofthis unit, thestudent will beable to
- Determineefficiencyofboilers,furnacesandotherthermalsystems.(l5)
- Recommendenergyconservationmeasuresinthermalsystems.(l5)

- Justifysteamsystemsinenergyconservation.(l4)

UNITIV: Energy Conservation In Major Utilities
Pumps, Fans, Blowers, Compressed Air Systems,RefrigerationAnd Air ConditioningSystems– Cooling Towers– D.G. Sets.

LearningOutcomes
Atthe end ofthis unit, thestudent will beable to
- Explainenergy conservationmeasuresinmajorutilities.(l2)
- Applyperformancetestcriteriaforfans, pumps,compressors,hvacsystems.(l3)
- Assessenergy conservationincoolingtowers andd.g.sets.(l5)

UNITV: EnergyManagement
PrinciplesofEnergyManagement,Energydemandestimation,Organisingand Managing EnergyManagement Programs, Energypricing.

LearningOutcomes
Atthe end ofthis unit, thestudent will beable to
- Describeprinciplesofenergymanagement.(l2)
- Assessenergydemandandforecast.(l5)
- Organizeenergymanagementprograms.(l6)
- Designelementsofenergypricing.(l6)

TEXT BOOKS:
1. EnergyManagerTrainingManual(4Volumes)AvailableAtwww.energymanagertraining.com, A Website Administered By Bureau Of EnergyEfficiency (BEE), A Statutory Body Under Ministry Of Power, Government Of India,2004.

REFERENCE BOOKS:

1. Witte.L.C.,P.S.Schmidt,D.R.Brown,“IndustrialEnergyManagementandUtilisation”Hemisphere Publ, Washington, 1988.
2. Callaghn,P.W.“DesignAndManagementForEnergyConservation”,PergamonPress,Oxford,1981.
3. Dryden. I.G.C.,“TheEfficientUseOfEnergy”Butterworths,London,1982
4. Murphy.W.R.AndG.McKAY,“EnergyManagement”,Butterworths,London1987.
5. Turner,W.C.,Doty,S.andTruner,W.C.,“EnergyManagementHandbook”,7thedition,Fairmont Press,2009.
6. De,B.K.,“EnergyManagementaudit&Conservation”,2ndEdition,Vrinda Publication,2010.
7. Smith,C.B.,“EnergyManagementPrinciples”,PergamonPress,2007.

COURSE OUTCOMES:
Attheend ofthiscourse,thestudentwill beableto:
- Explainenergyutilizationandenergy auditingmethods.(l2)
- Analyzeelectricalsystemsperformanceof electricmotorsandlightingsystems.(l4)
- Examineenergyconservationmethodsinthermal systems.(l4)
- Estimateefficiencyofmajorutilitiessuchasfans,pumps,compressedairsystems,hvacandd.g. Sets. (l4)
- Elaborateprinciplesofenergymanagement,programs,energydemandandenergy

pricing.(l6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**NON-DESTRUCTIVE TESTING**					SEE	70 M

COURSE OBJECTIVES

- Introducebasicconceptsof nondestructivetesting.
- Familiarizewithcharacteristicsofultrasonictest,transducers,rejectionandeffectiveness.
- DescribeconceptofliquidPenetrant,eddycurrentandmagneticparticletests,itsapplicationsandlimitations.
- Explaintheprinciplesofinfraredandthermaltesting,applicationsandhoneycombandsandwichstructures casestudies.
- ImpartNDEanditsapplicationsinpressurevessels,castingandweldedconstructions.

UNITI: Introduction to non-destructive testing

Radiographic test**,** Sources of X and Gamma Raysand their interaction with Matter, Radiographic equipment, Radiographic Techniques, SafetyAspectsofIndustrial Radiography.

Learningoutcomes:

Atthe end ofthis unit,thestudent will be ableto

- Explainnondestructivetestingtechniques (L2)
- Summarizethebasicconceptsof Radiographictest(L2)
- Outlinetheconcepts ofsources of Xand Gamma Rays(L2)
- Explaintheradiographic techniques(L2)
- Discussthesafetyaspectsof industrialradiography.(L4)

UNITII: Ultrasonic test

Principle of Wave Propagation, Reflection, Refraction, Diffraction, ModeConversion and Attenuation, Sound Field, Piezo-electric Effect , Ultrasonic Transducers andtheirCharacteristics,UltrasonicEquipmentandVariablesAffectingUltrasonicTest,Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection - EffectivenessandLimitations of UltrasonicTesting.

Learningoutcomes:

Atthe end ofthis unit, thestudent will beable to

Explaintheprincipleof ultrasonictest. (l2)

- Analyzetheperformanceofwavepropagation,reflection,refraction,diffractionandsoundfield in ultrasonictest. (l4)
- Discussthecharacteristicsofultrasonictransducers.(l4)
- Outlinethe limitations ofultrasonictesting. (l2)

UNITIII:

Liquid Penetrant Test: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System,TestProcedure, Effectiveness andLimitations of LiquidPenetrant Testing**.**

Eddy Current Test: Principle of Eddy Current, Eddy Current Test System, Applications ofEddyCurrent-Testing Effectiveness of Eddy CurrentTesting.

Magnetic Particle Test: Magnetic Materials, Magnetization of Materials, Demagnetizationof Materials, Principle of Magnetic Particle Test, Magnetic Particle Test Equipment,Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation andEvaluation,EffectiveApplications andLimitations oftheMagneticParticleTest.

LearningOutcomes:
Atthe end ofthis unit, thestudent will beable to

- Illustrate the procedure of Liquid Penetrant, eddy current and magnetic particle tests.(L2)
- OutlinethelimitationsofPenetrant,eddycurrentandmagneticparticletests.(L2)
- ExplaintheeffectivenessofPenetrant,eddy current andmagneticparticletests.(L2)
- Applytheapplicationsof Magneticparticle test.(L3)

UNITIV: Infrared And Thermal Testing:
Introduction and fundamentals to infrared and thermaltesting–Heat transfer –Active and passive techniques –Lock in and pulse thermography–Contact and non contact thermal inspection methods–Heat sensitive paints –Heat sensitivepapers-–thermallyquenchedphosphorsliquidcrystals–techniquesforapplyingliquidcrystals–other temperature sensitive coatings –Inspection methods –Infrared radiation and infrareddetectors–thermo mechanical behavior of materials–IR imaging in aerospace applications,electronic components,Honey comb andsandwich structures–Casestudies.

LearningOutcomes:
Atthe endofthisunit, the studentwill beable to

- Discussthefundamentalsofthermaltesting.(l6)
- Explainthetechniquesof liquid crystals,activeandpassive.(l2)
- Illustratethermalinspectionmethods.(l2)
- Outlinethe limitationsofthermal testing.(l2)
- Explaintheapplicationsofhoneycombandsandwichstructures.(l2)

UNITV: Industrial Applications of NDE
Span of NDE Activities Railways, Nuclear, Non-nuclearand Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, OffshoreGasandPetroleumProjects,CoalMiningIndustry,NDEofpressurevessels,castings,weldedconstructions

LearningOutcomes:
Atthe end ofthis unit, thestudent will beable to

- IllustrateapplicationsofNDE.(L2)
- Explaintheapplicationsof Railways,Nuclearand chemicalindustries.(L2)
- OutlinethelimitationsanddisadvantagesofNDE. (L2)
- ExplaintheapplicationsofNDAofpressurevessels,castingandweldingconstructions(L2)

TEXT BOOKS:

1. JPrasad,GCKNair,“NondestructivetestandevaluationofMaterials”,Tatamcgraw-HillEducation Publishers, 2008.

2. JosefKrautkrämer, HerbertKrautkrämer,“Ultrasonictestingofmaterials”,3rdedition,Springer-Verlag,1983.
3. X.P.V.Maldague,“Nondestructiveevaluationofmaterialsbyinfraredthermography”,1stedition, Springer-Verlag, 1993.

REFERENCE BOOKS:

1. GaryL.Workman, PatrickO.Moore, DoronKishoni,“Non-destructive,HandBook,UltrasonicTesting”,3rdedition, AmerSociety for Nondestructive,2007.
2. ASTMStandards,Vol3.01, Metalsandalloys

COURSE OUTCOMES:

Attheend ofthe course,student willbe ableto

- Explainvariousmethodsofnon-destructivetesting.(l3)
- Applyrelevantnon-destructivetestingmethoddifferentapplications.(l3)
- Explaintheapplicationsofrailways,nuclear and chemicalindustries.(l2)
- Outlinethelimitationsanddisadvantagesofnde.(l2)
- Explain the applications of nda of pressure vessels, casting and welding constructions(l2)

SocialRelevantProjects

1. Solidwasteconversionintoenergy(Gasification)
2. Plasticwasteintofuel.
3. Bio-gasdigester.
4. Developmentofmechanismsforfarmers.
5. Smartirrigationforsavingwater.
6. Mechanizedwatersegregation.
7. Applicationsof solartechnologies forrural purpose.
8. Powergenerationfromwindturbine.
9. Applicationsofdronesforagriculture.
10. Solardrying.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**INTRODUCTIONTO IMAGE PROCESSING**					SEE	70 M

COURSE OBJECTIVES:

- Tointerpretfundamentalconceptsofdigitalimageprocessing.
- Toexemplifyimageenhancement.
- Tointerpretfundamentalconceptsofcolorimageprocessing.
- Toassessimagecompressiontechniquesfor digitalimages.
- Tosummarizesegmentationfordigitalimages.

UNIT-I: INTRODUCTIONTODIGITALIMAGE PROCESSING

Introduction: Digitalimagerepresentation,Fundamentalstepsinimageprocessing,Elementsofdigitalimage processing,Elementsofvisualperception,Simpleimagemodel,SamplingandQuantization,Basic relationshipsbetween pixels,Imagetransformations.

Applications:Medicalimaging,Robotvision,Characterrecognition,Remotesensing.

LearningOutcomes:

Atthe end ofthis unit, thestudent will beable to

- Understandthefundamentalconceptsofimageprocessing,Samplingprocessandbasisrelationships between pixels (L1)
- ExplaintheelementsofDigitalImageProcessing(L2)

UNIT–II: IMAGEENHANCEMENT

Needforimageenhancement,Pointprocessing,Histogramprocessing,Spatialfiltering-Smoothingand Sharpening.

LearningOutcomes:

Atthe end ofthis unit, thestudent will beable to

- Understandtheneedforenhancementprocess(L1)
- Explaintheterminologyinvolved inenhancementprocess(L2)

UNIT-III: COLORIMAGEPROCESSING

Colourfundamentals,Colourmodels,Colortransformations,Pseudocolourimageprocessing,Fullcolour imageprocessing.

LearningOutcomes:

Atthe end ofthis unit, thestudent will beable to

- Understandtheneedforenhancementprocess(L1)
- Explaintheterminologyinvolvedinenhancementprocess(L2)

UNIT–IV: IMAGECOMPRESSION

Redundancies, Fidelity criteria, Image compression model, Lossless compression: Huffmancoding, Arithmetic coding. Lossy compression: Lossy Predictive Coding, JPEG CompressionStandard.

LearningOutcomes:
Atthe end ofthis unit, thestudent will beable to

- Understandtheneedforimagecompression (L1)
- Explain the image compression and various types of compression techniques(L2)

UNIT–V: IMAGESEGMENTATION
Detectionofdiscontinuities:point, lineandedgedetection,EdgelinkingandBoundarydetections: Local Processing, Global processing via Hough transform, Thresholding, Regionorientedsegmentation: Region growing, Regionsplitting and merging.

LearningOutcomes:
Atthe end ofthis unit, thestudent will beable to

- Understandtheprinciple ofimagesegmentationanditsimportance(L1)
- Explaintheimagecompressionandvarioustypes ofcompressiontechniques(L2)
- Analyzethevariousterminologiesinvolvedinimagesegmentationlikeedge,boundarydetectionetc. (L3)

TEXT BOOKS:

1. RafaelC.GonzalezandRichardE.Woods,“DigitalImageProcessing”, 3rdEdition ,PearsonEducation, 2011.

REFERENCEBOOKS:

1. SJayaraman,SEsakkirajanandTVeerakumar,“Digital ImageProcessing”,TMH,2011.
2. S.Sridhar,“DigitalImageProcessing”,2nd Edition,OxfordPublishers, 2016.

COURSE OUTCOMES:

- Interpret fundamentalconceptsofdigitalandcolor imageprocessing.
- Exemplifyimageenhancement.
- Analyze the various terminologies involved in image segmentation like edge,boundarydetectionetc.
- Assessimagecompressiontechniquesfordigitalimages.
- Summarizesegmentation techniquesfordigitalimages

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**PRINCIPLES OF CELLULAR AND MOBILE COMMUNICATIONS**					SEE	70 M

COURSE OBJECTIVES:

- Tounderstandtheconceptsandoperationofcellularsystems.
- Toapplytheconceptsofcellularsystemstosolveengineeringproblems.
- Toanalysecellularsystems formeaningfulconclusions.
- Toevaluatesuitabilityof acellularsysteminrealtimeapplications.
- Todesigncellularpatternsbasedonfrequencyreusefactor.

UNIT-I: IntroductiontoCellularMobileSystems

Why cellular mobile communication systems? A basic cellular system, Evolution of mobileradio communications, Performance criteria, Characteristics of mobile radio environment,Operationofcellularsystems. Examplesfor analog and digitalcellularsystems.

LearningOutcomes:

Atthe end ofthe unit, thestudent should be able to

- Understandthe concepts andoperationofcellularsystems(L1).
- Analyzethe characteristicsofmobileradioenvironment(L3).

UNIT-II: CellularRadioSystemDesign

Generaldescriptionoftheproblem,Conceptoffrequencyreusechannels,Cochannelinterference reduction, Desired C/Iratio, Cell splitting andsectoring.

LearningOutcomes:

Atthe end ofthe unit, thestudent should beable to

- Understandtheconceptoffrequencyreuseandcochannelinterferenceincellularsystems(L1).
- Applytheconcept of cellularsystems tosolveengineering problems(L2).
- Analyzethe designproblemsof cellularsystems (L3).
- Designofcellularpatternsbasedfrequencyreusefactor(L5).

UNIT-III: HandoffsandDroppedCalls
Whyhandoffs andtypesof handoffs,Initiationof handoff,Delayinga handoff,Forcedhandoffs, Queuing of handoffs, Power-difference handoffs, Mobile assisted handoff and softhandoff,Cell-sitehandoff,Intersystemhandoff.Introduction todropped callrate.

LearningOutcomes:
Atthe end ofthe unit, thestudent should beable to
- Understandwhyhandoffisrequired(L1).
- Applyhandofftechniques tosolveengineering problems(L2).
- Comparevarioustypesofhandoffs(L3).

UNIT-IV: MultipleAccessTechniquesforWirelessCommunications
Introduction, Frequency Division Multiple Access, Time Division Multiple Access, CodeDivisionMultiple Access and SpaceDivision MultipleAccess.

LearningOutcomes:
Atthe end ofthe unit, thestudent should beable to
- Understandvarioustypes ofmultipleaccesstechniques(L1).
- Applytheconceptof multipleaccesstosolveengineeringproblems(L2).
- Comparevarioustypesofmultipleaccesstechniques(L3).

UNIT-V: DigitalCellularSystems
Global System for Mobile Systems, Time Division Multiple Access Systems, Code DivisionMultipleAccess Systems.Examples for2G,3Gand 4Gsystems. Introduction to5G system.

LearningOutcomes:
Atthe end ofthe unit, thestudent should beable to
- Understandoperationofvarioustypes ofdigitalcellularsystems(L1).
- Comparevarioustypesofdigitalcellularsystems (L3).
- Evaluatesuitabilityofacellularsysteminrealtimeapplications (L4).

Note:Themainemphasisisonqualitativetreatment.Complexmathematicaltreatmentmaybeavoided.

TEXT BOOKS:
1. William C. Y. Lee, “Mobile Cellular Telecommunications”, 2ndEdition, McGraw-HillInternational,1995.
2. TheodoreS.Rappaport,“WirelessCommunications–PrinciplesandPractice”,2ndEdition,PHI, 2004.

REFERENCE BOOKS:
1. Aditya K. Jagannatham “Principles of Modern Wireless Communications Systems –Theoryand Practice”, McGraw-HillInternational, 2015.

COURSE OUTCOMES:
Attheend ofthe course,thestudent shouldbe ableto
- Understandthe concepts andoperationof cellularsystems(L1)
- Applytheconceptsofcellularsystems tosolveengineeringproblems(L2).

- Analysecellularsystemsformeaningfulconclusions,Evaluatesuitabilityofacellularsystemin real timeapplications (L3).
- Designcellularpatterns basedonfrequencyreuse factor(L4).

- -

Blooms'Learninglevels:
L1: Remembering and Understanding L2: Applying
L3: Analyzing, EvaluatingL4:Designing,Creating

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**INDUSTRIAL ELECTRONICS**					SEE	70 M

COURSE OBJECTIVES:

Thiscoursewill enablestudents to:

- Describe semi-conductor devices (such as PN junction diode &Transistor)and theirswitching characteristics.
- Understandthe characteristicsofACtoDCconverters.
- UnderstandaboutthepracticalapplicationsElectronicsinindustries
- DescribetheUltrasonicsanditsapplication.

UNITI:

ScopeofindustrialElectronics,Semiconductors,Meritsofsemiconductors,crystallinestructure,Intrinsicsemiconductors,Extrinsicsemiconductors,currentflowinsemiconductor,Open-circuitedp-njunction,Dioderesistance,Zenerdiode,Photoconductorsandjunction photo diodes, Photo voltaiceffect,Light emitting diodes(LED).

LearningOutcomes:

Atthe end ofthis unit, thestudent will beable to

- UnderstandtheimportanceofElectronicsandsemiconductordevicesinindustry,operationofsemiconductor devices (L1)
- Describetheworkingof semiconductordiodes(L1)

UNITII:

Introduction,Thejunctiontransistor,Conventionsforpolaritiesofvoltagesandcurrents,Opencircuited transistor, Transistor biased in the active region, Current components in transistors,Currents in a transistor, Emitter efficiency, Transport factor and transistor-α,Dynamic emitterresistance,Transistorasanamplifier,Transistorconstruction,Lettersymbolsforsemiconductor Devices, Characteristic curves of junction transistor in common configuration,static characteristic curves of PNP junction transistor in common emitter configuration, Thetransistorin common collector Configuration.

LearningOutcomes:

Atthe end ofthis unit, thestudent will beable to

- Understandtheworking ofTransistoranditsdifferentconfigurations(L1)
- Describetheworkingof CE,CC,CBconfigurations(L1)

UNITIII: ACtoDCconverters

Introduction,ClassificationofRectifiers,HalfwaveRectifiers,FullwaveRectifiers,ComparisonofHalfwaveand fullwaverectifiers,BridgeRectifiers,Bridge Rectifier meter, Voltage multiplying Rectifier circuits, Capacitor filter, LCFilter,MetalRectifiers,RegulatedPowerSupplies,ClassificationofVoltageRegulators,Shortperiod

Accuracy of Regulators, Long period .Accuracy of Voltage Regulator, PrincipleofautomaticvoltageRegulator,SimpleD.C.VoltagestabilizerusingZenerdiode,D.C.VoltageRegulators,SeriesVoltageRegulators,Completeseriesvoltageregulatorcircuit,Simpleseriesvoltageregulator.

UNITIV:
Resistanceweldingcontrols: Introduction,Resistanceweldingprocess,BasicCircuitforA.C.resistancewelding,TypesofResistancewelding,ElectronicweldingcontrolusedinResistancewelding, Energy storage welding. **Induction heating:** Principle ofinduction heating, TheoryofInductionheatingmeritsofinductionheating,Applicationofinductionheating,Highfrequencypowersourceofinductionheating.**Dielectricheating**:Principleofdielectricheating, theory of dielectric heating, dielectric propertiesof typical materials, electrodes usedin dielectric heating, method of coupling ofelectrodes to the R.F. generator, Thermal losses inDielectricheating, Applications.

LearningOutcomes:
Atthe end ofthis unit, thestudent will beable to
- UnderstandtheprincipleofoperationofResistancewelding,InductionheatingandDielectricheating (L1)
- Apply the process of Resistance welding, Induction heating and Dielectric heatingin theindustry (L2)

UNITV: Ultrasonics
Introduction, Generation of Ultrasonic waves, Application of Ultrasonicwaves,Ultrasonicstroboscope,ultrasonicasmeansofcommunication,ultrasonicflawdetection,Optical image on non-homogeneities, ultrasonic study of structure of matter,Dispersive studyof structure of matter, Dispersive and colloidal effect of Ultrasonic,Coagulating action ofUltrasonic,separationofmixturesbyultrasoni8cwaves,cuttingandmachiningofhardmaterials by ultrasonic vibrations, Degassing of liquids byultrasonic waves, Physio-chemicaleffectsofultrasonics,chemicaleffectsofultrasonics,ThermaleffectsofUltrasonics,solderingandwelding by ultrasonics,UltrasonicDrying

LearningOutcomes:
Atthe end ofthis unit, thestudent will beable to
- Understandtheprinciple ofoperationof Ultrasonicsanditsapplications(L1)
- Analyze the thermal effects of Ultrasonics, soldering and welding byultrasonics, UltrasonicDrying in the industry (L3)

TEXT BOOKS:

1. G.K.Mithal,"IndustrialElectronics",KhannaPublishers,Delhi,2000.
2. J.Gnanavadivel, R.Dhanasekaran, P.Maruthupandi, "Industrial Electronics",AnuradhaPublications,2011.

REFERENCEBOOKS:

1. F.D.Petruzulla, "IndustrialElectronics",McGrawHill,Singapore,1996.
2. M. H. Rashid, "power Electronics Circuits, Devices and Application", PHI, 3rdedition,2004.
3. G.M.ChuteandR.D.Chute,"Electronicsin Industry",McGrawHillLtd,Tokyo,1995.

COURSE OUTCOMES:

- Understandthesemi-conductordevicesandtheirswitchingcharacteristics.
- ApplytheUltrasonicwaveswithdifferentapplications
- Analyze the thermal effects of Ultrasonics, soldering and welding byultrasonics,Ultrasonic Drying in the industry, Interpret the characteristics of AC toDCconverters,
- DevelopthepracticalapplicationsElectronicsinindustries.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**ELECTRONIC INSTRUMENTATION**					SEE	70 M

COURSE OBJECTIVES:
Thiscoursewill enablestudents to:

- Tointroducevariousmeasuringinstrumentsandtheirfunctionality
- Toteachvariousmeasurementmetricsforperformanceanalysis
- Toexplainprinciplesof operationandworkingof differentelectronicinstruments
- Tofamiliarizethecharacteristics,operations,calibrationsandapplicationsofthedifferentoscilloscopes andsignal generators.
- Toprovideexposuretodifferenttypesoftransducers

UNIT– I:

Measurement and Error: Definitions, Accuracy, Precision, Resolution and SignificantFigures,Types of Errors, Measurementerror combinations. (Text2)

Ammeters: DC Ammeter, Multi-range Ammeter, The Ayrton Shunt or Universal Shunt,Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple),Limitationsof Thermocouple. (Text 1)

Voltmeters and Multi-meters: Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter,Multi range Voltmeter, Extending Voltmeter Ranges, Loading, AC Voltmeter usingRectifiers.TrueRMS Voltmeter, Multi-meter. (Text 1)

LearningOutcomes:
Atthe end ofthis unit, thestudent will beable to

- Explaintheimportanceofmeasurementsystem (L1)
- Examinethecharacteristicsofdifferent Instruments(L2)
- Illustrate different types of errors that may occur in instruments during measurements(L2)

UNIT– II

Digital Voltmeters: Introduction, RAMP technique, Dual Slope Integrating Type DVM,Integrating Type DVM, Most Commonly used principles of ADC, SuccessiveApproximations, -Digit, Resolution and Sensitivity of Digital Meters, General SpecificationsofDVM, (Text 1)

Digital Instruments: Introduction, Digital Multi-meters, Digital Frequency Meter, DigitalMeasurement of Time, Universal Counter, Digital Tachometer, Digital pH Meter, DigitalPhaseMeter, Digital CapacitanceMeter,(Text 1)

LearningOutcomes:
Atthe end ofthis unit, thestudent will beable to

- Explainworkingofdigitalmeasuring Instruments(L2)
- Comparethevariousmeasuringtechniquesformeasuring voltage(L4)

UNIT– III:
Oscilloscopes: Introduction, Basic principles, CRT features, Block diagram of Oscilloscope,Simple CRO, Vertical Amplifier, Horizontal Deflecting System, Sweep or Time BaseGenerator, Measurement of Frequency by Lissajous Method, Digital Storage Oscilloscope.(Text1)
Signal Generators: Introduction, Fixed and Variable AF Oscillator, Standard SignalGenerator, Laboratory Type Signal Generator, AF sine and Square Wave Generator, FunctionGenerator,(Text 1)

LearningOutcomes:
Atthe end ofthis unit, thestudent will beable to
- DescribefunctionsofBasic buildingofCRO(L1)
- Measureparametersviz.Amplitude,frequencyandtimeperiodusingCRO(L2)
- Classifysignalgeneratorsanddescribeitscharacteristics(L2)

UNIT– IV:
Measuring Instruments: Field Strength Meter,Stroboscope, Phase Meter, Q Meter, Megger.(Text1)
Bridges: Introduction, Wheatstone's bridge, Kelvin's Bridge; AC bridges, CapacitanceComparison Bridge, Inductance Comparison Bridge, Maxwell's bridge, Wien's bridge. (Text1)

LearningOutcomes:
Atthe end ofthis unit, thestudentwill be able to
- Describefunctionofvariousmeasuring Instruments.(L1)
- Describehowunknowncapacitanceandinductancecanbemeasuredusingbridges(L1)
- SelectappropriatebridgeformeasuringR,Land Cparameters(L2)

UNIT– V:
Transducers: Introduction,Electricaltransducers,Selectingatransducer,Resistivetransducer, Resistive position transducer, Strain gauges, Resistance thermometer, Thermistor,Inductivetransducer,LVDT,Piezoelectrictransducer,Photocell,Photovoltaiccell,Semiconductor photo diodeand transistor. (Text 1)

LearningOutcomes:
Atthe end ofthis unit, thestudent will beable to
- Explaintheimportanceoftransducer(L1)
- Illustratedifferentmeasuringtechniquesintransducerstomeasurephysicalquantities.(L2)
- Selecttheappropriatetransducerforthemeasurementofphysicalparameters(L2)

TEXT BOOKS:

1. H. S. Kalsi, "Electronic Instrumentation", McGraw Hill, 3rd Edition, 2012,ISBN:9780070702066.
2. D. Helfrick and W.D. Cooper, "Modern Electronic Instrumentation and MeasuringTechniques",Pearson, 1st Edition, 2015, ISBN: 9789332556065.

REFERENCEBOOKS:

1. David A. Bell, "Electronic Instrumentation & Measurements", Oxford UniversityPressPHI2nd Edition, 2006 ISBN 81-203-2360-2.
2. A. K. Sawhney, "Electronics and Electrical Measurements", Dhanpat Rai &Sons.ISBN-81-7700-

016-0

COURSE OUTCOMES:

- Learn different types of errors in measurement, calibration process and standards,variousmethodsformeasurementofnon-electricalquantities,Understandthedifferentmethodsformeasurement of various electrical quantities.
- Familiarizethedynamicsofinstrumentsystems,variouspassiveandactivetransducers
- Comparethevariousmeasuring techniquesfor measuringvoltage(L4)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**BLOCK CHAIN TECHNOLOGY AND APPLICATIONS**					SEE	70 M

COURSE OBJECTIVES:
Thiscourseis designed to:
- UnderstandthephilosophyofBlockchainandthecuttingedgetechnologybehinditsfunctions
- IllustratehowtosetupEthereumtools
- Explainthekeyvocabulary andconceptsusedinBlockchainforBusiness

UNIT-I:
Blockchainconcepts: Blockchain,Blockchainapplicationexample:Escrow,Blockchainstack, from web 2.0 to the next generation decentralized web, domain specific Blockchainapplication,Blockchainbenefits and challenges.
Blockchainapplicationtemplates: Blockchainapplicationcomponents,designmethodologyforBlockchain applications, Blockchain applications templates

LearningOutcomes:
Aftercompletingthis Unit,students willbeableto
- Outlinethebenefitsand challengesofBlockchain(L2)
- DesigntheBlockchainapplications(L6)

UNIT-II:
Setting up Ethereum development tools: Ethereum clients,Ethereum languages, TestRPC,MistEthereumwalle, metamask, web3 JavaScriptAPI, truffle.
Ethereum Accounts: Ethereum Accounts, keypairs, working with EOA Accounts, workingwithcontract accounts.

LearningOutcomes:
Aftercompletingthis Unit,students willbeableto
- IllustratetheuseofEthereum developmenttools(L2)
- CreateEthereumaccountsandworkwiththem (L6)

UNIT-III:
Smart contracts: Smart contract, structure of a contract, setting up and interacting with acontractusingGethclient,setting upandinteractingwith acontractusingMist Wallet

LearningOutcomes:
Aftercompletingthis Unit,students willbeableto
- Makeuseof ofsmartcontracts(L3)
- DistinguishsettingupandinteractingwithacontractusingGethclientandMistWallet.(L4)

UNIT-IV:

Smartcontracts(continued): Smartcontract examples,Smartcontractpatterns.
DecentralizedApplications: implementingDapps,casestudies,

LearningOutcomes:
Aftercompletingthis Unit,students willbeableto
- IllustratetheSmartcontractexamples andpatterns(L2)
- DevelopDecentralizedapplications.(L6)

UNIT-V
Mining: ConcensusonBlockchainnetwork,mining,Blockvalidation,statestorageinEthereum.

LearningOutcomes:
Aftercompletingthis Unit,students willbeableto
- DefineConcensusonBlockchainnetwork(L1)
- DemonstrateStateStorageinEthereum(L2)

TEXTBOOKS:
1. Arshadeepbahga,Vijaymadisetti,“BlockchainApplicationsAhands-onapproach”,VPT 2017.
2. Chandramouli Subramanian, Asha A George, Abhilash K A and MeenaKarthikeyan,“BlockchainTechnology”, Universty Press,2021

REFERENCE BOOKS:
1. ImranBashir,“MasteringBlockchain”PacktPublishingLtd,March2017.
2. Melanieswan,“Blokchainblueprintforaneweconomy”,O’REILLY

COURSE OUTCOMES:
Uponcompletionofthecourse,thestudents shouldbeableto:
- Createcustomizedblockchainsolutions(L6)
- Makeuseof thespecific mechanics ofEthereum(L3)
- ExperimentwithSmartcontracts(L3)
- DevelopEnterpriseapplicationsusingBlockchain(L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**MEAN STACK TECHNOLOGIES**					SEE	70 M

COURSE OBJECTIVES:
Thiscourseis designed to:

- Translateuserrequirementsintotheoverallarchitecture
- Implementnewsystemsandmanagetheprojects
- Writeoptimizedfrontendcodeusing HTMLandJavaScript
- Monitortheperformance ofwebapplications&itsinfrastructure
- Designandimplement RobustandScalableFront EndApplications

UNITI:
Introduction to Web: Internet and World Wide Web, Domain name service, Protocols:HTTP,FTP,SMTP.Html5concepts,CSS3,Anatomyofawebpage.XML:DocumenttypeDefinition, XMLschemas,Documentobjectmodel,XSLT,DOMandSAX Approaches.

LearningOutcomes:
Aftercompletingthis Unit,students willbeableto

- SummarizetheprotocolsrelatedtoInternet&WWW(L2)
- CompareandcontrastXMLandHTML(L5)

UNITII:
JavaScript: The Basic of JavaScript: Objects, Primitives Operations and Expressions,ControlStatements, Arrays,Functions,Constructors,PatternMatchingusing RegularExpressions.AngularJavaScriptAngularJSExpressions:ARRAY,Objects,$eval,Strings,AngularJS FormValidation&FormSubmission,SinglePageApplicationdevelopmentusing Angular JS.

LearningOutcomes:
Aftercompletingthis Unit,students willbeableto

- IllustratetheimportanceofJavaScript(L2)
- DevelopapplicationsusingAngularJS(L6)

UNITIII
Node.js: Introduction, Advantages, Node.js Process Model, Node JS Modules. Express.js:Introduction to Express Framework, Introduction to Nodejs , What is Nodejs, GettingStarted with Express, Your first Express App, Express Routing, Implementing MVC inExpress,Middleware,UsingTemplateEngines,ErrorHandling,APIHandling,Debugging, Developing Template Engines, Using Process Managers, Security &Deployment.

LearningOutcomes:
Aftercompleting thisUnit, students willbeable to

- ExplaintheNodeJSmodules(L2)
- MakeuseofMVC inExpress(L3)

UNITIV:
RESTfulWebServices: UsingtheUniformInterface,DesigningURIs, WebLinking,ConditionalRequests.ReactJs:WelcometoReact,ObstaclesandRoadblocks, React's Future, Keeping Up with the Changes, Working with the Files, PureReact,PageSetup,TheVirtualDOM,ReactElements,ReactDOM,Children,ConstructingElementswith Data, React Components,DOM Rendering, Factories.

LearningOutcomes:
Aftercompletingthis Unit,students willbeableto
- OutlinetheRESTfulWebServices(L2)
- Assessthefutureof React Js(L5)

UNITV:
MongoDB:Introduction,Architecture,Features,Examples,DatabaseCreation&Collection in Mongo DB. Deploying Applications: Web hosting & Domains, DeploymentUsingCloud Platforms.

LearningOutcomes:
Aftercompletingthis Unit,students willbeableto
- ExplainthefeaturesandarchitectureofMongoDB (L2)
- CreateandcollectDatabaseinMongDB(L6)

TEXT BOOKS:
1) ProgrammingtheWorld WideWeb,Robet WSebesta,7ed,Pearson.
2) WebTechnologies,UttamKRoy,Oxford
3) ProMeanStackDevelopment,ELadElrom,Apress
4) RestfulWebServicesCookbook,SubbuAllamraju,O'Reilly
5) JavaScript&jQuerythemissingmanual,Davidsawyermcfarland,O'Reilly
6) WebHostingforDummies,PeterPollock,JohnWileyBrand

REFERENCEBOOKS:
1) RubyonRailsupandRunning,LightningfastWebdevelopment,BruceTate,Curt Hibbs, Oreilly(2006).
2) ProgrammingPerl,4ed,TomChristiansen,JonathanOrwant,Oreilly(2012).
3) Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX,Blackbook, DreamTech.
4) AnIntroductiontoWebDesign,Programming,PaulSWang,SandaSKatila,CengageLearning.
5) Express.JS Guide,The Comprehensive Book on Express.js, Azat Mardan,LeanPublishing.

COURSE OUTCOMES:
Afterthe completionofthecourse, studentwillbeableto
- ListtheBasicConcepts ofWeb&MarkupLanguages(L1)
- Developweb ApplicationsusingScriptingLanguages&Frameworks(L6)
- Makeuseof ExpressJS and NodeJSframeworks(L3)

- Illustratetheusesofwebservicesconceptslikerestful,reactjs(L2)
- DeployingapplicationsusingCloudPlatforms(L6)

e-Resources:

1)http://www.upriss.org.uk/perl/PerlCourse.html

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**FOOD PLANT UTILITIES & SERVICES**					SEE	70 M

PREAMBLE
This subject focuses on different utilities like water, steam, electricity and its properties,productionofconsumption ofthesesources in thefoodplant.

COURSE OBJECTIVES:
- To give brief idea about the utilities that are required/used in food industry and theirsourcesand importance.

UNIT I
IntroductionClassificationofvariousutilitiesandservicesinfoodindustry.WateruseinFoodProcessingIndustryWatersupplysystem:Pumpsofdifferenttypes,operationalaspects,pipingsystem for fresh water, chilled water etc., fittings and control, water requirement for cleaningandprocessing, waterquality, waterpurification and softening Unit

LearningOutcomes:
Attheend ofunit, studentswill beable tounderstand thefollowing
- Waterusein FoodProcessingIndustry
- Watersupplysystem:Pumpsof differenttypes,operationalaspects,pipingsystemforfresh water, chilled wateretc.,
- fittingsandcontrol,waterrequirementforcleaningandprocessing,
- waterquality,waterpurification andsofteningUnit

UNIT II:
Wateruseinfoodprocessing:Differenttypesofwaterrequirementsinfoodprocessingplants,types of water use, wastewater sources, water wastage minimization, water loadings per unitmassofrawmaterial.Waterconservation:Waterandwastewatermanagement,economicuseofwater,water filtration and recirculation.

LearningOutcomes:
Attheend ofunit, studentswill beable tounderstand thefollowing
- Differenttypes ofwaterrequirementsin foodprocessing plants,
- typesofwater use,waste watersources,waterwastageminimization,
- waterloadingsper unitmassof rawmaterial
- Waterandwaste watermanagement,economicuseofwater,
- waterfiltrationand recirculation

UNIT III:
SteamusesinFoodIndustrySteamusesinfoodindustry:Foodprocessingoperationsinwhichsteamisused,temperature,pressureandquantityofsteamrequiredinvariousfoodprocessingoperationsSteam generation system: Components of a boiler system, fuels used in boilers,energy analysis for a steam generation

system, heat loss from boiler system, boiler designconsideration.

LearningOutcomes:
Attheend ofunit, studentswill beable tounderstand thefollowing

- Foodprocessingoperationsinwhichsteamisused
- Temperature,pressureandquantityofsteamrequiredinvariousfoodprocessing operations
- Componentsofaboilersystem,fuelsusedinboilers,energyanalysisforasteamgenerationsystem
- Heatlossfromboilersystem,boilerdesignconsideration.

UNIT IV
Waste-HeatRecoveryinFoodProcessingFacilitiesQuantityandqualityofwasteheatinfoodprocessing facilities, waste heat utilization, heat exchangers for waste heat recovery, heatpumps for waste heat recovery.Waste Disposal and its Utilization Industrial waste, sewage,influent, effluent, sludge, dissolved oxygen, biological oxygen demand, chemical oxygendemand.

LearningOutcomes:
Attheend ofunit, studentswill beable tounderstand thefollowing

- Waste-heatrecoveryinfoodprocessingfacilities
- Quantityandqualityofwasteheatinfoodprocessingfacilities,
- Wasteheatutilization,heatexchangersforwasteheatrecovery,heatpumpsforwasteheatrecovery.
- Wastedisposalanditsutilizationindustrialwaste,sewage,influent,effluent,sludge,
- Dissolvedoxygen,biologicaloxygendemand, chemicaloxygendemand

UNIT V
PlanningandDesignofServiceFacilitiesinFoodIndustryEstimationofutilitiesrequirements:Lighting, ventilation, drainage, CIP system, dust removal, fire protection etc.Maintenance offacilities:Designandinstallationofpipingsystem,codesforbuilding,electricity,boilerroom,plumbingandpipe colouring,maintenanceoftheservicefacilities.Servicesrequiredinoffices, laboratories,lockerandtoiletfacilities,canteen,parkinglotsandroads,loadingdocks,garage,repair and maintenanceshop, warehouses etc.

LearningOutcomes:
Attheend ofunit, studentswill beable tounderstand thefollowing

- PlanningandDesignofServiceFacilitiesinFoodIndustryEstimationofutilitiesrequirements:Lighting, ventilation, drainage, etc.
- Maintenanceoffacilities:Designandinstallationofpipingsystem,codesforbuilding,electricity,plumbing, maintenanceof theservicefacilities.
- Servicesrequiredinoffices,laboratories,lockerandtoiletfacilities,canteen,parkinglotsand roads, repair andmaintenanceshop, warehouses etc.,

TEXTBOOKS

1. LijunWang.“EnergyEfficiencyandManagementinFoodProcessingFacilities”.CRCPress.2008,
2. M.E.Casper.“Energy-savingTechniquesfortheFoodIndustry”.NoyesDataCorporation.1977,

REFERENCE BOOKS:

1. P.L.Ballaney,“ThermalEngineeringinSIUnits”,23rdEdition,KhannaPublishers,Delhi,2003.

2. C.P.Arora."RefrigerationandAirConditioning".3rd Edition,TataMcGrawHillPublishingCo. Ltd. NewDelhi. 2008,
3. W.E.Whitman,"ASurveyofWaterUseintheFoodIndustry",S.D.Holdsworth.Publishedby BritishFood ManufacturingIndustries ResearchAssociation.
4. Chilton'sFoodEngineering.1979,ChiltonCoPublishers.

COURSE OUTCOMES:

Byend ofthe course,students willunderstand the following

- Various utilities and services used in food industry and its applications in food industrynamelywater, steam, electricity and etc.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**NUTRACEUTICALSAND FUNCTIONAL FOODS**					SEE	70 M

PREAMBLE

This course will cover the classification, brief history and the impact of nutraceuticals andfunctional foods on health and disease prevention. Nutraceuticals to be covered in the courseincludeisoprenoids,isoflavones,flavanoids,carotenoids,lycopene,garlic,omega3fattyacids,sphingolipids, vitamin E and antioxidants, herbal products in foods. Also marketing issuesrelatedto functionalfoods andnutraceuticals aswell asstability testingwill bereviewed.

COURSE OBJECTIVES:

- Tounderstandtheinterrelationshipbetweennutraceuticalsandhealthmaintenance.
- Citetheevidencesupportingtheefficacyandsafetyofnutraceuticalandfunctionalfood products
- Toexplainthemetabolic consequencesofnutraceuticalsandfunctionalfoods.
- Describethephysiologicandbiochemicalchangesassociatedwithconsumptionof nutraceuticals

UNIT I

Introduction, definition, Modification in the definition of nutraceuticals. Classification ofnutraceuticals, Nutraceuticals market scenario, formulation considerations. Challenges forNutraceuticals.

LearningOutcomes:

Attheend ofunit, studentswill beable tounderstand thefollowing

- Classificationofnutraceuticals,
- Nutraceuticalsmarketscenarioand formulationconsiderations.
- ChallengesforNutraceuticals.

UNIT II

Nutraceuticals value of spices and seasoning – Turmeric, Mustard, Chilli, Cumin, Fenugreek,BlackCumin,Fennel,Asafoetidia,Garlic,Ginger,Onion,Clove,Cardamometc.,Nutraceuticals from Fruits And Vegetables – Mango, Apple, Grapes, Bel, Banana, Broccoli,Tomato,BitterMelon, Bitter Orangeetc.

LearningOutcomes:

Attheend ofunit, studentswill beable tounderstand thefollowing

- Nutraceuticalsvalueofspicesandseasoning–Turmeric,Mustard,Chilli,Etc.
- Nutraceuticalsfrom FruitsandVegetables–Mango,Apple,Grapes, Tomatoetc.

UNIT III

Omega -3 fatty acids from fish- Typical properties, structural formula, functional category.CLA-typicalproperties,structuralformula,functionalcategory.ApplicationinNutraceuticals.Calcium,chromium,copper,iodine,iron,magnesium,Zn-mechanismofaction,bioavailability,uses and deficiency, dietary sources.

LearningOutcomes:
Attheend ofunit, studentswill beable tounderstand thefollowing

- PropertiesofOmega-3fattyacidsfromfishandstructures
- ApplicationinNutraceuticals.Calcium,iodine,iron,Zn-mechanismofaction,bioavailability,uses and deficiency, dietary sources.

UNIT IV
Definition,classification–Typeofclassification(Probiotics,probioticsandsynbiotics:Taxonomy and important features of probiotic microorganisms. Health effects of probioticsincludingmechanismofaction.Probioticsinvariousfoods:fermentedmilkproducts,non-milkproducts etc. Prebiotics. Definition, chemistry, sources, metabolism and bioavailability, effectof processing, physiological effects, effects on human health and potential applications in riskreduction of diseases, perspective for food applications for the following: Non-digestiblecarbohydrates/oligosaccharides:Dietaryfibre, Resistantstarch, Gums.

LearningOutcomes:
Attheend ofunit, studentswill beable tounderstand thefollowing

- Probiotics, probiotics and synbiotics: important features of probiotic microorganisms.
- Non-digestiblecarbohydrates/oligosaccharides:Dietaryfibreandetc.

UNIT V
Phytosterol,FattyAcids,Carotenoids,Anthocyanins,Carotenoids,AminoAcids,WaterSoluble Vitamins, Free radical biology and antioxidant activity of nutraceuticals. RegulationsofNutraceuticals andFunctionalFoods inIndiaand rest ofthe world.

LearningOutcomes:
Attheend ofunit, studentswill beable tounderstand thefollowing

- Phytosterol,FattyAcids,Carotenoids,Anthocyanins,Freeradicalbiologyandantioxidantactivity of nutraceuticals.
- RegulationsofNutraceuticalsandFunctionalFoodsinIndia andrestofthe world.

TEXTBOOKS

1. “HandbookofNutraceuticalsandFunctionalFoods.YashwantPathak,Vol.1.(Ingredients,formulations ,and applications)”CRC Press2005.
2. “HandbookofNutraceuticalsandFunctionalFoods”.RobertWildman,2nd Edition.CRC Press2001.

REFERENCE BOOKS:

1. B.Shrilakshmi,“Dietetics”,5th Edition,NewAgeInternational(P)Ltd.,NewDelhi,2005.
2. A.E.Bender,“NutritionandDieteticFoods”,Chem.Pub.Co.NewYork,2nd Edition,2004.
3. P.S.Howe,“BasicNutritioninHealthandDisease”,2nd Edition,W.B.SaundersCompany,London, 2003.
4. Kramer,“NutraceuticalsinHealthandDiseasePrevention”,HoppeandPacker,MarcelDekker, Inc., NY2001.
5. BaoandFenwick,“PhytochemicalsinHelathandDisease”,MarcelDecker,Inc.NY2004.

COURSE OUTCOMES:

- Studentswillgetknowthenutraceuticalsand itsactivecomponentsindifferentfoods,regulationson nutraceuticals inIndia.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester Civil Engineering)

Course Category	:	Open Elective IV	L	T	P	C	Exam	3 Hrs
Course Code	:		3	0	0	3	CIA	30 M
Course Title	:	**MATHEMATICALMODELING & SIMULATION**					SEE	70 M

COURSEOBJECTIVES:
This course focuses on what is needed to build simulation software environments, andnotjust building simulations using preexistingpackages.

UNIT-I:
Simulation Basics-Handling Stepped and Event-based Time in Simulations-Discrete versusContinuousModeling-Numerical Techniques-Sourcesand Propagation of Error

LearningOutcomes:
Studentswill beable to
- Understandcomputersimulationtechnologiesandtechniques.

UNIT-II:
Dynamical, Finite State, and Complex Model Simulations-Graph or Network TransitionsBasedSimulations-ActorBasedSimulations-MeshBasedSimulations-HybridSimulations

LearningOutcomes:
Studentswill beable to
- Implement andtestavarietyofsimulationanddataanalysis.

UNIT-III:
Converting to Parallel and Distributed Simulations-Partitioning the Data-Partitioning theAlgorithms-HandlingInter-partition Dependencies

LearningOutcomes:
Studentswill beable to
- Understand concepts of modeling layers of society's critical infrastructure networks.
- Understandpartitioningthedata.

UNIT-IV:
Probability and Statistics for Simulations and Analysis-Introduction to Queues and RandomNoise-RandomVariatesGeneration-Sensitivity Analysis

LearningOutcomes:
Studentswill beable to
- UnderstandQueuesand Randomnoise.
- Understandsensitivityanalysis.

UNIT-V:
Simulations Results Analysis and Viewing Tools-Display Forms: Tables, Graphs, andMultidimensional Visualization-Terminals, X and MS Windows, and Web Interfaces-ValidationofModel Results

LearningOutcomes:

Studentswill beable to

- Buildtoolstoviewandcontrolsimulations andtheirresults.

TEXT BOOKS:

1. JNKapur,“Mathematicalmodelling”,Newagepublishers
2. Kai Velten, “Mathematical Modeling and Simulation: Introduction for Scientists andEngineers”Wiley Publishers.

COURSE OUTCOMES:

Afterthe completion ofcourse, studentwillbe ableto

- UnderstandbasicModelForms.
- UnderstandbasicSimulationApproaches.
- Evaluatehandling Steppedand Event-basedTimeinSimulations.
- DistinguishDiscreteversusContinuous Modeling.
- ApplyNumericalTechniques.
- CalculateSourcesandPropagationofError.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

Course Structure& Syllabifor Four Year Regular B.Tech. Degree Program

(Effective for the batches admitted from 2019-20 onwards)

COMPUTER SCIENCE & ENGINEERING

INDUCTION PROGRAM (3 weeks duration)

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

B. Tech – I Semester (Theory – 5, Lab – 3)

S.No	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9901	Mathematics – I	3	1	0	4	30	70	100
2	BS	19ABS9904	Engineering Chemistry	3	0	0	3	30	70	100
3	ES	19AES0501	C Programming	3	1	0	4	30	70	100
4	HS	19AHS9901	Communicative English	2	0	0	2	30	70	100
5	MC	19AMC9901	Human Values & Professional Ethics	3	0	0	0	30	-	30
PRACTICAL										
6	BS	19ABS9905	Engineering Chemistry Lab	0	0	3	1.5	30	70	100
7	ES	19AES0502	CProgramming Lab	0	0	3	1.5	30	70	100
8	HS	19AHS9902	Communicative English Lab	0	0	3	1.5	30	70	100
			TOTAL:	**14**	**2**	**9**	**17.5**	**240**	**490**	**730**

B. Tech – II Semester (Theory – 4, Lab – 4)

S.No	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9906	Mathematics – II	3	1	0	4	30	70	100
2	BS	19ABS9902	Engineering Physics	3	0	0	3	30	70	100
3	ES	19AES0201	Basic Electrical and Electronics Engineering	3	0	0	3	30	70	100
4	MC	19AMC9902	Environmental Sciences	3	0	0	0	30	-	30
PRACTICAL										
5	ES	19AES0301	Engineering Drawing Lab	1	0	4	3	30	70	100
6	BS	19ABS9903	Engineering Physics Lab	0	0	3	1.5	30	70	100
7	LC	19ALC0301	Engineering & IT Workshop Lab	0	0	3	1.5	30	70	100
8	ES	19AES0202	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5	30	70	100
			TOTAL:	**13**	**01**	**13**	**17.5**	**240**	**490**	**730**

B. Tech – III Semester (Theory – 7, Lab – 3)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19ABS9909	Probability & Statistics	3	0	0	3	30	70	100
2	ES	19AES0503T	Data Structures	3	0	0	3	30	70	100
3	ES	19AES0504T	Python Programming	3	0	0	3	30	70	100
4	HS	19AHS9903	Design Thinking	2	0	0	2	30	70	100
5	PC	19APC0501	Computer Organization	3	0	0	3	30	70	100
6	PC	19APC0502T	Database Management Systems	3	0	0	3	30	70	100
7	PC	19APC0503	Digital Logic Design	3	0	0	3	30	70	100
PRACTICAL										
8	ES	19AES0503P	Data Structures Lab	0	0	3	1.5	30	70	100
9	ES	19AES0504P	Python ProgrammingLab	0	0	2	1	30	70	100
10	PC	19APC0502T	Database Management Systems Lab	0	0	3	1.5	30	70	100
			TOTAL:	**20**	**00**	**08**	**24**	**300**	**700**	**1000**

B. Tech – IV Semester (Theory – 8, Lab – 3)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	19AHS9904	Discrete Mathematical Structures	3	0	0	3	30	70	100
2	HS	19AHS9905	Managerial Economics and Financial Analysis	3	0	0	3	30	70	100
3	PC	19APC0504	Formal Languages and Automata Theory	3	0	0	3	30	70	100
4	PC	19APC0505T	Object Oriented ProgrammingThrough Java	3	0	0	3	30	70	100
5	PC	19APC0506	Operating Systems	3	0	0	3	30	70	100
6	PC	19APC0507	Software Engineering	3	0	0	3	30	70	100
7	PC	19APC0509	Statistical Analysis using R	3	0	0	3	30	70	100
8	MC	19AMC9903	Biology for Engineers	3	0	0	0	30	0	30
PRACTICAL										
9	PC	19APC0505P	Object Oriented ProgrammingThrough Java Lab	0	0	3	1.5	30	70	100
10	PC	19APC0508	Operating Systems & Software Engineering Lab	0	0	3	1.5	30	70	100
11	PC	19APC0510	R Programming Lab	0	0	2	1	30	70	100
			TOTAL:	**24**	**0**	**8**	**25**	**330**	**700**	**1030**

B. Tech – V Semester (Theory – 7, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
1	PC	19APC0511T	Object Oriented Analysis, Design &Testing	2	0	0	2	30	70	100
2	PC	19APC0512T	Artificial Intelligence	3	0	0	3	30	70	100
3	PC	19APC0513	Design and Analysis of Algorithms	3	0	0	3	30	70	100
4	PC	19APC0514T	Computer Networks	3	0	0	3	30	70	100
5	PE		**Professional Elective-I**	3	0	0	3	30	70	100
		19APE0501	Data warehousing and Data mining							
		19APE0502	Web Technologies							
		19APE0503	Software Project Management							
6	OE		**Open Elective-I**	3	0	0	3	30	70	100
		19AOE0101	Experimental stress analysis							
		19AOE0102	Building Technology							
		19AOE0201	Electrical Engineering Materials							
		19AOE0301	Introduction to Hybrid and Electric Vehicles							
		19AOE0302	Rapid Prototyping							
		19AOE0401	Analog Electronics							
		19AOE0402	Digital Electronics							
		19AOE0504	Free and Open Source Systems							
		19AOE0503	Computer Graphics and Multimedia Animation							
		19AOE0501	Brewing Technology							
		19AOE0303	Optimization Techniques							
		19AOE9901	Technical Communication and Presentation Skills							
7	MC	19AMC9905	Essence of Indian Knowledge Tradition	3	0	0	0	30	--	30
PRACTICAL										
8	PC	19APC0512P	Artificial Intelligence Lab	0	0	3	1.5	30	70	100
9	PC	19APC0514P	Computer Networks Lab	0	0	3	1.5	30	70	100
10	PC	19APC0511P	Object Oriented Analysis, Design & Testing Lab	0	0	2	1	30	70	100
11	PR	19APR0501	Socially Relevant Project (15 Hrs/Sem) (**Web Applications**)	0	0	1	0.5	50	--	50
			TOTAL:	**20**	**00**	**10**	**21.5**	**350**	**630**	**980**

B. Tech – VI Semester (Theory – 7, Lab – 3)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC	19APC0515	System Software and Compiler Design	2	1	0	3	30	70	100
2	PC	19APC0516	Machine Learning	3	0	0	3	30	70	100
3	PC	19APC0517T	Mobile Application Development	3	0	0	3	30	70	100
4	PE		**Professional Elective-II**	3	0	0	3	30	70	100
		19APE0504	Mobile Computing							
		19APE0505	Data Science using Python							
		19APE0506	Design Patterns							
5	OE		**Open Elective-II**	3	0	0	3	30	70	100
		19AOE0104	Industrial waste and waste water management							
		19AOE0103	Building Services & Maintenance							
		19AOE0304	Industrial Automation							
		19AOE0202	System Reliability Concepts							
		19AOE0305	Introduction to Mechatronics							
		19AOE0406	Optimization techniques through MATLAB							
		19AOE0404	Basics of VLSI							
		19AOE0506	Fundamentals of VR/AR/MR							
		19AOE0505	Data Science using Python							
		19AOE0407	Wavelet Transforms & its applications							
		19AOE9902	Soft Skills							
		19AOE0507	Human Computer Interaction							
6	HS	19AHS9908	Management Science	2	0	0	2	30	70	100
7	MC	19AMC9906	Research Methodology	3	0	0	--	30	--	30
PRACTICAL										
8	PC	19APC0517P	Mobile Application Development Lab	0	0	3	1.5	30	70	100
9	HS	19AHS9906	Advanced English Communication Skills Lab	0	0	3	1.5	30	70	100
10	PR	19APR0502	Socially Relevant Project (15 Hrs/Sem) (**Machine Learning**)	0	0	1	0.5	50	--	50
			TOTAL:	**19**	**01**	**07**	**20.5**	**320**	**560**	**880**
Mandatory Industrial Training / Skill Development/Research Project for 4 weeks duration during Summer Vacation										

B. Tech – VII Semester (Theory – 6, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	PC	19APC0518T	Internet of Things	2	1	0	3	30	70	100
2	PC	19APC0519T	Cryptography & Network Security	2	1	0	3	30	70	100
3	PE		**Professional Elective-III**	3	0	0	3	30	70	100
		19APE0507	Cloud Computing							
		19APE0508	Natural Language Processing							
		19APE0509	Agile Methodologies							
4	OE		**Open Elective-III**	3	0	0	3	30	70	100
		19AOE0105	Air pollution and control							
		19AOE0106	Basics of civil Engineering							
		19AOE0204	Renewable Energy Systems							
		19AOE0203	Electric Vehicle Engineering							
		19AOE0306	Finite element methods							
		19AOE0307	Product Marketing							
		19AOE0408	Introduction to Microcontrollers & Applications							
		19AOE0410	Principles of Digital Signal Processing							
		19AOE0509	Fundamentals of Game Development							
		19AOE0508	Cyber Security							
5	HS	19AHS9907	Entrepreneurship & Incubation	3	0	0	3	30	70	100
6	MC	19AMC9904	Indian Constitution and Society	3	0	0	0	30	--	30
PRACTICAL										
7	PC	19APC0518P	Cryptography & Network Security Lab	0	0	2	1.0	30	70	100
8	PC	19APC0519P	Internet of Things Lab	0	0	3	1.5	30	70	100
9	PR	19APR0503	Project Stage - I	0	0	4	2	50	--	50
10	PR	19APR0504	Industrial Training / Skill Development / Research Project	0	0	-	1.5	50	--	50
			TOTAL:	**16**	**02**	**9**	**21.0**	**340**	**490**	**830**

B. Tech – VIII Semester (Theory – 2, Project – 1)

<table>
<tr><th rowspan="2">S. No.</th><th rowspan="2">Course Category</th><th rowspan="2">Course Code</th><th rowspan="2">Course Title</th><th colspan="3">Instruction Hours per week</th><th rowspan="2">Credits</th><th colspan="3">Scheme of Examination (Max. Marks)</th></tr>
<tr><th>L</th><th>T</th><th>P</th><th>CIE</th><th>SEE</th><th>Total</th></tr>
<tr><td colspan="11">THEORY</td></tr>
<tr><td rowspan="4">1</td><td rowspan="4">PE</td><td colspan="2">Professional Elective – IV</td><td rowspan="4">3</td><td rowspan="4">0</td><td rowspan="4">0</td><td rowspan="4">3</td><td rowspan="4">30</td><td rowspan="4">70</td><td rowspan="4">100</td></tr>
<tr><td>19APE0510</td><td>Software Development and IT Operations</td></tr>
<tr><td>19APE0511</td><td>Deep Learning</td></tr>
<tr><td>19APE0512</td><td>Ad Hoc and Sensor Networks</td></tr>
<tr><td rowspan="11">2</td><td rowspan="11">OE</td><td colspan="2">Open Elective – IV</td><td rowspan="11">3</td><td rowspan="11">0</td><td rowspan="11">0</td><td rowspan="11">3</td><td rowspan="11">30</td><td rowspan="11">70</td><td rowspan="11">100</td></tr>
<tr><td>19AOE0107</td><td>Disaster Management</td></tr>
<tr><td>19AOE0108</td><td>Global Warming and climate changes</td></tr>
<tr><td>19AOE0308</td><td>Energy conservation and management</td></tr>
<tr><td>19AOE0309</td><td>Non-Destructive testing</td></tr>
<tr><td>19AOE0413</td><td>Introduction to Image Processing</td></tr>
<tr><td>19AOE0415</td><td>Principles of Cellular and Mobile Communications</td></tr>
<tr><td>19AOE0411</td><td>Electronic Instrumentation</td></tr>
<tr><td>19AOE0512</td><td>Block Chain</td></tr>
<tr><td>19AOE0514</td><td>MEAN Stack Technology</td></tr>
<tr><td>19AOE0515</td><td>Mathematical Modeling & Simulation</td></tr>
<tr><td>3</td><td>PR</td><td>19APR0505</td><td>Project Stage-II</td><td>-</td><td>-</td><td>-</td><td>07</td><td>60</td><td>140</td><td>200</td></tr>
<tr><td colspan="4">TOTAL:</td><td>06</td><td>00</td><td>00</td><td>13</td><td>120</td><td>280</td><td>400</td></tr>
</table>

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE, ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9901	3	1	0	4	CIA	30 M
Course Title	:	MATHEMATICS – I					SEE	70 M

COURSE OBJECTIVES:

1. To enlighten the learners in the concept of differential equations, matrices and multivariable calculus.
2. To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

COURSE OUTCOMES:

After the completion of this course, the students will be able to:

1. Understand the effective mathematical tools for the solutions of differential equations that model physical processes.
2. Identify the essential characteristics of linear differential equations with constant coefficients and solve the linear differential equations with constant coefficients by appropriate method.
3. Solving systems of linear equations, using technology to facilitate row reduction determine the rank, Eigen values and Eigen vectors, diagonal form and different factorizations of a matrix.
4. Translate the given function as series of Taylor's and McLaren's with remainders and analyze the behavior of functions by using mean value theorems.
5. Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies and acquire the Knowledge maxima and minima of functions of several variables.

Unit I

Ordinary Differential Equations of First Order: Formation of the ordinary differential equations (ODEs) – Solution of an ordinary differential equation – Equations of the First Order and First Degree – Linear Differential Equation – Bernoulli's Equation – Exact Differential Equations – Equations Reducible to exact equations-Orthogonal Trajectories.

Ordinary Differential Equations of First Order but not First Degree: Equations solvable for p – Equations solvable for x – Equations solvable for y – Equations do not contain x(or y) – Clairaut's Equations.

Unit II

Ordinary Differential Equations of Higher Orders: Solutions of Linear Ordinary Differential Equations With Constant Coefficients – Rules for finding the Complimentary Functions – Rules for finding the particular integral – Method of variation of parameters – Cauchy's linear equation – Legendre's Linear Equation.

Unit III

Matrices: Inverse and rank of a matrix - System of linear equations; Symmetric, skew-symmetric and orthogonal matrices - Eigen values and Eigen vectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix, quadratic forms and nature of the quadratic forms, reduction of quadratic form to canonical forms by orthogonal transformation.

Unit IV

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), indeterminate forms and L'Hospital's rule; Maxima and minima.

Unit V

Multivariable Calculus: Limit, continuity and partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd.
2. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.
3. H. k Das, Er. RajnishVerma, Higher Engineering Mathematics, S. Chand.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9904	3	0	0	3	CIA	30 M
Course Title	:	ENGINEERING CHEMISTRY					SEE	70 M

COURSE OBJECTIVES:

COURSE OUTCOMES:

At the end of the course the students will be able to:

1. To impart the concept of soft and hard waters, softening methods of hard water.
2. Explain the importance of polymers in our daily life and mechanism of conduction in the conducting polymers.
3. To analyze the fuel and methods for preparation of synthetic fuels.
4. To understand the basics of electrochemistry, conductometry and batteries.
5. To familiarizes the Engineering materials.

Unit I **(10 hrs)**

Water Technology: Sources of Water, Impurities and their Influence on Living Systems, Soft Water and Hardness of Water, Estimation of Hardness by EDTA Method, Boiler Troubles **-** Scale and Sludge, Industrial Water Treatment Internal Treatment Methods(Phosphate Conditioning, Calgon Conditioning), Water softening Methods (Zeolite and Ion-Exchange Processes), Specifications for Drinking Water, Bureau of Indian Standards(BIS) and World Health Organization(WHO), Municipal Water Treatment, Desalination of Brackish Water, Reverse Osmosis (RO) and Electrodialysis.

Unit II **(10 hrs)**

Polymer Chemistry: Introduction to Polymers, Types of Polymerisation (Addition & Condensation), Mechanism of Addition Polymerisation (Ionic and Radical).

Plastics: Thermoplastics and Thermosettings. Preparation, Properties and Applications of Bakelite, Nylon-66.

Elastomers: Buna-S, Buna-N–Preparation, Properties and Applications.

Conducting Polymers: Polyacetylene, Polyaniline, Mechanism of Conduction and Applications.

Unit III **(10 hrs)**

Fuel Technology: Fuels –Classification of fuels.

Solid Fuels: Wood and Coal, Ranking of Coal-Analysis (Proximate and Ultimate), Coke Manufacture Otto Hoffman Process.

Liquid Fuels: Petroleum Origin, Extraction, and Refining. Motor Fuels Petrol, Diesel Oil, Knocking Octane Number and Cetane Number; Synthetic petrol-Fischer-Tropsch's& Bergius process.

Gaseous Fuels: Composition and Uses of Natural Gas, LPG, and CNG. Flue gas analysis and its significance.

Unit IV **(10 hrs)**

Electrochemistry: Introduction to Electrochemistry (Conductors, Semi-Conductors, Insulators, Conductance). Electrodes, Reference Electrodes, Electrochemical Cell, Nernst Equation, Cell Potential and its Calculations, Numerical Problems. Principle and Applications of Potentiometry, Conductometry.

Batteries: Primary Batteries – Zinc-Air Battery.

Secondary Batteries- Lithium Ion Batteries- Working of the Batteries including Cell Reactions.
Fuel Cell- Hydrogen-Oxygen.

Unit V **(10 hrs)**

Materials of Engineering Chemistry:

Building materials: Portland Cement, Constituents, Phases and Reactivity of Clinker, Setting and Hardening of Cement.

Refractories: Classification, Properties, Factors affecting the Refractory Materials and Applications.

Lubricants: Classification of Lubricants with examples. Definition and Significance of the following Characteristics of a Good Lubricating Oil- Viscosity, Viscosity Index, Flash & Fire Point, Acid Number, Saponifaction Value, Pour Point and Cloud Point.

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Shashi Chawla, A Reading of Engineering Chemistry, 3rd Edition, DhanpatRai and Co., New Delhi, 2011,3rd edition.
3. Puri, Sharma and Pathania “Principles of Physical Chemistry”. Vishal Publishing Co.,Jalandhar.1991, 31^{st} edition
4. Gowariker*et al.*, Polymer Science and Technology, Prentice Hall of India Pvt. Ltd., New Delhi, 2004, 10^{th} reprint.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0501	3	1	0	4	CIA	30 M
Course Title	:	C PROGRAMMING					SEE	70 M

COURSE OBJECTIVES:

1. Introduce the internal parts of a computer, and peripherals.
2. Introduce the Concept of Algorithm and use it to solve computational problems
3. Identify the computational and non – computational problems
4. Teach the syntax and semantics of a C Programming language
5. Demonstrate the use of Control structures of C Programming language

COURSE OUTCOMES:

1. Illustrate the working of a computer and apply algorithmic approach for solving aproblem.
2. Recognize the importance of programming language independent constructs
3. Select the control structure to solve computational problems
4. Design and implement programs to analyze the array applications.
5. Structure the individual data elements to simplify the solutions.

Unit I

Introduction to Computer Programming Languages: Evolution of Computer Programming languages – Machine, Symbolic and high-level languages. Fundamentals of Algorithms (Pseudo Codes) and Flowcharts, Compiler, Interpreter, Loader, and Linker.

Creating and Running Programs: Writing, Editing, Compiling, Linking and Executing.

Program Control Structures: Sequence, Selection and Iteration. Software Development Method.

Unit II

Introduction to C Language: Background,Basic Structure of a C Program – Steps to execute a C Program – Character Set of C Language – Basic I/O Statements – Basic Data Types and Sizes – C – Tokens: Identifiers, Keywords, Constants, and Variables. Sample Programs.

Input and output: standard input and output, formatted output – printf, formatted input – scanf.

Unit III

Operators: Arithmetic, Relational, Logical, Increment and decrement, Conditional, Assignment, Bitwise – Operator Precedence – Expressions – Type Conversions, Conditional Expressions – Precedence and Order of Evaluation. Sample Programs.

Control Flow / Control Statements: Selection & Making Decisions – Logical Data and Operators – Two-way Selection, Multi-way selection – Standard Statements and blocks – Non-iterative Statements: (if, if-else, null else, nested if-else, if-else ladder, else-if, switch) – Repetitive / Iterative Statements: Concept of loop – Pre-test and post-test loops – While loop, do-while loop, and for loops, initialization and updating, event and counter controlled loops. Branching: break, continue, and Goto. – Sample programs on applications.

Unit IV

Arrays in C language: Concept – Definition – Declaration – Types of arrays – One Dimensional, two dimensional, multidimensional – initialization of arrays – Storing and assessing elements – Array applications.

Strings: Definition, Declaration, Initialization – Basic operations – String manipulations – String handling functions – Arrays using strings -

Unit V

Pointers and arrays: Concept –Definition,Declaration,Initialization, pointer to pointer, functions and pointers, arraysand pointers, pointer as function arguments (call-by-reference), pointers and strings.

Functions: Concept –Definition,Declaration, Types of functions – parameter passing – passing arrays to functions, passing pointers to functions, Recursion – returning non-integers, external variables, scope variables, header variables, register variables, block structure. User defined functions – Standard Library Functions.

Structures: Definition –Declaration – Initialization - Accessing the structure elements – arrays of structures, Array with in structures, pointers to structures, Passing Structure to functions – nested structures, self-referential structures, unions, typedef.

Text Books:

1. PradipDey, and Manas Ghosh, “Programming in C”, 2018, Oxford University Press.
2. R.G. Dromey, “How to Solve it by Computer”. 2014, Pearson.
3. Brian W. Kernighan, and Dennis M. Ritchie, “The C Programming Language”, 2ndEdition, Pearson.

Reference Books:

1. RS Bichkar “Programming with C”, 2012, Universities Press.
2. PelinAksoy, and Laura Denardis, “Information Technology in Theory”, 2017, CengageLearning.
3. Byron Gottfried and Jitender Kumar Chhabra, “Programming with C”, 4th Edition, 2019,McGraw Hill Education.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9901	2	0	0	2	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH					SEE	70 M

COURSE OBJECTIVES:

Reading Skills
- Addressing explicit and implicit meanings of a text on current topics.
- Understanding the context.
- Learning new words and phrases.
- Using words and phrases in different contexts.

Writing Skills
- Using the basic structure of a sentence.
- Applying relevant writing formats to create paragraphs, essays, letters, emails, reports and presentations.
- Retaining a logical flow while writing.
- Planning and executing an assignment creatively.

Interactive Skills
- Analyzing a topic of discussion and relating to it.
- Participating in discussions and influencing them.
- Communicating ideas effectively.
- Presenting ideas coherently within a stipulated time.

Life Skills
- Examining self-attributes and identifying areas that require improvement: self-diagnosis and self-motivation.
- Adapting to a given situation and developing a functional approach to finding solutions: adaptability and problem solving.
- Understanding the importance of helping others: community services and enthusiasm.

COURSE OUTCOMES:
1. The student will acquire basic proficiency in English using all LSRW skills.
2. Read and explore for enrichment of works from various genres (Poems, essays etc.)
3. Make correct usage of grammar and Vocabulary in writing and speaking.
4. To make them develop Linguistic competence.
5. To make them understand the concept of redundancies in writing skills.

UNIT I

Reading : *On the conduct of life:* William Hazlitt
Grammar : Prepositions
Vocabulary : Word Formation I: Introduction to Word Formation
Writing : Clauses and Sentences
Life skills : **Values and Ethics**
If: Rudyard Kipling

UNIT II

Reading : *The Brook:* Alfred Tennyson
Grammar : Articles

Vocabulary	:	Word Formation II: Root Words from other Languages
Writing	:	Punctuation
Life skills	:	**Self-Improvement** *How I Became a Public Speaker*: George Bernard Shaw

UNIT III

Reading	:	*The Death Trap*: Saki
Grammar	:	Noun-Pronoun Agreement Subject- Verb Agreement
Vocabulary	:	Word Formation III: Prefixes and Suffixes
Writing	:	Principles of Good Writing
Life skills	:	**Time Management** *On saving Time*: Seneca

UNIT IV

Reading	:	*ChinduYellama*
Grammar	:	Misplaced Modifiers
Vocabulary	:	Synonyms; Antonyms
Writing	:	Essay Writing
Life skills	:	**Innovation** *Muhammad Yunus*

UNIT V

Reading	:	*Politics and the English Language*: George Orwell
Grammar	:	Clichés; Redundancies
Vocabulary	:	Common Abbreviations
Writing	:	Writing a Summary
Life skills	:	**Motivation** *The Dancer with a White Parasol*: Ranjana Dave

Prescribed Textbook:*Language and Life: A Skills Approach* Board of Editors,Orient Black Swan Publishers, India. 2018.

Suggested Readings

- Practical English Usage. Michael Swan. OUP. 1995.
- Remedial English Grammar. F.T. Wood. Macmillan.2007
- On Writing Well. William Zinsser. Harper Resource Book. 2001
- Study Writing. Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
- Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011.
- Exercises in Spoken English. Parts. I-III. CIEFL, Hyderabad. Oxford University Press.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II SemesterECE, CE, and ME)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9901	3	0	0	0	CIA	30 M
Course Title	:	HUMAN VALUES AND PROFESSIONAL ETHICS					SEE	--

COURSE OBJECTIVES:-This introductory course input is intended.

1. To help the students appreciate the essential complementarity between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life, profession and happiness, based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Value based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually satisfying human behavior and mutually enriching interaction with Nature.

UNIT I

Course Introduction – Need, basic Guidelines, Content and Process for Value Education: Understanding the need, basic guidelines, content and process for Value Education. Self Exploration – what is it? – its content and process; 'Natural Acceptance' and Experiential Validation – as the mechanism for self exploration. Continuous Happiness and Prosperity – A look at basic Human Aspirations. Right understanding, Relationship and Physical Facilities – the basic requirements for fulfillment of aspirations of every human being with their correct priority. Understanding Happiness and Prosperity correctly – A critical appraisal of the current scenario. Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT II

Understanding Harmony in the Human Being – Harmony in Myself! : Understanding human being as a co-existence of the sentient 'I' and the material 'Body'. Understanding the needs of Self ('I') and 'Body' – Sukh and Suvidha. Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer). Understanding the harmony of I with the Body: Sanyam and Swasthya; correct appraisal of Physical needs, meaning of Prosperity in detail. Programs to ensure Sanyam and Swasthya.

UNIT III

Understanding Harmony in the Family and Society – Harmony in Human – Human Relationship: Understanding harmony in the Family the basic unit of human interaction. Understanding values in human – human relationship; meaning of Nyaya and program for its fulfillment to ensure Ubhay-tripti;

Trust (Vishwas) and Respect (Samman) as the foundational values of relationship. Understanding the meaning of Vishwas; Difference between intention and competence. Understanding the meaning of Samman, Difference between respect and differentiation; the other salient values in relationship. Understanding the harmony in the society (society being an extension of family): Samadhan, Samridhi, Abhay, Sah-astiva as comprehensive Human Goals. Visualizing a universal harmonious order in society – Undivided Society (AkhandSamaj), Universal Order (SarvabhaumVyawastha) – from family to world family!

UNIT IV

Understanding Harmony in the nature and Existence – Whole existence as Co-existence: Understanding the harmony in the Nature. Interconnectedness and mutual fulfillment among the four orders of nature – recyclability and self-regulation in nature. Understanding Existence as Co-existence (Sah-astiva) of mutually interacting units in all-pervasive space. Holistic perception of harmony at all levels of existence.

UNIT V

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values, Definitiveness of Ethical Human Conduct, Basic for Humanistic Education, Humanistic Constitution and Humanistic Universal Order. Competence in professional ethics:

a. Ability to utilize the professional competence for augmenting universal human order,
b. Ability to identify the scope and characteristics of people-friendly and eco-friendly production systems,
c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems. Strategy for transition from the present state to Universal Human Order.

a. At the level of individual: as socially and ecologically responsible engineers, technologists and managers
b. At the level of society: as mutually enriching institutions and organizations.

TEXT BOOKS:

1. R. R. Gaur, R Sangal, G P Bagaria, 2009, A Foundation Course in Human Values and Professional Ethics.
2. Prof. K. V. SubbaRaju, 2013, Success Secrets for Engineering Students, Smart Student Publications, 3rd Edition.

REFERENCE BOOKS:

1. Ivan IIlich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
2. E. F. Schumancher, 1973, Small is Beautiful: a study of economics as if people mattered. Blond & Briggs, Britain.
3. A Nagraj, 1998 JeevanVidyaekParichay, Divya Path Sansthan, Amarkantak.
4. Sussan George, 1976, How the Other Half Dies, Penguin Press, Reprinted 1986, 1991.
5. P. L. Dhar, R. R. Gaur, 1990, Science and Humanism, Commonwealth Publishers.
6. A. N. Tripathy, 2003, Human Values, New Age International Publishers.
7. SubhasPalekar, 2000, How to practice Natural Farming, Pracheen(Vaidik) KrishiTantraShodh, Amravati.
8. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, Limits to Growth – Club of Rome's report, Universe Books.
9. E G Seebauer& Robert L.Berry, 2000, Fundamentals of Ethics for Scientists & Engineers, Oxford University Press.
10. M Govindrajan, S Natrajan& V. S Senthilkumar, Engineering Ethics (including Humna Values), Eastern Economy Edition, Prentice Hall of India Ltd.

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9905	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING CHEMISTRY LAB					SEE	70 M

COURSE OBJECTIVES:

COURSE OUTCOMES: At the end of the course, the students will be able to

1. **Prepare** of various Solutions
2. **Determine** the hardness of water
3. **Analysis** of water
4. **Calculate** the cell constant and conductance of solutions
5. **Determine** the physical properties like viscosity, acid number, saponification number
6. **Estimate** the Iron and Calcium in cement

LIST OF EXPERIMENTS:

1. Preparation of Primary Standard (sodium carbonate) Solution.
2. Estimation of Hardness of Water by EDTA method.
3. Estimation of Dissolved Oxygen by Winkler's method.
4. Estimation of Available Chlorine in Bleaching Powder.
5. Estimation of Ferrous ion in the given Mohr Salt by using KMnO4 Solution
6. Determination of Strength of an Acid in Pb-Acid Battery.
7. Preparation of Polymer (Bakelite).
8. Determination of Cell Constant and Conductance of Solutions
9. Determination of Strength of Acid by Conductometric Titrations.
10. Estimation of Calcium in Port land Cement.
11. Determination of Iron in Cement Sample by Colorimeter.
12. Determination of Viscosity of Lubricating Oil using Ostwald Viscometer.
13. Determination of Average Molecular Mass of given Polymer (Polyvinyl Alcohol) by Using Ostwald Viscometer.
14. Determination of acid number of given lubricating oil.
15. Determination of Saponification number of given lubricating oil.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0502	0	0	3	1.5	CIA	30 M
Course Title	:	C PROGRAMMING LAB					SEE	70 M

COURSE OBJECTIVES:

1. To learn about the computer systems, computing environments, developing a computer program and structure of C.
2. To gain Knowledge of the operators, control statements in C.
3. To learn about the design concepts of arrays, strings and their usage.
4. To assimilate about pointers and dynamic memory allocation.

COURSE OUTCOMES:

1. Acquire skills to write, compile and debug programs in c language.
2. Be able to use different operators, data types and write programs
3. Acquire knowledge to select the best loop construct for a given problem.
4. Design and implement programs to analyze the array applications.
5. Design and implement C programs with Functions.

Exercise:1

a) Write a C program to print a given statement.
b) Write a C program for exchanging (interchanging) values of two variables.
c) Write a C program to find the reverses of a given Number.

Exercise: 2

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program to find the second maximum number among the given list of numbers.
c) Write a C program to find the kthsmallest number among the given list of numbers.

Exercise: 3

a) Write a C program to demonstrate various operators (Arithmetic operator, increment & decrement operator, Relational operator, and Assignment operator).
b) Write a C Program, to counts number of positive and negative numbers separately and also compute the sum ofthem.

Exercise: 4

a) Write a C programto generate the first 'n' terms in the sequence of Fibonacci series.

Exercise: 5

a) Write a C program to generate all the prime numbers between 1 and n, where 'n' is the value given by the user.
b) Write a program which Prints the following patterns.

```
ABCDEFGFEDCBA
ABCDEF FEDCBA
ABCDE   EDCBA
ABCD     DCBA
ABC       CBA
AB         BA
A           A
```

```
    0
   111
  22222
 3333333
444444444
```

c) Write a C program to generate Pascal's triangle.
d) Write a C program to construct a pyramid of numbers.

Exercise: 6

a) Write a C program, for the arithmetic operators using switch case (which takes two integer operands and one operator from the user, performs the specified operation and then prints the result. (Consider theoperators +,- ,*, /, % and use Switch Statement)
b) Write a program to find G.C.D (Greatest Common Divisor) of two numbers using recursion and non-recursion.
c) Write a program to find factorial of a number using recursion and non-recursion.

Exercise: 7

a) Write a C program to calculate distance between two points.
b) Write a program to find Roots of quadratic equation.

Exercise: 8

a) Write a C program to perform Matrix Addition
b) Write a C program to perform Matrix Multiplication
c) Write a C program to perform inverse of a Matrix.
d) Write a C program to find the transpose of a given matrix.

Exercise: 9

a) Write a C program for any numerical method.
b) Write a C program to make a simple calculator.

Exercise: 10

a) Write a C program to solve Towers of Hanoi problem by using recursive function.
b) Write a C program to know if the given string is a palindrome or non-palindrome.
c) Write a C program to find whether the given year is a leap year or not.

Exercise: 11

a) Write a C program to insert a sub-string in to the given main string.
b) Write a C program to demonstrate the parameter passing mechanism using: call-by-value, call-by-reference.

Exercise: 12

a) Implement the sorting algorithm: Insertion sort and Selection sort.
b) Write a C program to access elements of an array using pointers
c) Write a C program to find the sum of numbers with arrays and pointers.

Exercise: 13

a) Implementation of string using operations.
   i) Copy
   ii) Concatenate
   iii) Length
   iv) Compare

Exercise: 14

a) Write a C program to find the position of a substring.
b) Write a C program to represent complex numbers using structure.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & II Semester ECE, CE, and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9902	0	0	3	1.5	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH LAB					SEE	70 M

COURSE OBJECTIVES:

1. Students will be exposed to a variety of self instructional, learner friendly modes oflanguage learning
2. Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams likeGRE, TOEFL, and GMAT etc.
3. Students will learn better pronunciation through stress, intonation and rhythm
4. Students will be trained to use language effectively to face interviews, group discussions,public speaking
5. Students will be initiated into greater use of the computer in resume preparation, reportwriting, format making etc

COURSE OUTCOMES:

1. Remember and understand the different aspects of the English languageproficiency with emphasis on LSRW skills.
2. Apply communication skills through various language learning activities.
3. Analyze the English speech sounds, stress, rhythm, intonation and syllabledivision for better listening and speaking comprehension.
4. Evaluate and exhibit acceptable etiquette essential in social and professionalsettings.
5. Create awareness on mother tongue influence and neutralize it in order toimprove fluency in spoken English.

Unit I

1. Phonetics for listening comprehension of various accents
2. Reading comprehension
3. Describing objects/places/persons

Learning Outcomes: At the end of the module, the learners will be able to

- understand different accents spoken by native speakers of English
- employ suitable strategies for skimming and scanning on monitor to get the general ideaof a text and locate specific information
- learn different professional registers and specific vocabulary to describe differentpersons, places and objects

Unit II

1. JAM
2. Small talks on general topics
3. Debates

Learning Outcomes: At the end of the module, the learners will be able to

- produce a structured talk extemporarily
- comprehend and produce short talks on general topics
- participate in debates and speak clearly on a specific topic using suitable discoursemarkers

-

Unit III

1. Situational dialogues – Greeting and Introduction
2. Summarizing and Note making
3. Vocabulary Building

Learning Outcomes: At the end of the module, the learners will be able to

- Learn different ways of greeting and introducing oneself/others
- summarize the content with clarity and precision and take notes while listening to atalk/lecture and make use of them to answer questions
- replenish vocabulary with one word substitutes, homonyms, homophones, homographs toreduce errors in speech and writing

Unit IV

1. Asking for Information and Giving Directions
2. Information Transfer
3. Non-verbal Communication – Dumb Charade

Learning Outcomes: At the end of the module, the learners will be able to

- Learn different ways of asking information and giving directions
- Able to transfer information effectively
- understand non-verbal features of communication

Unit V

1. Oral Presentations
2. Précis Writing and Paraphrasing
3. Reading Comprehension and spotting errors

Learning Outcomes: At the end of the module, the learners will be able to

- make formal oral presentations using effective strategies
- learn different techniques of précis writing and paraphrasing strategies
- comprehend while reading different texts and edit short texts by correcting common errors.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CSE, ECE, CE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9906	3	1	0	4	CIA	30 M
Course Title	:	MATHEMATICS – II					SEE	70 M

COURSE OBJECTIVES:

1. To familiarize the prospective engineers with techniques in multivariate integration and partial differential equations.
2. To equip the students to deal with advanced level of mathematics and applications that would be essential for their disciplines.

COURSE OUTCOMES:

After the completion of this course, the students will be able to:

1. Understand beta and gamma functions and its relations and conclude the use of special function in evaluating definite integrals.
2. Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and apply double integration techniques in evaluating areas bounded by region.
3. Apply Del to Scalar and vector point functions and illustrate the physical interpretation of Gradient, Divergence and Curl.
4. Find the work done in moving a particle along the path over a force field and evaluate the rates of fluid flow along and across curves.
5. Apply a range of techniques to find solutions of standard PDEs and outline the basic properties of standard PDEs.

Unit I

Sequences and Series: Convergence of sequence and series, tests for convergence;
Fourier series: Half range sine and cosine series, Parseval's theorem.

Unit II

Special Functions: Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions, evaluation of improper integrals.

Unit III

Multiple Integrals: Double integrals, change of order of integration, double integration in polar coordinates, areas enclosed by plane curves, Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates.

Unit IV

Vector Calculus: Scalar and vector point functions, vector operator del, del applies to scalar point functionsGradient, del applied to vector point functions-Divergence and Curl, vector identities.

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Unit V

Partial Differential Equations: First order partial differential equations, solutions of first order linear and non-linear PDEs. Solutions to homogenous and non-homogenous higher order linear partial differential equations.

Text Books:

3. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers.
4. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons.

Reference Books:

4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd.
5. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education.
6. H. k Das, Er. RajnishVerma, Higher Engineering Mathematics, S. Chand.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II SemesterCSE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9902	3	0	0	3	CIA	30 M
Course Title	:	ENGINEERING PHYSICS					SEE	70 M

COURSE OBJECTIVES:

1. To disseminate knowledge in basic concepts of mechanics and to understand the basic ideas of damping and resonance.
2. To interpret the significant concepts of magnetic materials which leads to potential applications and basics of electromagnetic waves.
3. To identify the importance of the optical phenomenon i.e. interference, diffraction andpolarization related to its Engineering applications.
4. To teach the concepts related to laser, fiberoptics and superconductivity which lead to their fascinating applications.
5. To familiarize the concept of Quantum mechanics and semiconductors relevant to engineering branches.

UNIT I

MECHANICS AND OSCILLATIONS: Basic laws of vectors and scalars-rotational frames – conservative forces; F = – grad V, torque andangular momentum - Newton's laws in inertial and linear accelerating non-inertial frames ofreference.

Simple Harmonic motion –Characteristics of SHM; Damped harmonic motion – over-damped, critically damped and lightlydampedoscillators; Forced oscillations and resonance.

UNIT II

ELECTROMAGNETISM AND MAGNETIC PROPERTIES OF MATERIALS: Divergence of Electric and Magnetic Fields – Gauss theorem for divergence – Curl of Electric and Magnetic Fields – Stokes theorem for curl – Maxwell's Equations – Electromagnetic wave propagation (conducting and non-conducting media) – Poynting's Theorem.

Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and permeability – Origin of permanent magnetic moment – Classification of Magnetic materials – Domain Concepts of ferromagnetism – Hysteresis – soft and hard magnetic materials – Magnetic device applications.

UNIT III

WAVE OPTICS: Interference: Principle of superposition – Young's Experiment – Coherence – Interference in thin films,Wedge shaped film, Newton's Rings – Determination of wavelength.

Diffraction: Diffraction, differences between interference and diffraction, Fraunhofer diffraction due to Single slit

Polarization: Polarization by double refraction – Plane polarized light byNicol's Prism – Half wave and Quarter wave plate – Engineering applications of Polarization.

UNIT IV

LASERS AND FIBER OPTICS: Introduction, spontaneous and stimulated emissions, population inversions, pumping, Ruby laser, Gas laser (He-Ne Laser), Semiconductor laser, Applications of lasers.

Optical Fibre and Total Internal Reflection, Acceptance Angle and cone of a fibre, Numerical aperture, Fibre optics in communications, Types of Optical Fibres,Applications of optical fibers.

SUPERCONDUCTIVITY: Super conductivity, Meissner Effect, Basics of BSC theory, Types of Superconductors and Applications of Superconductors.

UNITV

QUANTUM MECHANICS: Introduction,Photoelectric Effect, de-Broglie's hypothesis, Wave-particle duality Heisenberg's Uncertainty principle,Schrodinger's time independent wave equation, Particle in one dimensional box.

SEMICONDUCTOR PHYSICS: Energy bands in solids, Types of electronic materials: metals, semiconductors, and insulators**.** Intrinsic and Extrinsic semiconductors, Direct and Indirect band gap semiconductors Hall effect – Applications of Hall effect – Drift and Diffusion currents – Continuity equation– Applications of Semiconductors.

COURSE OUTCOMES:

After the completion of this course, the student will be able to:

1. ExtendNewton's second law for inertial and non-inertial frame of reference and analyze the concept of resonance.
2. Applythe Gauss' theorem for divergence and Stokes' theorem for curl andClassifythe magnetic materials based on susceptibility
3. Interpretthe differences between interference and diffraction,illustratethe concept of polarization of light and its applications and classify ordinary polarized light and extraordinary polarized light.
4. Applyelectromagnetic wave propagation in different Optical Fibers, the lasers concepts in various applicationsandexplainMeissner's effect, BCS theory.
5. interpretthe direct and indirect band gap in semiconductors and identify the type of semiconductor using Hall effect.
   Analyze the behavior of particles at very microscopic level by using wave nature of particles.

TEXT BOOKS:

1. Gaur R.K. and Gupta S.L., "Engineering Physics"-DhanpatRai publishers, 2012
2. A textbook of Engineering Physics, Dr. M. N. Avadhanulu, Dr. P.G. Krshisagar - S. Chand publications,11thEdition 2019.
3. Fundamentals of Physics by David Halliday and Robert Resnick – Part I and Part II - Wiley.
4. H.K.Malik&A.K. Singh "Engineering Physics" - McGraw Hill Publishing Company Ltd.
5. "Engineering Physics",K.Thyagarajan - McGraw Hill Publishing Company Ltd.,2015.
6. D.Kleppner and Robert Kolenkow"An introduction to Mechanics"-II -Cambridge University Press,2015

REFERENCE TEXT BOOKS:

1. M K Varma "Introduction to Mechanics"-Universities Press-2015.
2. I. G. Main, "Vibrations and waves in physics", 3rdEdn., Cambridge University Press
3. D.K. Bhattacharya and A. Bhaskaran, "Engineering Physics"- Oxford Publications-2015
4. David J.Griffiths, "Introduction to Electrodynamics"- 4/e, Pearson Education,2014
5. P.K.Palaniswamy, "Engineering Physics" Scitech Publications
6. ShatendraSharma,Jyotsna Sharma, "Engineering Physics" Pearson Education,2018
7. D.Kleppner and Robert Kolenkow"An introduction to Mechanics" – II – CambridgeUniversity Press,2015.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, ME and ECE& II Semester CSE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0201	3	0	0	3	CIA	30 M
Course Title	:	BASIC ELECTRICAL AND ELECTRONICS ENGG.					SEE	70 M

COURSE OBJECTIVES:-

1. To introduce basics of simple electric circuits.
2. To impart knowledge on measuring devices for voltages and currents.
3. To provide comprehensive idea about working principle, operation and applications of PN junction diode & knowledge about semiconductors
4. To teach applications of electronic principles which are used in Engineering
5. To give knowledge about Special purpose diodes and applications

COURSE OUTCOMES:-

1. Able to recall Simple electrical connections.
2. Knowledge about the Measuring Instruments
3. Learning operation and properties of semiconductors
4. Useful knowledge on PN diode and simple applications.
5. Working and construction of Analog Electronic devices.

UNIT I

ELECTRICAL CIRCUITS: Basic Electrical Circuit elements–(R-L-C)– Ohms Law–KirchoffsLaw– Introduction to AC Circuits – and DC Circuits – Series connection – parallel connections,Analysis of single – phase ac circuits consisting of RL – RC – RLC series circuits – Nodal Analysis-Mesh Analysis.

UNIT II

MEASURING INSTRUMENTS: Moving coil and moving iron instruments (Ammeter and voltmeter) – Cathoderayoscilloscope – cathoderaytube-Regulated power supply – Digital Multi Meter(DMM) – Megger instrument-Introduction to Electric and magnetic fields – Thermistor – LinearModepower supply.

UNIT III

SEMICONDUCTORS: Classification of semiconductors – Intrinsic semiconductors – Extrinsic semiconductors – conductivity of Intrinsic and Extrinsic semiconductors – P-type semiconductor – N-type semiconductor – Qualitativetheory of P-N junction – V-I characteristics of PN junction diode – and simple applications – LigihtEmittingDiode(LED).

UNIT IV

RECTIFIERS AND FILTERS: Introduction to Rectifiers – Half Wave Rectifiers – Full WaveRectifiers – Bridge rectifier – Advantages of Bridge rectifier – Comparision of Rectifiers – Harmonic components in a Rectifier circuit – Introduction to Filters – Inductor Filter – capacitor Filter – LC or L-section Filter – Types of Voltage regulators – series voltage regulator – shunt voltage regulator – Clippers and Clampers.

UNIT V

ANALOG ELECTRONICS: Zener diode, Applications of diode as switch and rectifier, Zener diode as regulator, Breakdown mechanism –Avalanche zener Breakdown– special purpose diodes: Schottky diode, tunnel diode, varactor diode, photodiode, phototransistor ,Introduction to Bipolar

JuntionTransistor–BJT construction, operation, configurations–CB,CE,CC.–Introduction to Basic Logic Gates.

Text Books:-

1. D.P. Kothari, I.J.Nagrath, Basic Electrical and Electronics Engineering, 2^{nd} Edition, McGrawHill Education (India) Private Limited.
2. S.K. Bhattacharya, Basic Electrical and Electronics Engineering, 2nd edition, Pearson India PrivateLimited.

Reference Books:-

1. Principles of Electrical Engineering and Electronics, V.K. Mehta & Rohit Mehta, S.Chandpublications.
2. Electronic Devices and Circuit Theory by Robert L.Boylestad and Louis Nashelsky.,pearson.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II SemesterCSE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9902	3	0	0	0	CIA	30 M
Course Title	:	ENVIRONMENTAL SCIENCES					SEE	--

COURSE OBJECTIVES:-

1. Creating basic awareness on environment
2. Understanding the importance of ecological balance for sustainable development.
3. Creating awareness on biodiversity and its conservation
4. Understanding the impacts of developmental activities and mitigation measures.
5. Understanding the environmental policies and regulations.

COURSE OUTCOMES:

Based on this course, the Engineering graduate will understand / evaluate / develop technologies on the basis of ecological principles and environmental regulations which in-turn helps in sustainable development.

UNIT I

Ecosystems: Definition, Scope and Importance ecosystem. Classification, Structure and function of an ecosystem, Food chains, food webs and ecological pyramids. Energy flow in the ecosystem, Biogeochemical cycles, Bioaccumulation, ecosystem value, derives and carrying capacity, Field visits.

UNIT II

Natural Resources: Classification of Resources: Living and Non - Living resources, water resources: use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problem, Mineral resources: use and exploitation, environmental effects of extracting and using mineral resources, Land resources: Forest resources, Energy resources: growing energy needs, renewable energy source, case studies.

UNIT III

Biodiversity and its Conservation: Introduction - Definition: genetic, species and ecosystem diversity. Bio-geographical classification of India - Value of biodiversity: consumptive use, productive use, social, ethical, aesthetic and option values - . Biodiversity at global, National and local levels -India as a megadiversity nation - Hot-sports of biodiversity - Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; Conservation of biodiversity: In-situ and Ex-situ conservation. National Biodiversity Act.

UNIT IV

Environmental Pollution and Control Technologies: Environmental Pollution & Control: Classification of pollution, Air Pollution: Primary and secondary pollutants, Automobile and industrial pollution, Ambient air quality standards. Water pollution: Sources and types, Impacts of modern agriculture, degradation of soil. Noise Pollution: Sources and Health hazards, standards, Solid Waste management composition and characteristics of e - Waste and its management. Pollution control technologies: Wastewater Treatment methods: Primary, Secondary Tertiary.

Overview of air pollution control technology, Concept of bioremediation. Global Environmental Problems and Global Efforts: Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol and Montreal Protocol.

UNIT V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio - economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan(EMP). **Towards Sustainable Future:** Concept of Sustainable Development, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl Human Health, Environmental Ethics, Concept of Green Building, Ecological foot print, Life Cycle Assessment(LCA), Low carbon life style.

TEXT BOOKS:

1. Textbook of Environmental Studies for Undergraduate Courses by ErachBharucha for University Grants Commission.
2. Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCES:

1. Textbook of Environmental Sciences and Technology by M. Anji Reddy, BS Publication.
2. Enviromental Science: towards a sustainable future by Richard T. Wright. 2008 PHL Learning Private Ltd. New Delhi.
3. Environmental Engineering and science by Gilbert M. Masters and Wendell P. Ela . 2008 PHI Learning Pvt Ltd.
4. Environmental Science by Daniel B. Botkin& Edwards A. Keller, Wiley INDIA edition.
5. Enviromental Studies by AnubhaKaushik, 4th Edition, New age international publishers.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II SemesterCSE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0301	1	0	4	3	CIA	30 M
Course Title	:	ENGINEERING DRAWING LAB					SEE	70 M

COURSE OBJECTIVES:

1. To gain and understanding of the basics of geometrical constructions of various planes and solids, understanding system of graphical representation of various objects and various views to draft and read the products to be designed and eventually for manufacturing applications.
2. To learn about various projections, to understand complete dimensions and details of object.
3. Ultimately student must get imaginary skill to put an idea of object, circuit, assembly of parts in black & white, to design a product and to understand the composition, which can be understood universally.

COURSE OUTCOMES:

1. Drawing 2D and 3D diagrams of various objects.
2. Learning conventions of Drawing, which is an Universal Language of Engineers.
3. Drafting projections of points, planes and solids.

UNIT I

Introduction to Engineering Drawing: Principles of Engineering Graphics and their Significance – Conventions in Drawing – Lettering – BIS Conventions.

Curves used in Engineering Practice: (a) Conic Sections including the Rectangular Hyperbola – General method only, (b) Cycloid, Epicycloid and Hypocycloid, (c) Involutes.

UNIT II

Scales: Plain, Diagonal and Vernier.

Projection of Points: Principles of orthographic projection – Convention – First angle projections, projections of points.

UNIT III

Projections of Lines: Lines inclined to one or both planes, Problems on projections, Finding True lengths.

Projections of Planes: Projections of regular plane surfaces- plane surfaces inclined to both planes.

UNIT IV

Projections of Solids: Projections of Regular Solids with axis inclined to both planes.

Developments of Solids: Development of Surfaces of Right Regular Solids – Prism, Cylinder, Pyramid, Cone.

UNIT V

Isometric and Orthographic Projections: Principles of isometric projection- Isometric Scale- Isometric Views- Conventions- Isometric Views of lines, Planes, Simple solids (cube, cylinder and cone).
Isometric projections of spherical parts. Conversion of isometric Views to Orthographic Views.

Text Books:

1. Engineering Drawing, N.D. Bhatt, Charotar Publishers
2. Engineering Drawing, K.L. Narayana& P. Kannaih, Scitech Publishers, Chennai

References:

1. Engineering Drawing, Johle, Tata McGraw-Hill Publishers
2. Engineering Drawing, Shah and Rana,2/e, Pearson Education
3. Engineering Drawing and Graphics, Venugopal /New age Publishers
4. Engineering Graphics, K.C. John, PHI,2013
5. Engineering Drawing, B.V.R. Guptha, J.K. Publishers

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II SemesterCSE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9903	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING PHYSICS LAB					SEE	70 M

COURSE OBJECTIVES:

1. To understand the phenomenon of interference and diffraction using Travelling Microscope and spectrometer.
2. To analyze the interaction of electromagnetic fields.
3. To understand the concept of polarization and classify polarized and unpolarized lights.
4. To realize the laws of resistance by using Carey Foster's bridge.
5. To analyze the frequencies of electrically maintained tuning fork by Melde's apparatus.

COURSE OUTCOMES:

After completion of this course, the students will be able to:

1. Apply the knowledge of optics to calculate geometrical parameters of thickness of thin object and radius of curvature of a lens.
2. Plot the intensity of the magnetic field of circular coil carrying current with varying distance.
3. Evaluate the Planck's constant value practically and analyze the characteristics of photo electric cell and Cauchy's constants.
4. Determine coefficient ofthermal Conductivity of a Bad Conductor.

LIST OF EXPERIMENTS:

1. Determination of Radius of Curvature of a given Convex Lens By forming Newton's Rings.
2. Determination of Wavelength of Spectral Lines in the Mercury Spectrum by Normal Incidence method.
3. Study the Intensity Variation of the Magnetic Field along axis of Current Carrying Circular Coil.
4. Determination of Cauchy's Constants of a Given Material of the Prism using Spectrometer.
5. Determination of Refractive Index of Ordinary ray $\mu_0$and extraordinary$\mu_e$ray.
6. Determination of Thickness Given Paper Strip by WedgeshapeMethod.
7. Calibration of LowRange Voltmeter.
8. Calibration of LowRange Ammeter.
9. Determination of Magnetic Moment and Horizontal Component of Earth's Magnetic Field.
10. Lees Method - Coefficient of thermal Conductivity of a Bad Conductor.
11. Carey Foster's Bridge – Verification of laws of Resistance and Determination of Specific Resistance.
12. Melde's Apparatus – Frequency of electrically maintained Tuning Fork.
13. Photoelectric cell-Characteristics.
14. Planks Constants.
15. Determination of Wavelength of Monochromaticsource using LASERdiffraction

Reference Books:

1. S.Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S.ChandPublishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II SemesterCSE)

Course Category	:	Laboratory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19ALC0301	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING & IT WORKSHOP LAB					SEE	70 M

ENGINEERING WORKSHOP LAB

COURSE OBJECTIVES:

The budding Engineer may turn out to be a technologist, scientist, entrepreneur, practitioner, consultant etc. There is a need to equip the engineer with the knowledge of common and newer engineering materials as well as shop practices to fabricate, manufacture or work with materials. Essentially he should know the labor involved, machinery or equipment necessary, time required to fabricate and also should be able to estimate the cost of the product or job work. Hence engineering work shop practice is included to introduce some common shop practices and on hand experience to appreciate the use of skill, tools, equipment and general practices to all the engineering students.

COURSE OUTCOMES:

1. Acquires basic knowledge of various tools and their uses in different sections of manufacturing.
2. Apply wood working skills in real world applications.
3. Design and model various basic prototypes in the trade of fitting.
4. Able to perform various basic House Wiring techniques.

TRADES FOR EXERCISES:

(a) Carpentry: Bench Work, tools used in carpentry.

Jobs for Class work: (i) Half lap joint (ii) Mortise and Tenon joint (iii) Bridle joint (iv) Corner dovetail joint

(b) Fitting: Tools used in fitting work, Different files, chisels, hammers and bench vice.

Jobs for class work: (i) Vee Fit (ii) Square Fit (iii) Dovetail Fit (iv) Half Round Fit

(c) House Wiring: Tools used in house wiring work.

Jobs for class work: (i) Series / Parallel Connection with three bulbs (ii) Tube Light Connections (iii) Stair Case Connections (iv) Measurement of Earth Resistance / Godown Wiring

Note: At least two exercises to be done from each trade.

TRADES FOR DEMONSTRATION:

a) Plumbing
b) Machine Shop

REFERENCE BOOKS:

1. Engineering Work shop practice for JNTU, V. Ramesh Babu, VRB Publishers Pvt. Ltd., 2009.
2. Work shop Manual / P.Kannaiah/ K.L.Narayana/ SciTech Publishers.
3. Engineering Practices Lab Manual, Jeyapoovan, SaravanaPandian, 4/e Vikas.
4. Dictionary of Mechanical Engineering, GHF Nayler, Jaico Publishing House.

IT WORKSHOP LAB

COURSE OBJECTIVES:

1) Understand the basic components and peripherals of a computer.
2) To become familiar in configuring a system.
3) Learn the usage of productivity tools.
4) Acquire knowledge about the netiquette and cyber hygiene.
5) Get hands on experience in trouble shooting a system

COURSE OUTCOMES:

At the end of the course the students can able to

1) Assemble and disassemble the systems
2) Use the Microsoft Office Tools
3) Install various software
4) Know about various search engines
5) Trouble shoots various Hardware and Software problems.

LIST OF EXERCISES

1. System Assembling, Disassembling and identification of Parts / Peripherals
2. Operating System Installation - Install Operating Systems like Windows, Linux along withnecessary Device Drivers.The system should be configured as dual boot with bothwindows and Linux.
3. MS-Office / Open Office
   a) Word – All Toolbars, Page Setup, Page Background, Font, Para Graph, Page Borders, Headers & Footers, Mail Merge, Tables, Symbols, Equations, Saving, and Reviewing.
   b) Excel / Spread Sheet - All Toolbars, Cell Formatting, Grid Lines, Font, Page Setup, Organize data, Functions, Formulae, Headers & Footers, Tables, Graphs and Charts.
   c) Power Point Presentation – Slide Layouts, Inserting Text, Word Art, Formatting Text, Bullets, Numbering, Slide Show, Animations, Hyperlinks, Inserting – Images, Clip Art, Shapes, Objects, Tables and Charts, Audio, and Video files.
   d) Access- creation of database, validate data.
4. Network Configuration & Software Installation-Configuring TCP/IP, proxy and firewall settings. Installing application software, system software & tools.
5. Internet and World Wide Web Search Engines, Types of search engines, netiquette,cyber hygiene.
6. Trouble Shooting-Hardware trouble shooting, Software trouble shooting.

Reference Books:

1. Computer Hardware, Installation, Interfacing, Troubleshooting and Maintenance, K.L. James, Eastern Economy Edition.
2. Microsoft Office 2007: Introductory Concepts and Techniques, Windows XP Edition By Gary B. Shelly, Misty E. Vermaat and Thomas J. Cashman (2007, Paperback).
3. Getting Started with MATLAB: A Quick Introduction for Scientists and Engineers, RudraPrathap, Oxford University Press, 2002.
4. Scott Mueller's Upgrading and Repairing PCs, 18/e, Scott. Mueller, QUE, Pearson, 2008
5. The Complete Computer upgrade and repair book, 3/e, Cheryl A Schmidt, Dreamtech.
6. Comdex Information Technology course tool kit Vikas Gupta, WILEY Dreamtech.
7. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester ECE, CE, and ME & II Semester CSE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0202	0	0	3	1.5	CIA	30 M
Course Title	:	BASIC ELECTRICAL & ELECTRONICS ENGG.LAB					SEE	70 M

COURSE OBJECTIVES:

1. Get exposure to common electronic components and their ratings.
2. Make electrical connections by wires of appropriate ratings.
3. Understand usage of common electrical measuring instruments.
4. Determine performance characteristics of PNJunction diodes and applications.
5. Understanding simple Network connections Like series circuits

COURSE OUTCOMES:

1. To learn about the simple Logicgates functions.
2. Understanding the simple configurations of the Transistor.
3. Useful for the simple applications of PN diode.
4. To give knowledge about PN diode characteristics.
5. Knowledge about simple Network Analysis

BASIC ELECTRICAL ENGINEERING LAB

List of Experiments:

1. Verification of Ohms Law
2. Verification of KCL and KVL Laws
3. MESH analysis
4. NODAL analysis
5. Verification of RC and RL Parallel Resonance
6. Verification of R-L-C Series Resonance

BASIC ELECTRONICS ENGINEERING LAB

List of Experiments:

1. V-I Characteristics of PN DIODE
2. Half Wave Rectifier
3. Full Wave Rectifier
4. BJT Configuration of CB, CE, CC
5. ZENER Diode Characteristics
6. Basic LOGIC gates

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9909	3	0	0	3	CIA	30 M
Course Title	:	PROBABILITY AND STATISTICS					SEE	70 M

COURSE OBJECTIVES:-

- To familiarize the students with the foundations of probability and statistical methods
- To impart probability concepts and statistical methods in various applications Engineering

Unit I: Descriptive statistics 10 hrs Statistics Introduction, Measures of Variability (dispersion) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, principle of least squares, method of least squares, regression lines, regression coefficients and their properties.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Summarize the basic concepts of data science and its importance in engineering (L2)
- Analyze the data quantitatively or categorically , measure of averages, variability (L4)
- Adopt correlation methods and principle of least squares, regression analysis (L5)

Unit II: Probability 08 hrs

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Define the terms trial, events, sample space, probability, and laws of probability (L1)
- Make use of probabilities of events in finite sample spaces from experiments (L3)
- Apply Baye's theorem to real time problems (L3)
- Explain the notion of random variable, distribution functions and expected value(L2)

Unit III: Probability distributions 08hrs

Discrete distribution - Binomial, Poisson approximation to the binomial distribution and their properties. Continuous distribution: normal distribution and their properties.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Apply Binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies (L3)
- Interpret the properties of normal distribution and its applications (L2)

Unit IV: Estimation and Testing of hypothesis, large sample tests 08 hrs

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain the concept of estimation, interval estimation and confidence intervals (L2)
- Apply the concept of hypothesis testing for large samples (L4)

Unit V: Small sample tests **08 hrs**

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test), χ^2 - test for goodness of fit, χ^2 - test for independence of attributes.

Learning Outcomes: Students will be able to

- Apply the concept of testing hypothesis for small samples to draw the inferences (L3)
- Estimate the goodness of fit (L5)

TEXT BOOKS:

1. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.
2. Ronald E. Walpole, Raymond H Mayers, Sharon L.Myers, Keying Ye, Probability and statistics for Engineers & scientists., Pearson Publishers
3. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.

REFERENCE BOOKS:

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.
3. Peyton Z. Peebles ,Probability, Random Variables & Random Signal Principles -, McGraw Hill Education, 4th Edition, 2001.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Make use of the concepts of probability and their applications (L3)
2. Apply discrete and continuous probability distributions (L3)
3. Classify the concepts of data science and its importance (L4)
4. Interpret the association of characteristics and through correlation and regression tools (L4)
5. Design the components of a classical hypothesis test (L6)
6. Infer the statistical inferential methods based on small and large sampling tests (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester CE, CSE & ME)

(For III Semester ECE weekly 02 hrs with 02 Credits only)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0503T	3	0	0	3	CIA	30 M
Course Title	:	DATA STRUCTURES					SEE	70 M

COURSE OBJECTIVES:-

- To teach the representation of solution to the problem using algorithm
- To explain the approach to algorithm analysis
- To introduce different data structures for solving the problems
- To demonstrate modeling of the given problem as a graph
- To elucidate the existing hashing techniques

Unit I: Introduction

Algorithm Specification, Performance analysis, Performance Measurement. Arrays: Arrays, Dynamically Allocated Arrays. Structures and Unions. Sorting: Motivation, Insertion sort, Quick sort, How fast can we sort, Merge sort, Heap sort.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Analyze the given algorithm to find the time and space complexities.(L4)
- Select appropriate sorting algorithm (L4)
- Design a sorting algorithm (L6)

Unit II: Stack, Queue and Linked lists

Stacks, Stacks using Dynamic Arrays, Queues, Circular Queues Using Dynamic Arrays, Evaluation of Expressions, Multiple Stacks and Queues. Linked lists: Singly Linked Lists and Chains, Representing Chains in C, Linked Stacks and Queues, Additional List Operations, Doubly Linked Lists.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Evaluate expressions (L5)
- Develop the applications using stacks and queues (L3)
- Construct the linked lists for various applications (L6)

Unit III: Trees

Introduction, Binary Trees, Binary Tree Traversals, Additional Binary Tree Operations, Binary Search Trees, Counting Binary Trees, Optimal Binary search Trees, AVL Trees. B-Trees: B-Trees, B + Trees.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain the concept of a tree (L2)
- Compare different tree structures (L4)
- Apply trees for indexing (L3)

Unit IV: Graphs and Hashing

The Graph Abstract Data Type, Elementary Graph Operations, Minimum Cost Spanning Trees, Shortest Paths and Transitive Closure.

Hashing: Introduction to Hash Table, Static Hashing, Dynamic Hashing.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Recognize the importance of Graphs in solving real world problems (L2)
- Apply various graph traversal methods to applications (L3)
- Design a minimum cost solution for a problem using spanning trees (L6)
- Select the appropriate hashing technique for a given application (L5)
- Design a hashing technique (L6)

Unit V: Files and Advanced sorting

File Organization: Sequential File Organization, Direct File Organization, Indexed Sequential File Organization.

Advanced sorting: Sorting on Several keys, List and Table sorts, Summary of Internal sorting, External sorting.

Learning Outcomes: Students will be able to

- Organize files (L3)
- Design the algorithms which sort the elements which doesn't fit in main memory (L6)

TEXT BOOKS:

1. Ellis Horowitz and SartajSahni, "Fundamentals of Data Structures in C", 2nd Edition, Galgotia Book Source, Pvt. Ltd., 2004.
2. ALAN L.THARP, "File Organization and Processing", Wiley and Sons, 1988.

REFERENCE BOOKS:

1. D. Samanta, "Classic Data Structures", 2nd Edition, Prentice-Hall of India, Pvt. Ltd., India, 2012.
2. Peter Bras, "Advanced Data Structures", Cambridge University Press, 2016
3. Richard F.Gilberg, Behrouz A.Forouzan,"Data Structures A Pseudo code Approach with C", Second Edition, Cengage Learning 2005.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Select Appropriate Data Structure for solving a real world problem. (L4)
2. Select appropriate file organization technique depending on the processing to be done. (L4)
3. Construct Indexes for Databases. (L6)
4. Analyse the Algorithms.(L4).
5. Develop Algorithm for Sorting large files of data.(L3).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0504T	3	0	0	3	CIA	30 M
Course Title	:	PYTHON PROGRAMMING					SEE	70 M

COURSE OBJECTIVES:-

- To teach the fundamentals of Python
- To elucidate problem-solving using a Python programming language
- To introduce a function-oriented programming paradigm through python
- To develop the skill of designing Graphical user Interfaces in Python
- To learn how to use lists, tuples, and dictionaries in Python programs.

Unit I:

Introduction: What is a program, running python, Arithmetic operators, Value and Types?

Variables, Assignments and Statements: Assignment statements, Script mode, Order of operations, string operations, comments.

Functions: Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.

Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.

Learning Outcomes: After successful completion of this unit, the students will be able to

- List the basic constructs of Python (L1)
- Solve the problems by applying modularity principle (L3)

Unit II:

Conditionals and Recursion: Floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.

Fruitful Functions: Return values, Incremental development, Composition, Boolean functions, More recursion, Leap of Faith, Checking types

Iteration: Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms.

Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Apply the conditional execution of the program (L3)

- Apply the principle of recursion to solve the problems (L3)

Unit III:
Case Study: Reading word lists, Search, Looping with indices.

Lists: List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.

Tuples: Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Use the data structures Lists, Dictionaries, and Tuples (L3)
- Design programs for manipulating strings (L6)

Unit IV:
Files: Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.

Classes and Objects: Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.

Classes and Functions: Time, Pure functions, Modifiers, Prototyping versus Planning

Classes and Methods: Object oriented features, Printing objects, Theinit method, The __str__method, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation

Inheritance: Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Apply object orientation concepts (L3)
- Organize data in the form of files (L6)

Unit V:
Introduction to data science:
Functional Programming, JSON and XML in Python, Numpy with Python, Pandas.

Learning Outcomes: Students will be able to

- Apply python programming for solving Data science problems (L3)
- Design solutions to Data science problems using the API supported by Python (L6)

TEXT BOOKS:

1. Allen B. Downey, “Think Python”, 2nd edition, SPD/O’Reilly, 2016.
2. Gowri Shankar S., Veena A, “Introduction to Python Programming”, CRC Press.

REFERENCE BOOKS:

1. Martin C.Brown, “The Complete Reference: Python”, McGraw-Hill, 2018.
2. Kenneth A. Lambert, B.L. Juneja, “Fundamentals of Python”, CENGAGE, 2015.
3. R. Nageswara Rao, “Core Python Programming”, 2nd edition, Dreamtech Press, 2019

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Explain the features of Python language (L2)
2. Select appropriate data structure of Python for solving a problem (L4)
3. Design object oriented programs for solving real-world problems (L6)
4. Design Data Science applications using Python (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Humanities Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9903	2	0	0	2	CIA	30 M
Course Title	:	DESIGN THINKING					SEE	70 M

COURSE OBJECTIVES:-

- To impart knowledge on design thinking process for understanding complex designs.
- To provide design skills to analyze design thinking issues and apply the tools techniques of design.
- To inculcate attitude to solve societal problems using design thinking tools.

Unit I: Introduction to Design Thinking

Design Thinking Process: Types of the thinking process, Common methods to change the human thinking process, Design thinking: Definition, Origin of design thinking, Importance of design thinking, Design vs Design thinking, Problem solving, Understanding design thinking and its process model, A framework of design thinking, The principles and the mindset of design thinking, Design thinking tools.

Unit II: Empathize

Design thinking phases, How to empathize, Role of empathy in design thinking, purpose of empathy maps, Things to be done prior to empathy mapping, Activities during and after the session, Understanding empathy tools : Customer Journey Map, Personas, Empathy changes experiences, The application of empathy to enhance marketing.

Unit III: Ideation

Challenges in idea generation, need for systematic method to connect to user, Visualize, Empathize, Ideate method, Importance of visualizing and empathizing before ideating, Applying the method, Ideation Tools: How Might We? (HMW), Story board, Brainstorming.

Unit IV: Prototyping

What is a prototype? - Prototyping as a mindset, prototype examples, prototyping for products; Why we prototype? Fidelity for prototypes, Process of prototyping- Minimum Viable prototype, Exploration centric, Audience centric, Assumption centric, Process in action- An Etsy case study.

Unit V: Testing Prototypes

Prototyping for digital products: What's unique for digital, Preparation, Low-Fidelity, Mid-Fidelity, High-Fidelity digital prototypes, prototyping for physical products: What's unique for physical products, Preparation, Low-Fidelity, Mid-Fidelity, High-Fidelity physical prototypes; Testing prototypes with users.

TEXT BOOKS:

1. S.Salivahanan, S.Suresh Kumar, D.Praveen Sam, "Introduction to Design Thinking",TataMcGraw Hill, First Edition,2019.
2. Kathryn McElroy, "Prototyping for Designers: Developing the best Digital and Physical Products", O'Reilly,2017.

REFERENCE BOOKS:

1. Michael G. Luchs, Scott Swan , Abbie Griffin, ”Design Thinking – New Product Essentials from PDMA”, Wiley, 2015.
2. Vijay Kumar, “101 Design Methods: A Structured Approach for Driving Innovation in Your Organization”, 2012.

ADDITIONAL LEARNING RESOURCES:

1. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
2. https://www.ibm.com/design/thinking/page/toolkit
3. https://www.interaction-design.org/literature/article/define-and-frame-your-design-challenge-by-creating-your-point-of-view-and-ask-how-might-we
4. https://www.culturepartnership.eu/en/article/ten-tools-for-design-thinking
5. https://nptel.ac.in/courses/109/104/109104109/
6. https://nptel.ac.in/courses/110106124/

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

7. Analyze design thinking concepts and principles to perform human centered design process for creative problem solving (L4)
8. Create empathy maps to visualize user attitudes and behavior for gaining insights of customers (L6)
9. Develop innovative products/services for a customer base using ideation techniques(L3)
10. Build prototypes for complex problems using gathered user requirements (L6)
11. Apply design thinking tools techniques to produce good design and relevant products or services for a specific target market (L3)
12. Improve prototype by testing it with a specific set of users for making it sustainable by following ethics (L6).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0501	3	0	0	3	CIA	30 M
Course Title	:	COMPUTER ORGANISATION					SEE	70 M

COURSE OBJECTIVES:-

- Learn the fundamentals of computer organization and its relevance to classical and modern problems of computer design
- Understand the structure and behavior of various functional modules of a computer.
- Discuss the techniques that computers use to communicate with I/O devices
- Study the concept of pipelining and the way it can speed up processing.
- Describe the basic characteristics of multiprocessors

Unit I:

Basic Structure of Computer: Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.

Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Identify the basic functional units and the ways they are interconnected to form a computer system (L2)
- Illustrate various addressing modes for accessing register and memory operands (L3)
- Describe the instruction sequencing and various types of instructions (L1)

Unit II:

Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.

Basic Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, Multiprogrammed Control.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Outline the arithmetic operations on signed numbers (L2)
- Describe the operations performed on floating point numbers (L1)
- Distinguish between hardwired and microprogrammed control units (L4)

Unit III:

The Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Recognize the various types of memories (L2)
- Analyze the performance of cache memory (L4)
- Apply effective memory management strategies (L2)

Unit IV:

Input/output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Examine the basics of I/O data transfer synchronization (L4)
- Analyze the interrupt handling mechanisms of various processors (L4)
- Describe various techniques for I/O data transfer methods (L1)

Unit V:

Pipelining: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.

Large Computer Systems: Forms of Parallel Processing, Array Processors, The Structure of General-Purpose multiprocessors, Interconnection Networks.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Investigate the use of pipelining and multiple functional units in the design of high-performance processors (L4)
- Design and analyze a high performance processor (L6)
- Describe the interconnection networks for multiprocessors (L1)

TEXT BOOKS:

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, “Computer Organization”, 5th Edition, McGraw Hill Education, 2013.

REFERENCE BOOKS:

1. M.Morris Mano, “Computer System Architecture”, 3rd Edition, Pearson Education.
2. Themes and Variations, Alan Clements, “Computer Organization and Architecture”, CENGAGE Learning.
3. SmrutiRanjanSarangi, “Computer Organization and Architecture”, McGraw Hill Education.
4. John P.Hayes, “Computer Architecture and Organization”, McGraw Hill Education

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Describe computer architecture concepts related to design of modern processors, memories and I/Os (L1)
2. Identify the hardware requirements for cache memory and virtual memory (L2)
3. Design algorithms to exploit pipelining and multiprocessors (L6)
4. Plan the use memory and I/O devices effectively (L6)
5. Identify pipeline hazards and identify possible solutions to those hazards (L2)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0502T	3	0	0	3	CIA	30 M
Course Title	:	DATA BASE MANAGEMENT SYSTEMS					SEE	70 M

COURSE OBJECTIVES:-

- Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL,System implementation techniques.
- Enable students to model ER diagram for any customized applications
- Provide knowledge on concurrency techniques.

Unit I: Introduction

Database system, Characteristics (Database Vs File System), Database Users(Actors on Scene, Workers behind the scene), Advantages of Data base systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Distinguish between Database and File System (L2)
- Categorize different kinds of data models (L2)
- Define functional components of a DBMS. (L1)

Unit II:

Relational Model: Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance.

Basic SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update), basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).

Learning Outcomes: After successful completion of this unit, the students will be able to

- Outline the elements of the relational model such as domain, attribute, tuple, relation and entity (L2)
- Distinguish between various kinds of constraints like domain, key and integrity (L4)
- Define relational schema (L1)
- Develop queries using Relational Algebra and SQL (L3)
- Perform DML operations on databases (L3)

Unit III: Entity Relationship Model

Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

SQL: Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable).

Learning Outcomes: After successful completion of this unit, the students will be able to

- Develop E-R model for the given problem (L3)
- Derive tables from E-R diagrams (L3)
- Formulate SQL queries using join operations on tables (L3)

Unit IV: Schema Refinement (Normalization)

Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency(1NF, 2NF and 3NF), concept of surrogate key, Boyce-codd normal form(BCNF), Lossless join and dependency preserving decomposition, Fourth normal form(4NF).

Learning Outcomes: After successful completion of this unit, the students will be able to

- Differentiate between various normal forms based on functional dependency (L2)
- Apply Normalization techniques to eliminate redundancy (L3)

Unit V: Transactions and Indexing Concepts

Transaction State, Implementation of Atomicity and Durability, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

File Organization and Indexing, Cluster Indexes, Primary and Secondary Indexes, Index data Structures, Hash Based Indexing: Tree based Indexing, Indexes and Performance Tuning

Learning Outcomes: After successful completion of this unit, the students will be able to

- Summarize transaction related concepts such as state, atomicity, durability, concurrency, serializability and recoverability(L2)
- Design atomic transactions for an application. (L3)

TEXT BOOKS:

1. Raghurama Krishnan, Johannes Gehrke, “Database Management Systems”, 3/e, TMH
2. A. Silberschatz, Korth “ Database System Concepts, ” 5/e, TMH 2019
3. C J Date, “Introduction to Database Systems”, 8/e, PEA.

REFERENCE BOOKS:

1. RamezElmasri, Shamkant B. Navathe, “Database Management System”, 6/e, PEA
2. Carlos Coronel, Steven Morris, Peter Robb, “Database Principles Fundamentals of Design Implementation and Management”, Cengage Learning.
3. A. Ananda Rao,Peter Robb,Carlos Coronel, “Database Management Systems”, Cengage Learning India, 2011

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Design a database for a real world information system (L6)
2. Apply Normalization techniques to eliminate redundancy.(L3)
3. Select the required information using SQL Query Language.(L1)
4. Organize the Database for efficient data retrieval. (L6)
5. Implement the Database transactions preserving the atomicity properties. (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0503	3	0	0	3	CIA	30 M
Course Title	:	DIGITAL LOGIC DESIGN					SEE	70 M

COURSE OBJECTIVES:-

- Understand basic number systems, codes and logical gates.
- Acquire the skills to manipulate and examine Boolean algebraic expressions, logical operations, and Boolean functions
- Acquaint with classical hardware design for both combinational and sequential logic circuits
- Study the design of combinational and sequential circuits.
- Explain the basics of various types of memories.

Unit I:

Digital Systems and Binary Numbers: Digital Systems, Binary Numbers, Number base conversions, Octal, Hexadecimal and other base numbers, complements, signed binary numbers, binary codes, binary storage and registers, binary logic

Boolean algebra and logic gates: Basic theorems and properties of Boolean algebra, Boolean functions, canonical and standard forms, Digital Logic Gates.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Summarize the binary number system (L2)
- Illustrate various binary codes (L3)
- Describe the basic postulates of Boolean algebra (L1)
- Develop a logic diagram using gates from a Boolean function (L3)

Unit II:

Gate–Level Minimization: The Map Method, Four-Variable K-Map, sum of products , product of sums simplification, Don’t care conditions, NAND and NOR implementation and other two level implementations, Exclusive-OR function.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Apply the map method for simplifying Boolean Expressions (L3)
- Apply Don’t care conditions to simplify a Karnaugh map (L3)
- Design two-level Boolean functions with NAND gates and NOR gates (L6)

Unit III:

Combinational Logic: Combinational Circuits, Analysis of Combinational Circuits, Design Procedure, Binary Adder-Subtractor, Decimal Adder, Binary Multiplier, Magnitude Comparator, Decoders, Encoders, Multiplexers, Demultiplexers.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Select fundamental combinational logic circuits (L1)
- Analyze and design combinational circuits (L4)
- Design Boolean function with a multiplexer (L6)

Unit IV:

Synchronous Sequential Circuits: Latches, Flip-flops, analysis of clocked sequential circuits **Register and Counters:** Registers, Shift registers, Ripple counters, Synchronous counters, other counters.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain the functionalities of latch and different flip-flops (L2)
- Analyze and design clocked sequential circuits (L4)
- Describe the use of sequential circuit components in complex digital systems (L1)

Unit V:

Memory and Programmable Logic: Random-Access memory, Memory decoding, ROM,Programmable Logic Array, Programmable Array Logic, Sequential programmable devices.

Digital Integrated Circuits: RTL and DTL Circuits, Transistor-Transistor Logic (TTL), Emitter-Coupled Logic (ECL), MOS, CMOS Logic, Comparisons of Logic Families

Learning Outcomes: After successful completion of this unit, the students will be able to

- Interpret the types of memory (L2)
- Construct the Boolean functions with PLA and PAL (L3)
- Describe the most common integrated circuit digital logic families (L1)

TEXT BOOKS:

1. M. Morris Mano, M.D.Ciletti, “Digital Design”, 5th edition, Pearson, 2018.

REFERENCE BOOKS:

1. Donald P Leach, Albert Paul Malvino, GoutamSaha, “Digital Principles and applications”, McGrawHill , 8th Edition,2015.
2. David J. Comer, “Digital Logic & State Machine Design”, Oxford University Press, 3rd Reprinted Indian Edition, 2012
3. R.D. Sudhakar Samuel, “Digital Logic Design”, Elsevier

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Analyze the number systems and codes (L4)
2. Decide the Boolean expressions using Minimization methods (L5)
3. Design the sequential and combinational circuits (L6)
4. Apply state reduction methods to solve sequential circuits (L3)
5. Describe various types of memory (L1)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester CE, CSE & ME)

(For III Semester ECE weekly 02 hrs with 01 Credits only)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0503P	0	0	3	1.5	CIA	30 M
Course Title	:	DATA STRUCTURES LAB					SEE	70 M

COURSE OBJECTIVES:-

- To introduce to the different data structures
- To elucidate how the data structure selection influences the algorithm complexity
- To explain the different operations that can be performed on different data structures
- To introduce the different search and sorting algorithms.

LIST OF EXPERIMENTS:

1. String operations using array of pointers
2. Searching Algorithms (With the Number of Key Comparisons) Sequential, Binary and Fibonacci Search Algorithms.
3. Sorting Algorithms: Insertion Sort, Selection Sort, Shell Sort, Bubble Sort, Quick Sort, Heap Sort, Merge Sort, and Radix Sort. Using the system clock, compute the time taken for sorting of elements. The time for other operations like I/O etc should not be considered while computing time.
4. Implementation of Singly Linked List, Doubly Linked List, Circular Linked List
5. Stack implementation using arrays
6. Stack implementation using linked lists
7. Queue implementation using arrays. Implement different forms of queue. While implementing you should be able to store elements equal to the size of the queue. No positions should be left blank.
8. Queue implementation using linked lists
9. Creation of binary search tree, performing operations insertion, deletion, and traversal.
10. Breadth first search
11. Depth first search
12. Travelling sales man problem
13. File operations
14. Indexing of a file

OPTIONAL:

1. Reversing the links (not just displaying) of a linked list.
2. Consider a linked list consisting of name of a person and gender as a node. Arrange the linked list using 'Ladies first' principle. You may create new linked lists if necessary.
3. An expression can be represented in three ways: infix, prefix and postfix. All the forms are necessary in different contexts. Write modules to convert from one form to another form.
4. A table can be defined as a collection of rows and columns. Each row and column may have a label. Different values are stored in the cells of the table. The values can be of different data types. Numerical operations like summation, average etc can be performed on rows/columns which contain numerical data. Such operations are to be prevented on data which is not numeric. User may like to insert row/columns in the already existing table. User may like to remove row/column. Create table data type and support different operations on it.

COURSE OUTCOMES: After successful completion of this Lab, the students will be able to:

1. Select the data structure appropriate for solving the problem (L5)
2. Implement searching and sorting algorithms (L3)
3. Design new data types (L6)
4. Illustrate the working of stack and queue (L4)
5. Organize the data in the form of files (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester CSE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AES0504P	0	0	3	1.5	CIA	30 M
Course Title	:	PYTHON PROGRAMMING LAB					SEE	70 M

COURSE OBJECTIVES:-

- To train the students in solving computational problems
- To elucidate solving mathematical problems using Python programming language
- To understand the fundamentals of Python programming concepts and its applications.

LIST OF TOPICS / EXPERIMENTS:

1. Write a program to demonstrate a) Different numeric data types and b) To perform different Arithmetic Operations on numbers in Python.
2. Write a program to create, append, and remove lists in Python.
3. Write a program to demonstrate working with tuples in Python.
4. Write a program to demonstrate working with dictionaries in Python.
5. Write a program to demonstrate a) arrays b) array indexing such as slicing, integer array indexing and Boolean array indexing along with their basic operations in NumPy.
6. Write a program that accepts a string from the user and display the same string after removing vowels from it.
7. Write a program to strip a set of characters from a string.
8. Write a function that prompts the user for the average temperature for each day of the week and returns a dictionary containing the required information.
9. Write a program that has the dictionary of your friends names as keys and phone numbers as its values. Print the dictionary in a sorted order. Prompt the user to enter the name and check if it is present in the dictionary. If the name is not present, then enter the details in the dictionary.
10. Write a program to store the latitude and longitude of your house as a tuple and display it.
11. Write a program to do the following operations on files
    a) count the occurrence of each letter b) read the last n lines
    c) remove new line characters from the file d) read random line from a file
    e) read and write the contents from one csv file to another.
12. Write a program to add two polynomials using classes.
13. Create a class called library with data attributes accno, publisher, title and author. The methods of the class should include
    a) read() accno, title, author
    b) compute() – to accept the number of days late, calculate an display the fine charged at the rate of Rs. 10 per day.
    C) display the data.
14. Create a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.
15. Write a program to create and display a DataFrame from a dictionary of data which has the index labels.
16. Write a program to create and display a one-dimensional array-like object containing an array of data using pandas library

17. Write a python pogram to add, subtract, multiply and divide two pandas series.

OPTIONAL

1. Develop a Python program to solve the n-queen problem with and without recursion.
   Problem Description
   The n-queen problem is the problem of placing n queens on an n x n chessboard such that no queen can attack another queen.
2. Design a python program to design a Calculator and Countdown timer.
3. Design a program in which the computer randomly chooses a number between 1 to 10, 1 to 100, or any range. Then give users a hint to guess the number. Every time the user guesses wrong, he gets another clue, and his score gets reduced. The clue can be multiples, divisible, greater or smaller, or a combination of all.
4. Design a simple youtube video downloader.
5. Develop a Python program which blocks the unnecessary website popups

TEXT BOOKS:

1. Francois Chollet, Deep Learning with Python, 1/e, Manning Publications Company, 2017
2. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, “How to Think Like a Computer Scientist: Learning with Python 3”, 3rd edition, Available at http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
3. Paul Barry, “Head First Python a Brain Friendly Guide” 2nd Edition, O’Reilly, 2016
4. DainelY.Chen “Pandas for Everyone Python Data Analysis” Pearson Education, 2019

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Illustrate the use of various data structures. (L3)
2. Analyze and manipulate Data using Pandas (L4)
3. Design solutions to real-world problems using Python (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0502P	0	0	3	1.5	CIA	30 M
Course Title	:	DATA BASE MANAGEMENT SYSTEMS LAB					SEE	70 M

Description of some of the Database Management Systems is given below. This is only for Reference. Instructors may use the following or use their own DBMS. Students should be asked to do the survey, identify the data that is essential, Identify the Nouns, Verbs and Attributes, Identify the keys including primary and Foreign keys, Represent them using ER diagram, Do the Normailization, Refine the ER diagrams if necessary, Identify the constraints and Triggers if any, Create tables along with keys, assertions and triggers, Design appropriate queries to retrieve the essential information as per the requirements related information gathered, Design PL/SQL programs or Procedures wherever appropriate. Instructors should ensure that all the DDL, DML statements of the DBMS which you are using are covered.

1. HOSPITAL MANAGEMENT SYSTEM

Arun hospital is a multi specialty hospital that includes a number of departments, rooms,doctors, nurses, compounders, and other staff working in the hospital. Patients having different kinds of ailments come to the hospital and get checkup done from the concerned doctors. If required they are admitted in the hospital and discharged after treatment.

The aim of this case study is to design and develop a database for the hospital to maintain the records of various departments, rooms, and doctors in the hospital. It also maintains records of the regular patients, patients admitted in the hospital, the check up of patients done by the doctors, the patients that have been operated, and patients discharged from the hospital.

Description:

In hospital, there are many departments like Orthopedic, Pathology, Emergency,Dental, Gynecology, Anesthetics, I.C.U., Blood Bank, Operation Theater, Laboratory, M.R.I., Neurology, Cardiology, Cancer Department, Corpse, etc. There is an OPD where patients come and get a card (that is, entry card of the patient) for check up from the concerned doctor. After making entry in the card, they go to the concerned doctor's room and the doctor checks up their ailments. According to the ailments, the doctor either prescribes medicine or admits the patient in the concerned department. The patient may choose either private or general room according to his/her need. But before getting admission in the hospital, the patient has to fulfill certain formalities of the hospital like room charges, etc. After the treatment is completed, the doctor discharges the patient. Before discharging from the hospital, the patient again has to complete certain formalities of the hospital like balance charges, test charges, operation charges (if any), blood charges, doctors' charges, etc.

Next we talk about the doctors of the hospital. There are two types of the doctors in the hospital, namely, *regular doctors* and *call on doctors*. Regular doctors are those doctors who come to the hospital daily. Calls on doctors are those doctors who are called by the hospital if the concerned doctor is not available.

1) **DEPARTMENT:** This table consists of details about the various departments in thehospital. The information stored in this table includes department name, department location, and facilities available in that department.

Constraint: Department name will be unique for each department.

2) **ALL_DOCTORS:** This table stores information about all the doctors working for thehospital and the departments they are associated with. Each doctor is given an identity number starting with DR or DC prefixes only.

   Constraint: Identity number is unique for each doctor and the correspondingdepartment should exist in DEPARTMENT table.

3) **DOC_REG:** This table stores details of regular doctors working in the hospital. Doctorsare referred to by their doctor number. This table also stores personal details of doctors like name, qualification, address, phone number, salary, date of joining, etc.

   Constraint: Doctor's number entered should contain DR only as a prefix and must existin ALL_DOCTORS table.

4) **DOC_ON_CALL:** This table stores details of doctors called by hospital when additionaldoctors are required. Doctors are referred to by their doctor number. Other personal details like name, qualification, fees per call, payment due, address, phone number, etc., are also stored.

   Constraint: Doctor's number entered should contain DC only as a prefix and must existin ALL_DOCTORS table.

5) **PAT_ENTRY:** The record in this table is created when any patient arrives in the hospitalfor a check up. When patient arrives, a patient number is generated which acts as a primary key. Other details like name, age, sex, address, city, phone number, entry date, name of the doctor referred to, diagnosis, and department name are also stored. After storing the necessary details patient is sent to the doctor for check up.

   Constraint: Patient number should begin with prefix PT. Sex should be*M*or*F*only.Doctor's name and department referred must exist.

6) **PAT_CHKUP:** This table stores the details about the patients who get treatment fromthe doctor referred to. Details like patient number from patient entry table, doctor number, date of check up, diagnosis, and treatment are stored. One more field status is used to indicate whether patient is admitted, referred for operation or is a regular patient to the hospital. If patient is admitted, further details are stored in PAT_ADMIT table. If patient is referred for operation, the further details are stored in PAT_OPR table and if patient is a regular patient to the hospital, the further details are stored in PAT_REG table.

   Constraint: Patient number should exist inPAT_ENTRYtable and it should be unique.

7) **PAT_ADMIT:** When patient is admitted, his/her related details are stored in this table.Information stored includes patient number, advance payment, mode of payment, room number, department, date of admission, initial condition, diagnosis, treatment, number of the doctor under whom treatment is done, attendant name, etc.

Constraint: Patient number should exist inPAT_ENTRYtable. Department, doctornumber, room number must be valid.

8) **PAT_DIS:** An entry is made in this table whenever a patient gets discharged from thehospital. Each entry includes details like patient number, treatment given, treatment advice, payment made, mode of payment, date of discharge, etc.

   Constraint: Patient number should exist inPAT_ENTRYtable.

9) **PAT_REG:** Details of regular patients are stored in this table. Information stored includesdate of visit, diagnosis, treatment, medicine recommended, status of treatment, etc.

   Constraint: Patient number should exist in patient entry table. There can be multipleentries of one patient as patient might be visiting hospital repeatedly for check up and there will be entry for patient's each visit.

10) **PAT_OPR:** If patient is operated in the hospital, his/her details are stored in this table.Information stored includes patient number, date of admission, date of operation, number of the doctor who conducted the operation, number of the operation theater in which operation was carried out, type of operation, patient's condition before and after operation, treatment advice, etc.

    Constraint: Patient number should exist inPAT_ENTRYtable. Department, doctornumber should exist or should be valid.

11) **ROOM_DETAILS:** It contains details of all rooms in the hospital. The details stored in thistable include room number, room type (general or private), status (whether occupied or not), if occupied, then patient number, patient name, charges per day, etc.

    Constraint: Room number should be unique. Room type can only be*G*or*P*and statuscan only be *Y* or *N* **E-R Diagram**

Relational Database Schema for Case Study

The relational database schema for *Hospital Management* database is as follows:

1. DEPARTMENT (D_NAME, D_LOCATION, FACILITIES)

2. ALL_DOCTORS (DOC_NO, DEPARTMENT)

3. DOC_REG(DOC_NO, D_NAME, QUALIFICATION, SALARY, EN_TIME, EX_TIME, ADDRESS, PH_NO, DOJ)

4. DOC_ON_CALL (DOC_NO, D_NAME, QUALIFICATION, FS_PR_CL, PYMT_DU, ADDRESS, PH_NO)

5. PAT_ENTRY (PAT_NO, PAT_NAME, CHKUP_DT, PT_AGE, SEX, RFRG_CSTNT, DIAGNOSIS, RFD, ADDRESS, CITY, PH_NO, DEPARTMENT)

6. PAT_CHKUP (PAT_NO, DOC_NO, DIAGNOSIS, STATUS, TREATMENT)

7. PAT_ADMIT (PAT_NO, ADV_PYMT, MODE_PYMT, ROOM_NO, DEPTNAME, ADMTD_ON, COND_ON, INVSTGTN_DN, TRMT_SDT, ATTDNT_NM)

8. PAT_DIS (PAT_NO, TR_ADVS, TR_GVN, MEDICINES, PYMT_GV, DIS_ON)

9. PAT_REG (PAT_NO, DATE_VIS, CONDITION, TREATMENT, MEDICINES, DOC_NO, PAYMT)

10. PAT_OPR (PAT_NO, DATE_OPR, IN_COND, AFOP_COND, TY_OPERATION, MEDICINES, DOC_NO, OPTH_NO, OTHER_SUG)

11. ROOM_DETAILS (<u>ROOM_NO</u>, TYPE, STATUS, RM_DL_CRG, OTHER_CRG)

2. RAILWAY RESERVATION

The railway reservation system facilitates the passengers to enquire about the trainsavailable on the basis of source and destination, booking and cancellation of tickets, enquire about the status of the booked ticket, etc.

The aim of case study is to design and develop a database maintaining the records of different trains, train status, and passengers. The record of train includes its number, name, source, destination, and days on which it is available, whereas record of train status includes dates for which tickets can be booked, total number of seats available, and number of seats already booked. The database has been developed and tested on the Oracle.

<u>Description:</u>

Passengers can book their tickets for the train in which seats are available. For this, passenger has to provide the desired train number and the date for which ticket is to be booked. Before booking a ticket for a passenger, the validity of train number and booking date is checked. Once the train number and booking date are validated, it is checked whether the seat is available. If yes, the ticket is booked with confirm status and corresponding ticket ID is generated which is stored along with other details of the passenger. After all the available tickets are booked, certain numbers of tickets are booked with waiting status. If waiting lot is also finished, then tickets are not booked and a message of non-availability of seats is displayed.

The ticket once booked can be cancelled at any time. For this, the passenger has to provide the ticket ID (the unique key). The ticket ID is searched and the corresponding record is deleted. With this, the first ticket with waiting status also gets confirmed.

<u>List of Assumption</u>

Since the reservation system is very large in reality, it is not feasible to develop the case study to that extent and prepare documentation at that level. Therefore, a small sample case study has been created to demonstrate the working of the reservation system. To implement this sample case study, some assumptions have been made, which are as follows:

1. The number of trains has been restricted to 5.
2. The booking is open only for next seven days from the current date.
3. Only two categories of tickets can be booked, namely, *AC* and *General*.
4. The total number of tickets that can be booked in each category (AC and General) is 10.

5. The total number of tickets that can be given the status of waiting is 2.
6. The in-between stoppage stations and their bookings are not considered.

Description of Tables and Procedures

Tables and procedures that will be created are as follows:

1) **TrainList:** This table consists of details about all the available trains. The informationstored in this table includes train number, train name, source, destination, fair for AC ticket, fair for general ticket, and weekdays on which train is available.

   Constraint: The train number is unique.

2) **Train_Status:** This table consists of details about the dates on which ticket can bebooked for a train and the status of the availability of tickets. The information stored in this table includes train number, train date, total number of AC seats, total number of general seats, number of AC seats booked, and number of general seats booked.
   Constraint: Train number should exist inTrainListtable.

3) **Passenger:** This table consists of details about the booked tickets. The informationstored in this table includes ticket ID, train number, date for which ticket is booked, name, age, sex and address of the passenger, status of reservation (either confirmed or waiting), and category for which ticket is booked.

   Constraint: Ticket ID is unique and the train number should exist inTrainListtable.

4) **Booking:** In this procedure, the train number, train date, and category is read from thepassenger. On the basis of the values provided by the passenger, corresponding record is retrieved from the Train_Status table. If the desired category is AC, then total number of AC seats and number of booked AC seats are compared in order to find whether ticket can be booked or not. Similarly, it can be checked for the general category. If ticket can be booked, then passenger details are read and stored in the Passenger table.

5) **Cancel:** In this procedure, ticket ID is read from the passenger and corresponding record issearched in the Passenger table. If the record exists, it is deleted from the table. After deleting the record (if it is confirmed), first record with waiting status for the same train and same category are searched from the Passenger table and its status is changed to confirm.

3. PAINTING HIRE BUSINESS

System Description:

A local businesswoman has decided to start her own Internet business, called Masterpieces Ltd, hiring paintings to private individuals and commercial companies.

Because of your reputation as a database designer she has called upon your services to design and implement a database to support her new business. At the initial planning meeting, to discuss the design, the following user requirements were requested.

The system must be able to manage the details of customers, paintings and those paintings currently on hire to customers. Customers are categorized as B (bronze), S (silver), G (gold) or P (platinum). These categories entitle a customer to a discount of 0%, 5%, 10% or 15% respectively.

Customers often request paintings by a particular artist or theme (eg animal, landscape, seascape, naval, still-life, etc). Over time a customer may hire the same painting more than once.

Each painting is allocated a customer monthly rental price defined by the owner. The owner of the painting is then paid 10% of that customer rental price. Any paintings that are not hired within six months are returned to the owner. However, after three months, an owner may resubmit a returned painting.

Each painting can only have one artist associated with it.

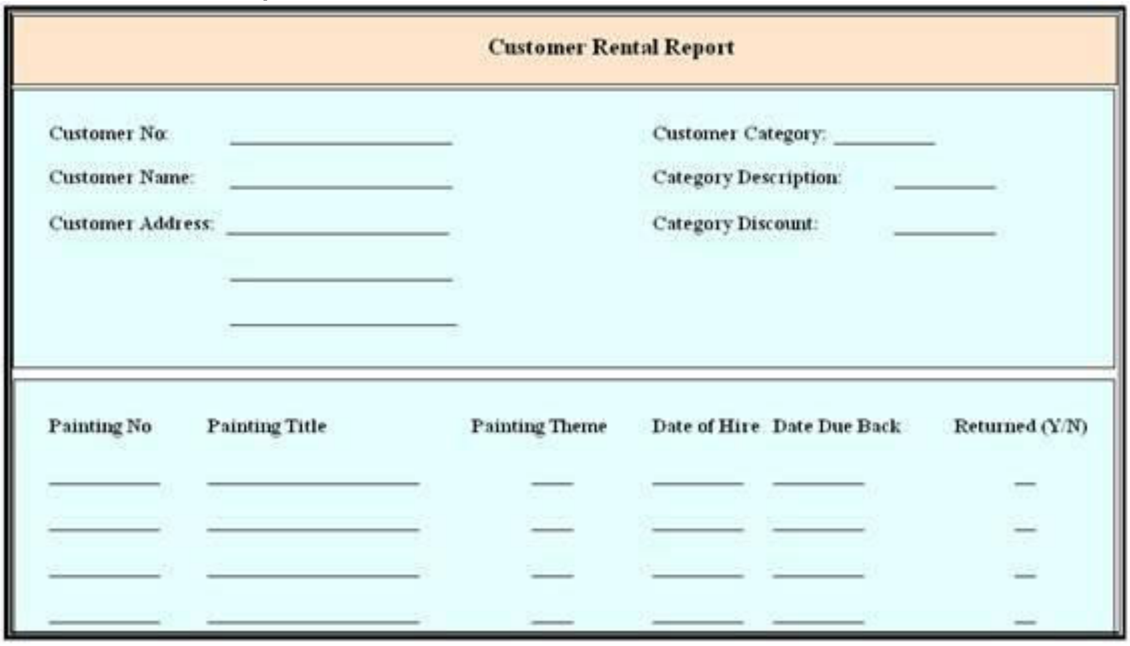
Several reports are required from the system. Three main ones are:

1) For each customer, a report showing an overview of all the paintings they have hired or are currently hiring
2) For each artist, a report of all paintings submitted for hire
3) For each artist, a returns report for those paintings not hired over the past six months

Remember to **identify key attributes** and any **foreign key attributes**.

PAGES TO BE CREATED

Customer Rental Report


Customer Rental Report

Customer No: ______ Customer Category: ______

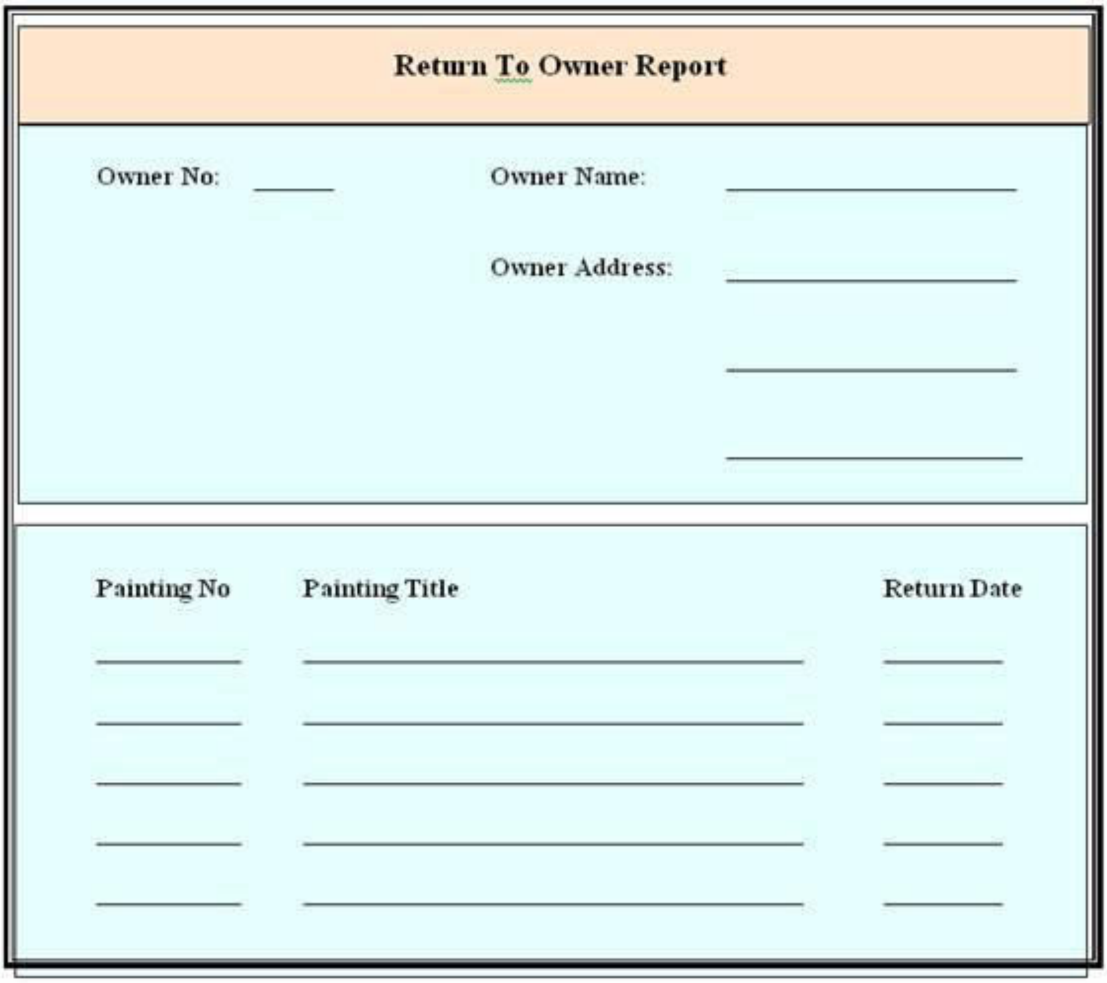
Customer Name: ______ Category Description: ______

Customer Address: ______ Category Discount: ______

Painting No	Painting Title	Painting Theme	Date of Hire	Date Due Back	Returned (Y/N)

Artist Report

Return to Owner Report



Return To Owner Report

Owner No: ______ Owner Name: ____________________

Owner Address: ____________________

Painting No	Painting Title	Return Date

4. NORMALIZATION

A relational database is to be designed for a medium sized Company dealing with industrial applications of computers. The Company delivers various products to its customers ranging from a single application program through to complete installation of hardware with customized software. The Company employs various experts, consultants and supporting staff. All personnel are employed on long- term basis, i.e. there is no short-term or temporary staff. Although the Company is somehow structured for administrative purposes (that is, it is divided into departments headed by department managers) all projects are carried out in an inter-disciplinary way. For each project a project team is selected, grouping employees from different departments, and a Project Manager (also an employee of the Company) is appointed who is entirely and exclusively responsible for the control of the project, quite independently of the Company's hierarchy. The following is a brief statement of some facts and policies adopted by the Company.

- Each employee works in some department.
- An employee may possess a number of skills
- Every manager (including the MD) is an employee
- A department may participate in none/one/many projects.
- At least one department participates in a project.
- An employee may be engaged in none/one/many projects
- Project teams consist of at least one member. For the above business stories you are expected to create the following. (i) Analyze the data required (ii) Normalize the attributes (iii) Create the logical data model (ER diagrams).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9910	3	0	0	3	CIA	30 M
Course Title	:	DISCRETE MATHEMATICAL STRUCTURES					SEE	70 M

COURSE OBJECTIVES:-

- To explain about the Boolean Algebra, Graph theory and Recurrence relations.
- To demonstrate the application of basic methods of discrete mathematics in Computer Science problem solving.
- To elucidate solving mathematical problems from algorithmic perspective.
- To introduce the mathematical concepts which will be useful to study advanced courses Design and Analysis of Algorithms, Theory of Computation, Cryptography and Software Engineering etc.
- To reveal how solutions of graph theory can be applied to computer science problems

Unit I:

Statements and Notation, **Connectives**- Negation, Conjunction, Disjunction, Conditional and Bi-conditional, Statement formulas and Truth Tables. Well-formed formulas, Tautologies, Equivalence of Formulas, Duality Law, Tautological Implications.

Normal Forms: Disjunctive Normal Forms, Conjunctive Normal Forms, Principal Disjunctive Normal Forms (PDNF), Principal Conjunctive Normal Forms (PCNF), Ordering and Uniqueness of Normal Forms.

The Theory of Inference for the Statement Calculus: Rules of Inference, Consistency of Premises and Indirect Method of Proof.

The predicate Calculus, **Inference theory of the Predicate Calculus**.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Describe logical sentences in terms of predicates, quantifiers, and logical connectives (L1)
- Evaluate basic logic statements using truth tables and the properties of logic (L5).
- Apply rules of inference to test the consistency of premises and validity of arguments (L3).
- Verify the equivalence of two formulas and their duals (L4).
- Find the Principal Conjunctive and Principal Disjunctive Normal Forms of a statement formula (L1).

Unit II:

Set Theory: Basic concepts of Set Theory, Representation of Discrete structures, Relations and Ordering, Functions, Recursion.

Lattices and Boolean algebra: Lattices as Partially Ordered Sets, Boolean algebra, Boolean Functions, Representation and Minimization of Boolean Functions.

Algebraic Structures: Algebraic Systems: Examples and General Properties, Semi Groups and Monoids, Groups.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Describe equivalence, partial order and compatible relations (L1).

- Compute Maximal Compatibility Blocks (L3).
- Identify the properties of Lattices (L2).
- Evaluate Boolean functions and simplify expression using the properties of Boolean algebra (L5).
- Infer Homomorphism and Isomorphism (L4).
- Describe the properties of Semi groups, Monoids and Groups (L1).

Unit III:

Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with repetitions, Enumerating Permutations and Combinations with constrained Representations, Binomial Coefficients, The Binomial and Multinomial Theorems, The Principle of Inclusion and Exclusion.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain fundamental principle of counting (L2).
- Examine the relation between permutation and combination (L4).
- Solve counting problems by applying elementary counting techniques using the product and sum rules (L3).
  Apply permutations, combinations, the pigeon-hole principle, and binomial expansion to solve counting problems (L3).

Unit IV:

Recurrence Relations: Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence Relations, Solving Recurrence Relations by Substitution and Generating Functions, The method of Characteristic Roots, Solution of Inhomogeneous Recurrence Relations.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Find the generating functions for a sequence (L1).
- Design recurrence relations using the divide-and-conquer algorithm (L6).
- Solve linear recurrence relations using method of Characteristic Roots (L3).
- Outline the general solution of homogeneous or Inhomogeneous Recurrence Relations using substitution and method of generating functions (L2).
- Solve problems using recurrence relations and recursion to analyze complexity of algorithms (L3).

Unit V:

Graphs: Basic Concepts, Isomorphism and Sub graphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs, Chromatics Number, The Four-Color Problem.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Investigate if a given graph is simple or a multigraph, directed or undirected, cyclic oracyclic (L4).
- Describe complete graph and complete bipartite graphs (L1).
- Identify Euler Graphs, Hamilton Graph and Chromatic Number of a graph (L2).
- Apply the concepts of functions to identify the Isomorphic Graphs (L3).
- Apply depth-first and breadth-first search (L3).

- Apply Prim's and Kruskal's algorithms to find a minimum spanning tree (L3).

TEXT BOOKS:

1. Joe L. Mott. Abraham Kandel and Theodore P.Baker, "Discrete Mathematics for ComputerScientists& Mathematicians", 2nd Edition, Pearson, 2008.(For Units III to V).
2. J P Trembly and R Manohar, "Discrete Mathematical Structures with Applications to Computer Science", 1st Edition, McGraw Hill, 2017(For Unit I&II).

REFERENCE BOOKS:

3. Ralph P. Grimaldi and B.V.Ramana, "Discrete and Combinatorial Mathematics, an Applied Introduction", 5th Edition, Pearson, 2016.
4. NARSINGH DEO, "Graph Theory with Applications to Engineering", Prentice Hall, 1979.
5. D.S.Malik and M.K.Sen"Discrete Mathematics theory and Applications", First Edition, Cenegage Learning, 2012.
6. C L Liu and D P Mohapatra, "Elements of Discrete Mathematics, A computer Oriented approach by", 4th edition, MCGRAW-HILL, 2018.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Evaluate elementary mathematical arguments and identify fallacious reasoning (L5).
2. Understand the properties of Compatibility, Equivalence and Partial Ordering relations, Lattices and Hassee Diagrams (L1).
3. Understand the general properties of Algebric Systems, Semi Groups, Monoids and Groups (L1).
4. Design solutions for problems using breadth first and depth first search techniques (L6)
5. Solve the homogeneous and non-homogeneous recurrence relations (L3).
6. Apply the concepts of functions to identify the Isomorphic Graphs (L3).
7. Identify Euler Graphs, Hamilton Graph and Chromatic Number of a graph (L2).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to IV Semester CSE & ECE)

Course Category	:	Humanities Sciences Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19ABS9905	3	0	0	3	CIA	30 M
Course Title	:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS					SEE	70 M

COURSE OBJECTIVES:-

- To inculcate the basic knowledge of micro economics and financial accounting analysis
- To understand fundamentals of Production & Cost Concepts which is an important subject helps to the Technocrats to take certain business decisions in the processes of optimum utilization of resources.
- To know various types of Market Structures & pricing methods and its strategies, and Trade Blocks.
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills about accounting and to explain the process of preparing accounting statements & analysis for effective business decisions.

Unit I: INTRODUCTION TO MANAGERIAL ECONOMICS & DEMAND

Managerial Economics – Definition – Nature & Scope - Contemporary importance of Managerial Economics - Demand Analysis **-** Concept of Demand **-** Demand Function - Law of Demand - Elasticity of Demand - Significance - Types of Elasticity - Measurement of Elasticity of Demand - Demand Forecasting - Factors governing Demand Forecasting - Methods of Demand Forecasting - Relationship of Managerial Economics with Financial Accounting and Management.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the nature and scope of Managerial Economics and its importance
- Understand the concept of demand and its determinants
- Analyze the Elasticity and degree of elasticity
- Evaluate Demand forecasting methods
- Design the process of demand estimation for different types of demand

Unit II: THEORY OF PRODUCTION AND COST ANALYSIS

Production Function– Least-cost combination - Short-run and Long-run Production Function - Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale – **Cost & Break Even Analysis**- Cost concepts and Cost behavior - Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems) - Managerial significance and limitations of Break-Even Analysis.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the production function, Input-Output relationship and different cost concepts
- Apply the least-cost combination of inputs
- Analyze the behavior of various cost concepts
- Evaluate BEA for real time business decisions
- Develop profit appropriation for different levels of business activity

Unit III: INTRODUCTION MARKETS AND NEW ECONOMIC ENVIRONMENT

Market structures: Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition- Monopoly - Monopolistic Competition - Oligopoly - Price - Output Determination - Pricing Methods and Strategies

Forms of Business Organizations - Sole Proprietorship - Partnership – Joint Stock Companies - Public Sector Enterprises - New Economic Environment - Economic Liberalization - Privatization – Globalization - Trade Blocks (SAARC,EU,NAFTA,BRICS)-EXIM Policy-International Economic Environment.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the structure of markets, features of different markets and forms of business organizations
- Apply the price output relationship in different markets
- Analyze the optimum output levels to maximize profit in different markets
- Evaluate price-output relationship to optimize cost, revenue and profit
- Interpret Pricing Methods and Strategies

Unit IV: CAPITAL AND CAPITAL BUDGETING

Concept of Capital - Significance **-** Types of Capital **-** Components of Working Capital - Sources of Short-term and Long-term Capital - Estimating Working capital requirements – Cash Budget - **Capital Budgeting** – Features of Capital Budgeting Proposals – Methods and Evaluation of Capital Budgeting Projects – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the concept of capital budgeting and its importance in business
- Contrast and compare different investment appraisal methods
- Analyze the process of selection of investment alternatives using different appraisal methods
- Evaluate methods of capital budgeting for investment decision making and for maximizing returns
- Design different investment appraisals and make wise investments

Unit V:INTRODUCTION TO FINANCIAL ACCOUNTING AND ANALYSIS

Accounting Concepts and Conventions - Introduction to Double-Entry Book Keeping, Journal, Ledger, Trial Balance - Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments).

Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability ratios-Du Pont Chart.

Learning Outcomes: After successful completion of this unit, the student will be able to:

- Know the concept, convention and significance of accounting
- Apply the fundamental knowledge of accounting while posting the journal entries
- Analyze the process and preparation of final accounts and financial ratios
- Evaluate the financial performance of an enterprise by using financial statements

Data Books Required: Present Value Factors table

TEXT BOOKS:

1. Varshney&Maheswari: "Managerial Economics", Sultan Chand, 2013.
2. Ahuja Hl "Managerial economics" 3rd edition, S. Chand, ,2013

REFERENCE BOOKS:

1. Aryasri: "Business Economics and Financial Analysis", 4th edition, MGH, 2019
2. S.A. Siddiqui and A.S. Siddiqui: "Managerial Economics and Financial Analysis", New Age International,. 2013.
3. Joseph G. Nellis and David Parker: "Principles of Business Economics", 2nd edition, Pearson, New Delhi.
4. Domnick Salvatore: "Managerial Economics in a Global Economy", Cengage, 2013.

COURSE OUTCOMES: After successful completion of the course, the students will be able to

1. Analyze fundamentals of Economics such as Demand, Elasticity & Forecasting methods CO2 To apply production, pricing & supply concepts for effective business administration (L4)
2. Identify the influence of various markets, the forms of business organization and its International Economic Environment (L1)
3. Analyze how to invest adequate amount of capital in order to get maximum return from selected business activity (L4)
4. Prepare and analyze accounting statements like income & expenditure statement, balance sheet apart from the fundamental knowledge, to understand financial performance of the business and to initiate the appropriate decisions to run the business profitably (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0504	3	0	0	3	CIA	30 M
Course Title	:	FORMAL LANGUAGES AND AUTOMATA THEORY					SEE	70 M

COURSE OBJECTIVES:-

The course aims to introduce the basic methods and conclusions of the Theory of Computation. At the end of the course, students learn to apply these methods to problems from different fields and be guided by the results in searching for computational solutions to the problems. The

Objectives are:

1. Understand formal definitions of machine models.
2. Classify machines by their power to recognize languages.
3. Understanding of formal grammars, analysis
4. Understanding of the logical limits to computational capacity
5. Understanding of un decidable problems

Unit I:

Automata: The methods and the Madness:

Importance of automata theory, Introduction to formal proof, additional forms of proof, Inductive proofs, the central concepts of automata theory

Finite Automata: An informal picture of finite automata, Deterministic finite automata, Nondeterministic finite automata, An application: Text Search, Finite automata with Epsilon- Transitions

Unit II:

Regular Expressions and Languages:

Regular Expressions, Finite Automata and Regular Expressions, Applications of Regular Expressions, algebra laws for Regular Expressions

Properties of Regular Languages:

Proving language not to be regular, closure properties of regular languages, Decisions properties of regular languages, Equivalences and minimizations of automata

Unit III:

Context Free Grammars:

Examples and definitions, more examples, Regular grammars, Derivations Trees and ambiguity, an unambiguous CFG for algebraic expressions, simplified forms and normal forms

Pushdown Automata:

Introduction by way of an example, the definitions of a pushdown automaton, deterministic pushdown automata, A PDA corresponding to a given context free grammar, a context free grammar corresponding to a Given PDA, Parsing

Unit IV:

Context Free and Non Context Free languages:

The Pumping lemma for context-free languages, Intersections and Complements of Context free languages, Decision problems Involving context free Languages

Turing Machines: Definitions and Examples, Computing a partial function with a Turing machine, combining turning machines, variations of Turing machines: Multitape TMs, Non deterministic Turing machines, universal turning machines, models of computation and the Church Turing Thesis

Recursively Enumerable Languages:

Recursively enumerable and recursive, enumerating a language, more general grammars, context sensitive languages and the Chomsky hierarchy, Not all languages are recursively enumerable

Unit V:

Unsolvable problems: A non recursive language and an unsolvable problem, reducing one problem to another: The Halting problem, other unsolvable problem involving TMs, Rice's theorems and more unsolvable problems, Post's correspondence problems, Unsolvable problems involving context free languages

Computable Functions:

Primitive Recursive Functions, Primitive Recursive predicates and some bounded operations, unbounded minimalization and μ-Recursive functions, Godel numbering, all Computable functions are μ-Recursive, Nonnumeric functions and other approaches to computability.

TEXT BOOKS:

1. "Introduction To Languages And The Theory of Computation", John C Martin, The McGraw-Hill Companies, Third Edition,2015.
2. "Introduction to Automata Theory, Languages, and Computation", John E.Hopcroft, Rajeev Motwani, Jeffery D. Ullman, PEARSON, Third Edition,2011.

REFERENCE BOOKS:

1. "Introduction to the theory of computation", Michael sipser, cengage learning, 3rd Edition
2. "Introduction to Automata Theory, Formal Languages and Computation", Shyamalendukandar, PEARSON.
3. "Theory of computer Science Automata, Languages and Computation", K.L.P. Mishra, N. Chandrasekaran, PHI, Third Edition.
4. "Formal Languages and Automata Theory", C.K. Nagpal, OXFORD.
5. "Fundamentals of the Theory of Computation, Principles and Practice", Raymond Greenlaw, H. James Hoover, MK(MORGAN KAUFMANN)
6. "Introduction to Formal Languages, Automata Theory and Computation", Kamala Krithivasan, Rama R, PEARSON.
7. "Theory of Computation", Vivek Kulkarni, OXFORD

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Construct finite state diagrams while solving problems of computer science
2. Find solutions to the problems using Turing machines
3. Design of new grammar and language

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0505T	3	0	0	3	CIA	30 M
Course Title	:	**OBJECT ORIENTED PROGRAMMING THROUGH JAVA**					SEE	70 M

COURSE OBJECTIVES:-

1. To introduce object oriented approach for problem solving
2. To enumerate classes, objects in JAVA Programming Language
3. To explain the basics of java Console and GUI based programming
4. To demonstrate creation of user interface
5. To expose to Network programming through JAVA

Unit I: Object Oriented Thinking and Java Basics:

The History and evolution of Java, An Overview of Java, Data types, Variables and Arrays, Operators and Control Statements.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Summarize the programming constructs of JAVA (L2)
- Select appropriate control structure in solving a problem (L4)

Unit II: Classes and Inheritance

Introducing classes, A Closer look at Methods and Classes.

Inheritance: Inheritance basics, using super, creating multilevel hierarchy, when constructors are executed, method overriding, Dynamic method dispatch, Using Abstract Classes, Using final with Inheritance, The object Class.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Illustrate various types of Inheritances (L4)
- Organize the solution to the problem using inheritance (L6)
- Organize data and methods in the form of a class (L6)

Unit III: Packages, Interface, Exceptions, Multithreading

Packages and Interfaces: Packages, Packages and Member Access, Importing Packages, Interfaces, Default interface methods, use static methods in an interface, private interface methods and final thoughts on packages and interfaces, Exception Handling and Multithreading.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Organize large programs in the form of packages (L6)
- Design error free Programs using exception handling mechanism (L6)
- Apply Multithreading for improved performance (L3)

Unit IV: Event Handling and AWT

Two Event handling mechanisms, Delegation Event Model, Event Classes, The key Event Class, Sources of Events, Event Listener Interfaces, Adapter Classes and Inner classes.

Introducing the AWT: working with windows, Graphics and Text, Using AWT Controls, Layout Managers and Menus.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Explain Event Handling Mechanism (L2)
- Build Graphical User Interface using AWT Components (L6)
- Select appropriate event during the execution of the program (L5)

Unit V: Applets and Swings

Applet: Types, Basics, Class, Architecture, Skeleton, Swing Applets

Swing: Introduction, Exploring swings, Introducing swing menus.

Learning Outcomes: After successful completion of this unit, the students will be able to

1. Design Applets for web applications (L6)
2. Develop Graphical User Interface using swing components (L3)

TEXT BOOKS:

1. Herbert Schildt, "Java the Complete Reference", 10^{th} Edition, TMH, 2018.

REFERENCE BOOKS:

1. An Introduction to Programming and OO Design using Java, J.Nino and F.A. Hosch, John wiley& Sons.
2. Understanding OOP with Java Updated Edition, T. Budd, Pearson Education.
3. Joel Murac, "Java Programming", 5th Edition, SPD Publishers, 2017.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Apply object orientation in solving the problem (L3)
2. Select Java programming construct in solving to real world problems (L3)
3. Design Web based Programming using Applets and GUI Components (L6)
4. Develop reliable programs (L3)
5. Divide a large program into packages and classes (L4)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0506	3	0	0	3	CIA	30 M
Course Title	:	OPERATING SYSTEMS					SEE	70 M

COURSE OBJECTIVES:-

1. Provide knowledge about the services rendered by operating systems
2. Present detail discussion on processes, threads and scheduling algorithms.
3. Discuss various file-system design and implementation issues
4. Provide good insight on various memory management techniques
5. Expose the students with different techniques of handling deadlocks
6. Familiarize students with the basics of Linux operating system and perform administrative tasks on Linux servers
7. Discuss how protection domains help to achieve security in a system

Unit I:

Operating Systems Overview: Operating system functions, Operating system structure, Operating systems operations, protection and security, Computing environments, Open-Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, operating system structure, operating system debugging, System Boot.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Recognize operating system structure and functions(L2)
- Recognize operating system services(L2)
- Identify different system calls(L2)

Unit II:

Process Concept: Process scheduling, Operations on processes, Inter-process communication, Communication in client server systems.

Multithreaded Programming: Multithreading models, Thread libraries, Threading issues, Examples.

Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples.

Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Differentiate between preemptive, non-preemptive and real time CPU scheduling (L4)
- Identify how to achieve mutual exclusion in uniprocessor systems (L2)
- Outline Classical IPC Problems(L4)

Unit III:

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples.
Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Examine the ability to implement various memory management techniques (L4)
- Illustrate various demand paging techniques. (L4)
- Summarize Page replacement techniques and allocation of frames(L2)

Unit IV:

Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection And recovery, Deadlock avoidance, Deadlock prevention.
File Systems: Files, Directories, File system implementation, management and optimization.
Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Examine file systems in various operating systems (L4)
- Analyze different disk scheduling algorithms (L4)
- Investigate Deadlocks (L4)

Unit V:

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.
System Security: Introduction, Program threats, System and network threats, Cryptography for security, User authentication, implementing security defenses, firewalling to protect systems and networks, Computer security classification.
Case Studies: Linux, Microsoft Windows.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Infer various schemes available for achieving system protection(L4)
- Implement various schemes available for achieving system security(L3)
- Outline protection and security in Linux and Microsoft Windows.(L1)

TEXT BOOKS:

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2013.
2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008. (forInterprocess Communication and File systems.)

REFERENCE BOOKS:

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.

3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
4. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Recognize how applications interact with the operating system (L2)
2. Analyze the functioning of a kernel in an OS (L4)
3. Summarize resource management in operating systems (L2)
4. Examine concurrency in Operating Systems (L4)
5. Select memory management techniques in operating systems(L2)
6. Compare file system interfaces for various operating systems (L2)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0507	3	0	0	3	CIA	30 M
Course Title	:	SOFTWARE ENGINEERING					SEE	70 M

COURSE OBJECTIVES:-

1. To teach the basic concepts of software engineering and life cycle models
2. To explore the issues in software requirements specification and enable students to write SRS documents for software development problems
3. To elucidate the basic concepts of software design and enable students to carry out procedural design of software development problems
4. To teach the basic concepts of black box and white box software testing and enable students to design test cases for unit, integration, and system testing
5. To reveal the basic concepts in software project management

Unit I: Basic concepts in software engineering and software project management

Basic concepts: abstraction versus decomposition, evolution of software engineering techniques, Software development life cycle (SDLC) models: Iterative waterfall model, Prototype model, Evolutionary model, Spiral model, RAD model, Agile models, software project management: project planning, project estimation, COCOMO, Halstead's Software Science, project scheduling, staffing, Organization and team structure, risk management, configuration management.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Recognize the basic issues in commercial software development (L2)
- Summarize software lifecycle models (L2)
- Infer Workout project cost estimates using COCOMO and schedules using PERT and GANTT charts (L4)

Unit II: Requirements analysis and specification

Requirements gathering and analysis, software requirements specification, Traceability, Characteristics of a Good SRS Document, IEEE 830 guidelines, Representing complex requirements using decision tables and decision trees, overview of formal system development techniques. axiomatic specification, algebraic specification.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Identify basic issues in software requirements analysis and specification (L4)
- Develop SRS document for sample problems using IEEE 830 format (L3)
- Develop algebraic and axiomatic specifications for simple problems (L3)

Unit III: Software Design

Good Software Design, Cohesion and coupling, Control Hierarchy: Layering, Control Abstraction, Depth and width, Fan-out, Fan-in, Software design approaches, object oriented vs. function oriented design. Overview of SA/SD methodology, structured analysis, Data flow diagram, Extending DFD technique to real life systems, Structured design, Detailed design, Design review, Characteristics of a good user interface, User Guidance and Online Help, Mode-based Vs Mode-less Interface, Types of user interfaces, Component-based GUI development, User interface design methodology: GUI design methodology, Task and object modeling, Selecting a metaphor, Interaction design and rough layout, User interface inspection.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Identify the basic issues in software design (L4)
- Apply the structured analysis and structured design (SA/SD) technique (L3)
- Recognize the basic issues in user interface design (L2)

Unit IV: Coding and Testing

Coding standards and guidelines, code review, software documentation, unit testing, black-box testing, white-box testing, debugging, integration testing, system testing, performance testing, regression testing.

Learning Outcomes: After successful completion of this unit, the students will be able to

- Identify the basic issues in coding practice (L4)
- Recognize the basic issues in software testing (L2)
- Design test cases for black box and white box testing (L6)

Unit V: Software quality, reliability, and other issues

Software reliability, Statistical testing, Software quality and management, ISO 9000, SEI capability maturity model (CMM), Personal software process (PSP), Six sigma, Software quality metrics, CASE and its scope, CASE environment, CASE support in software life cycle, Characteristics of software maintenance, Software reverse engineering, Software maintenance processes model, Estimation maintenance cost. Basics issues in any reuse program, Reuse approach, Reuse at organization level

Learning Outcomes: After successful completion of this unit, the students will be able to

- Summarize various methods of software quality management (L2).
- Instruct the quality management standards ISO 9001, SEI CMM, PSP, and Six Sigma (L3)
- Outline software quality assurance, quality measures, and quality control (L4)
- Identify the basic issues in software maintenance, CASE support, and software reuse (L4)

TEXT BOOKS:

1. Rajib Mall, “Fundamentals of Software Engineering”, 5th Edition, PHI, 2018.

REFERENCE BOOKS:

1. JalotePankaj, “An integrated approach to Software Engineering”, Narosa.
2. Pressman R, “Software Engineering- Practioner Approach”, McGraw Hill.
3. Somerville, “Software Engineering”, Pearson.
4. Richard Fairley, “Software Engineering Concepts”, Tata McGraw Hill.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Teach basic software life cycle activities (L3)
2. Design software requirements specification for given problems (L6).
3. Implement structure analysis and design for given problems (L3)
4. Design test cases for given problems (L6)
5. Apply quality management concepts at the application level (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0509	3	0	0	3	CIA	30 M
Course Title	:	STATISTICAL ANALYSIS USING R					SEE	70 M

COURSE OBJECTIVES:-

1. Understanding and being able to use basic programming concepts
2. Automate data analysis
3. Working collaboratively and openly on code
4. Knowing how to generate dynamic documents
5. Being able to use a continuous test-driven development approach Course Outcomes:
6. Be able to use and program in the programming language R
7. Be able to use R to solve statistical problems
8. Be able to implement and describe Monte Carlo the technology
9. Be able to minimize and maximize functions using R

Unit I:

Introduction: Overview of R, R data types and objects, reading and writing data, sub setting R Objects, Essentials of the R Language, Installing R, Running R, Packages in R, Calculations, Complex numbers in R, Rounding, Arithmetic, Modulo and integer quotients, Variable names and assignment, Operators, Integers, Factors, Logical operations

Unit II:

Control structures, functions, scoping rules, dates and times, Introduction to Functions, preview of Some Important R Data Structures, Vectors, Character Strings, Matrices, Lists, Data Frames, Classes Vectors: Generating sequences, Vectors and subscripts, Extracting elements of a vector using subscripts, Working with logical subscripts, Scalars, Vectors, Arrays, and Matrices, Adding and Deleting Vector Elements, Obtaining the Length of a Vector, Matrices and Arrays as Vectors Vector Arithmetic and Logical Operations, Vector Indexing, Common Vector Operations

Unit III:

Lists: Creating Lists, General List Operations, List Indexing Adding and Deleting List Elements, Getting the Size of a List, Extended Example: Text Concordance Accessing List Components and Values Applying Functions to Lists, DATA FRAMES, Creating Data Frames, Accessing Data Frames, Other Matrix-Like Operations

Unit IV:

FACTORS AND TABLES, Factors and Levels, Common Functions Used with Factors, Working with Tables, Matrix/Array-Like Operations on Tables , Extracting a Subtable, R16 B.TECH IT Finding the Largest Cells in a Table, Math Functions, Calculating a Probability, Cumulative Sums and Products, Minima and Maxima, Calculus, Functions for Statistical Distributions

Unit V:

OBJECT-ORIENTED PROGRAMMING: S Classes, S Generic Functions, Writing S Classes, Using Inheritance, S Classes, Writing S Classes, Implementing a Generic Function on an S Class, visualization, Simulation, code profiling, Statistical Analysis with R, data manipulation

TEXT BOOKS:

1. R Programming for Data Science by Roger D. Peng
2. The Art of R Programming by Prashanthsingh, VivekMourya, Cengage Learning India.

REFERENCE BOOKS:

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Understand the relation between the fields Statistics and Databases (L2)
2. Apply statistical techniques on data (L3)
3. Summarize and graph data (L2)
4. Build Hypotheses tests (L6)
5. Assess Goodness-of-fit (L5)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to III Semester CE& ME and IV Semester CSE& ECE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9903	3	0	0	0	CIA	30 M
Course Title	:	BIOLOGY FOR ENGINEERS					SEE	--

COURSE OBJECTIVES:-

- ToprovidebasicunderstandingaboutlifeandlifeProcess. Animalanplant systems.Tounderstandwhatbimolecules, are,theirstructuresarefunctions.Applicationof certainbimoleculesinIndustry.
- Briefintroductionabouthumanphysiologyandbioengineering.
- Tounderstandhereditaryunits,i.e.DNA(genes)andRNAandtheirsynthesisinliving organism.
- HowbiologyPrinciplescanbe appliedinourdailylifeusingdifferenttechnologies.
- Briefintroductiontotheproductionoftransgenicmicrobes,Plantsandanimals.

Unit I: IntroductiontoBasicBiology

CellasBasicunitoflife,celltheory, Cellshapes, Cellstructure, Cellcycle.Chromosomes. Prokaryotic andeukaryoticCell.PlantCell,AnimalCell,PlanttissuesandAnimaltissues,Brief introductiontofivekingdomsofclassification.

Learning Outcomes: Aftercompletingthisunit, thestudentwillbeableto

- Summarizethebasisoflife.(L1)
- Understandthedifferencebetweenlowerorganisms(prokaryotes)fromhigherorganisms (eukaryotes).(L2)
- Understandhoworganismsareclassified.(L3)

Unit II: IntroductiontoBiomolecules

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Learning Outcomes: Aftercompletingthisunit, thestudentwillbeableto

- Understandwhatarebiomolecules?theirroleinlivingcells,theirstructure,functionand howtheyareproduced.(L1)
- Interpretthe relationshipbetweenthestructureandfunctionofnucleic acids.(L2)
- Summarizetheapplicationsofenzymesinindustry.(L3)
- Understandwhatisfermentationandits applicationsoffermentationinindustry.(L4)

Unit III: HumanPhysiology

Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

Learning Outcomes: Aftercompletingthisunit,thestudentwillbeableto

- Understandwhatnutrientsare(L1)
- Understandthemechanismandprocessofimportanthumanfunctions(L2&L3)

Unit IV: IntroductiontoMolecularBiologyandrecombinantDNATechnology

Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. rDNA technology. Introduction to gene cloning.

Learning Outcomes: Aftercompletingthisunit,thestudentwillbeableto

- Understand and explain about gene structure and replication in prokaryotes and Eukaryotes (L1)
- How genetic material is replicated and also understands how RNA and proteins are synthesized. (L2)
- Understand about recombinant DNA technology and its application in different fields.(L3)
- Explain what is cloning. (L4)

Unit V: ApplicationofBiology

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

Learning Outcomes: AftercompletingthisunitthestudentwillbeabletoUnderstand.

- Howbiologyis appliedforproductionof usefullproductsformankind.(L1)
- Whatarebiosensors,biochipsetc.(L2)
- Understandtransgenicplantsandanimalsandtheirproduction(L3)

TEXT BOOKS:

1. P.K.Gupta,CellandMolecularBiology,5thEdition,RastogiPublications–
2. U.Satyanarayana.Biotechnology,Books&AlliedLtd2017

REFERENCE BOOKS:

1. N.A.Campbell, J.B.Reece, L.Urry, M.L.CainandS.A.Wasserman,“Biology:AGlobalApproach”,PearsonEducation Ltd,2018.
2. TJohnson,BiologyforEngineers,CRCpress,2011
3. J.M.WalkerandE.B.Gingold, MolecularBiologyandBiotechnology2nded..PanimaPublications.PP434.
4. DavidHames,InstantNotesin Biochemistry–2016
5. PhilTunner,A.Mctennan,A. Bates &M.White,InstantNotes–MolecularBiology– 2014

COURSE OUTCOMES: After successful completion of the course, the students will be able to:

1. Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
2. Explain about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.
3. Briefly about human physiology.
4. Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
5. Know about application of biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes, plants and animals.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0505P	0	0	3	1.5	CIA	30 M
Course Title	:	OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB					SEE	70 M

COURSE OBJECTIVES:-

1. To introduce the concepts of JAVA.
2. To demonstrate the concepts using simple JAVA programs
3. To illustrate building of real-time JAVA programs

List of Experiments:

1. Write a JAVA program to display the size of primitive data types of JAVA
2. Write JAVA programs to illustrate the concepts
   - Constructor overloading
   - Method overloading
   - Different types of Inheritance
   - Interfaces
   - Exception handling: built-in, User-defined
   - Static and Dynamic Polymorphism
   - Multithreading
   - Applets
   - AWT
   - Swings
   - Keyboard and Mouse events
3. Display digital and analog clock using Applets
4. Objective test:

   Number of users will write a test from different clients. The question paper is stored in the server. Use multithreading and assume different machines. The question paper is for a maximum of 100 marks. The question paper consists of three sections for 20, 30 and 50 marks respectively. The duration of the examination is 100 minutes. At a point of time the user may answer questions from any section. The questions can be multiple choice with single or multiple answers, and True/False type. The questions are to be displayed on the left side and the status of questions answered/not-interested/marked for answering are displayed on the other side. Initially all questions are in Not-answered state. If the user answers a question and goes to the next question, then the answer is saved automatically. The user is supposed to submit the answers at the end by pressing submit button. On-time out all answered questions are automatically saved. The keyboard must be disabled during the exam time as soon as user enters his credentials.

   Write JAVA program for the above problem.
5. A College Website has to collect some credentials from students. The credentials are username, password, Account number, Bank IFCS code, and AAdhar number. Except username and Bank IFCS code, the other things should not be displayed in plain text form. For security reasons the physical keyboard is disabled. Design a virtual keyboard for the same.
6. Design a virtual keyboard. Design a simple calculator which performs basic numerical operations.

7. Spatial Attention span test: Design a 3x3 block. A '*' symbol is displayed randomly in nine blocks with 'p' seconds time interval. P is not constant and the user should be able to configure it. The user should watch the display of stars in nine blocks and answer the sequence of blocks in which '*' is displayed. The system should evaluate the answer.
8. Java program for solving the producer and consumer problem.
9. Design a simple car game which allows a line-drawn car to be controlled with the arrow buttons of the keyboard. The car should move along the path displayed. If the car goes out of the path, the car has to be moved to the shed.
10. E-Voting: Assume 'n' number of candidates are contesting the elections and each is given a symbol. When the user presses a button next to his symbol, the number of votes he got should be incremented and also a receipt has to be generated for the same. Assume NOTA. At the end, count the number of votes and display the winner.

REFERENCE BOOKS:

1. Joshua Bloch, "Effective JAVA", 2nd Edition, Pearson, 2016.
2. Robert C. Martin, "Clean Code: A Handbook of Agile Software Craftsmanship", 1st edition, Prentice Hall, 2008.
3. Craig Walls, "Spring in Action", 4th edition, Dreamtech Press, 2015.
4. Scott Oaks, "Java Performance: The Definitive Guide", 1st edition, O'Reilly, 2014

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Recognize the JAVA programming environment (L1)
2. Develop efficient programs using multithreading (L6)
3. Design reliable programs using JAVA exception handling features (L6)
4. Extend the programming functionality supported by JAVA (L3)
5. Select appropriate programming construct to solve a problem (L5)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0508	0	0	3	1.5	CIA	30 M
Course Title	:	**OPERATING SYSTEMS & SOFTWARE ENGINEERING LAB**					SEE	70 M

PART-A : OPERATING SYSTEMS

COURSE OBJECTIVES:-

1. To familiarize students with the architecture of OS.
2. To provide necessary skills for developing and debugging CPU Scheduling algorithms.
3. To elucidate the process management and scheduling and memory management.
4. To explain the working of an OS as a resource manager, file system manager, process manager, memory manager, and page replacement tool.
5. To provide insights into system calls, file systems and deadlock handling.

List of Experiments:

1. Simulate the following CPU scheduling algorithms
   a. (a) Round Robin (b) SJF (c) FCFS (d) Priority
2. Simulate all file allocation strategies
   a. (a) Sequential (b) Indexed (c) Linked
3. Simulate MVT and MFT
4. Simulate all File Organization Techniques
   a. (a) Single level directory (b) Two level (c) Hierarchical (d) DAG
5. Simulate Bankers Algorithm for Dead Lock Avoidance
6. Simulate Bankers Algorithm for Dead Lock Prevention
7. Simulate all page replacement algorithms
   a. (a) FIFO (b) LRU (c) LFU Etc. …
8. Simulate Paging Technique of memory management
9. Control the number of ports opened by the operating system with
   a. (a) Semaphore (b) monitors
10. Simulate how parent and child processes use shared memory and address space
11. Simulate sleeping barber problem
12. Simulate dining philosopher's problem
13. Simulate producer and consumer problem using threads (use java)
14. Assume there are five jobs with different weights with values ranging between 1 and 5. Implement round robin algorithm with time slice equivalent to weight.
15. Implement priority scheduling algorithm. While executing, no process should wait for more than 10sec. If waiting time is more than 10sec, that process has to executed for at least 1sec before waiting again.
16. Implement dynamic priority scheduling algorithm.

REFERENCE BOOKS:

1. "Operating System Concepts", Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth Edition, John Wiley.
2. "Operating Systems: Internals and Design Principles", Stallings, Sixth Edition–2009, Pearson Education
3. "Modern Operating Systems", Andrew S Tanenbaum, Second Edition, PHI.

4. "Operating Systems", S.Haldar, A.A.Aravind, Pearson Education.
5. "Principles of Operating Systems", B.L.Stuart, Cengage learning, India Edition 2013-2014
6. "Operating Systems", A.S.Godbole, Second Edition, TMH.
7. "An Introduction to Operating Systems", P.C.P. Bhatt, PHI

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. Trace different CPU Scheduling algorithm (L2).
2. Implement Bankers Algorithms to Avoid and prevent the Dead Lock (L3).
3. Evaluate Page replacement algorithms (L5).
4. Illustrate the file organization techniques (L4).
5. Illustrate shared memory process (L4).
6. Design new scheduling algorithms (L6)

PART-B : SOFTWARE ENGINEERING

Choose any one project

1) Student Result Management System
2) Library management system
3) Inventory control system
4) Accounting system
5) Fast food billing system
6) Bank loan system
7) Blood bank system
8) Railway reservation system
9) Automatic teller machine
10) Video library management system
11) Hotel management system
12) Hostel management system
13) E-ticketing
14) Share online trading

Do the following tasks for that project

1) Write the complete problem statement
2) Write the software requirement specification document
3) Draw the entity relationship diagram
4) Draw the data flow diagrams at level 0 and level 1
5) Draw use case diagram
6) Draw activity diagram of all use cases.
7) Draw state chart diagram of all use cases
8) Draw sequence diagram of all use cases
9) Draw collaboration diagram of all use cases
10) Assign objects in sequence diagram to classes and make class diagram.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0510	0	0	2	1	CIA	30 M
Course Title	:	R PROGRAMMING LAB					SEE	70 M

COURSE OVERVIEW:

- Understand the fundamentals of 'R' programming
- Learn how to carry out a range of commonly used statistical methods including analysis of variance and linear regression.
- Explore data-sets to create testable hypotheses and identify appropriate statistical tests.

List of Experiments:

TASK-1 R BASIC PROGRAMS

1. R Multiplication Table
2. R Program to Check Prime Number
3. R Program to check Armstrong Number
4. R Program to Print the Fibonacci Sequence
5. R Program to Check for Leap Year
6. Check if a Number is Odd or Even in R Programming
7. R Program to Check if a Number is Positive, Negative or Zero
8. R Program to Find the Sum of Natural Numbers
9. Convert Decimal into Binary using Recursion in R
10. R program to Find the Factorial of a Number Using Recursion
11. R Program to Find the Factors of a Number
12. Fibonacci Sequence Using Recursion in R
13. R Program to Find H.C.F. or G.C.D.
14. R Program to Find L.C.M.
15. R Program to Make a Simple Calculator
16. Sum of Natural Numbers Using Recursion

TASK-2

1. Creating Vectors and sequences numbers
2. Importing Tabular data,
3. Simple summaries of categorical and continuous data.
4. Manipulating data frames and lists.
5. Writing functions in R using If/else statements.

TASK-3 A COMMON DATA CLEANING TASK

1. Write a Program on For/while loops.
2. Write a Program on Using apply() to iterate over data.
3. Write a Program on Using with() to specify environment.
4. Multivariate statistical summaries using plyr
5. Program using ggplot2 graphics

TASK-4 STATISTICAL TESTS AND MODELS

1. Write a Program on Testing for differences in means between two groups
2. Write a Program on QQ plots
3. Write a Program on Tests for 2x2 tables
4. Write a Program on Plotting confidence intervals
5. Write a Program and calculate ANOVA
6. Write a Program on Linear regression
7. Write a Program on Assessing multicollinearity
8. Write a Program on Diagnosing and interpreting regression

TASK-5 LINEAR REGRESSION

1. Write a Program on Interpreting categorical variables in regression
2. Write a Program on Interaction terms in regression

TASK-6 LOGISTIC REGRESSION

1. Program on Logstic regression

TEXT BOOKS:

1. "Beginning R the statistical programming language" Dr. Mark Gardener, Wiley Publications, 2015.

REFERENCE BOOKS:

1. Hands-On Programming with R Paperback by Grolemund (Author), Garrett (Author), SPD, 2014.
2. The R Book, Michael J. Crawley, WILEY, 2012.

COURSE OUTCOMES: After successful completion of this course, the students will be able to:

1. List motivation for learning a programming language
2. Access online resources for R and import new function packages into the R workspace
3. Import, review, manipulate and summarize data-sets in R
4. Explore data-sets to create testable hypotheses and identify appropriate statistical tests
5. Perform appropriate statistical tests using R
6. Create and edit visualizations with R

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0511T	2	0	0	2	CIA	30 M
Course Title	:	Object-Oriented Analysis, Design & Testing					SEE	70 M

Course Objectives:

This course is designed to:

- Understand the basic concepts of object-oriented techniques
- Build the Model of the software system using UML diagrams
- Elucidate design patterns as templates for good design
- Learn the object-oriented methodology in software design
- Explore testing techniques for object-oriented software

Unit – 1: Basic concepts

Basic concepts: objects, classes, abstract classes, data types, ADT, encapsulation and information hiding, inheritance, association, aggregation, composition, polymorphism, dynamic binding, object-oriented principles.

Learning Outcomes: At the end of the unit, students will be able to:

- Recognize basic issues of object-orientation (L2)
- Identify class relations from problem statements (L4)
- Construct basic principles of object-orientation (L6)

Unit – 2: Modelling Using UML

UML Diagrams: Use case diagrams, class diagrams, various relationships among classes: generalization, association, aggregation, composition, inheritance, dependency etc., object diagram, UML packages, activity diagram, state machine diagram, sequence diagram, communication diagram, interaction overview diagram, component diagram, deployment diagram, UML 2 diagrams.

Learning outcomes: At the end of the unit, students will be able to:

- Describe the basic syntax and semantics of UML (L2)
- Develop modeling of the user's view using use case diagrams (L3)
- Design class diagram and object-diagrams (L6)
- Summarize behavioral modeling of a given problem using sequence diagram, collaboration diagram, and state chart diagram (L2)

Unit – 3: Design Patterns

Basic pattern concepts, Types of patterns, some common design patterns such as Expert, Creator, Façade, MVS, MVC, Publish-Subscribe, Observer, Proxy etc.

Learning outcomes

- At the end of the unit, students will be able to:
- Identify the basic issues in reusable design (L4)
- Recognize the basic design patterns (L2)

Unit – 4: Designing using UML

Overview of OOAD methodology, Use case model development, Domain modelling, Identification of entity objects, Brooch's object identification method, Interaction modelling, CRC cards, Applications of the analysis and design process, object-oriented design principles. OOD goodness criteria, CK Metrics, LK Metrics, MOOD Metrics, Code Refactoring

Learning outcomes:

At the end of the unit, students will be able to:

- Interpret domain modeling (L2)
- Develop sequence diagram for any given use case (L3)
- Design class diagram for a given problem (L6)

Unit – 5 : Testing Object Oriented Software

Challenges in testing object-oriented software, Implications of object-oriented Features in testing object-oriented software, Importance of grey-box testing of object-oriented software, Coverage analysis, State-based testing, Class testing, Fault-Based Testing, Scenario-Based Test Design, Integration Testing: Thread-based integration Strategies, Use-based integration Strategies, Cluster Testing, Validation Testing, System Testing, Testing tools.

Learning outcomes:

- At the end of the unit, students will be able to:
- Design unit test cases (L6)
- Design integration test cases (L6)
- Select appropriate tool to carry out testing (L2)

Course outcomes:

Upon completion of the course, the students should be able to:

- Analyze the problem from object oriented perspective (L4)
- Model complex systems using UML Diagrams (L3)
- Choose the suitable design patterns in software design (L5)
- Adapt Object-Oriented Design Principles (L6)
- Identify the challenges in testing object-oriented software. (L3)

Text Book:

1. Rajib Mall, “Fundamentals of Software Engineering”, 5th Edition, PHI, 2018

Reference Books:

1. Rumbaugh and Blaha, Object-oriented Modeling and design with UML, Pearson, 2007
2. Bernd Bruegge and, Allen H. Dutoit, Object-Oriented Software Engineering Using UML, Patterns, and Java, Pearson, 2009

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0512T	3	0	0	3	CIA	30 M
Course Title	:	Artificial Intelligence					SEE	70 M

Course Objectives:

Thiscourseisdesignedto:

- DefineArtificialIntelligenceand establishtheculturalbackground for study
- Understandvariouslearningalgorithms
- Explorethesearchingandoptimizationtechniques forproblemsolving
- ProvidebasicknowledgeonNaturalLanguageProcessingandRobotics

Unit–I:**Introduction**:WhatisAI,FoundationsofAI,HistoryofAI,TheStateofArt.

Intelligent Agents: Agents and Environments, Good Behaviour: The Concept of Rationality,The NatureofEnvironments,TheStructureofAgents.

LearningOutcomes:

At theend oftheunit,studentswill beable to:

- RecognizetheimportanceofArtificialIntelligence(L1)
- Identifyhowintelligentagentisrelatedtoitsenvironment(L2)
- BuildanIntelligentagent(L3)

Unit–II:**SolvingProblemsbysearching**:Problem SolvingAgents,Exampleproblems,Searching for Solutions, Uninformed Search Strategies, Informed search strategies, HeuristicFunctions, Beyond Classical Search: Local Search Algorithms and Optimization Problems, LocalSearch in Continues Spaces, Searching with Nondeterministic Actions, Searching with partialobservations,onlinesearchagents andunknownenvironments.

LearningOutcomes:

At theend oftheunit,studentswill beable to:

- Explainhowanagentcanformulateanappropriateviewoftheproblemitfaces.(L2)
- Solvetheproblemsbysystematicallygeneratingnewstates(L2)
- Derivenewrepresentationsabouttheworldusingprocessofinference(L5)

Unit – III: Reinforcement Learning: Introduction, Passive Reinforcement Learning, Active Reinforcement Learning, Generalization in Reinforcement Learning, Policy Search, applications of RL

Natural Language Processing: Language Models, Text Classification, Information Retrieval, Information Extraction.

LearningOutcomes:

At theend oftheunit,studentswill beable to:

- Examinehowanagentcanlearnfromsuccessandfailure,rewardandpunishment.(L5)

- Develop programs that make queries to a database, extract information from texts, andretrieverelevantdocuments fromacollectionusingNaturalLanguageProcessing. (L6)

Unit-IV:**NaturalLanguageforCommunication**:Phrasestructuregrammars,SyntacticAnalysis,Augmented GrammarsandsemanticInterpretation,MachineTranslation,SpeechRecognition

Perception:ImageFormation,EarlyImageProcessingOperations,ObjectRecognitionbyappearance, Reconstructing the 3D World,Object Recognition from Structural information,UsingVision.

LearningOutcomes:

At the endof the unit,studentswillbeable to:

- Developprogramsthat translatefromonelanguageto another,or recognize spokenwords.(L6)
- Explainthetechniquesthatproviderobust objectrecognitioninrestrictedcontext.(L2)

Unit-V:Robotics:Introduction,RobotHardware,RoboticPerception,Planningtomove,planninguncertainmovements, Moving, Roboticsoftwarearchitectures, applicationdomains

Philosophical foundations: Weak AI, Strong AI, Ethics and Risks of AI, Agent Components,AgentArchitectures,Arewegoingintherightdirection,WhatifAIdoessucceed.

LearningOutcomes:

At theend oftheunit,studentswill beable to:

- ExplaintheroleofRobotinvariousapplications.(L2)
- Listthemainphilosophicalissues inAI. (L1)

Courseoutcomes:

Uponcompletionofthecourse,the students shouldbe able to:

- Applysearchingtechniques for solvingaproblem(L3)
- DesignIntelligentAgents(L6)
- DevelopNaturalLanguageInterfacefor Machines (L6)
- Designminirobots(L6)
- Summarizepast,presentandfutureofArtificialIntelligence(L5)

Textbook:

1.Stuart J.Russell, Peter Norvig, “Artificial Intelligence A Modern Approach”, 3rd Edition,PearsonEducation,2019.

References:

1. Nilsson, Nils J., and Nils Johan Nilsson. Artificial intelligence: a new synthesis. MorganKaufmann,1998.
2. Johnson,BennyG.,FredPhillips,andLindaG.Chase."Anintelligenttutoringsystemforthe accounting cycle: Enhancing textbook homework with artificial intelligence." JournalofAccountingEducation27.1(2009):30-39.

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(V Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0513	3	0	0	3	CIA	30 M
Course Title	:	Design and Analysis of Algorithms					SEE	70 M

Course Objectives:

Thiscourseisdesignedto:

- UnderstandthebasicconceptsofComputerNetworks.
- Introducethelayered approach fordesignofcomputernetworks
- FamiliarizewiththeapplicationsofInternet
- ExplorethenetworkprotocolsusedinInternetenvironment
- Explaintheformat ofheadersofIP,TCPand UDP
- Elucidatethedesignissues foracomputernetwork

UNIT I

Introduction: Algorithm, Algorithm specification, Performance analysis.

Divide and Conquer: General method, Binary Search, Finding the maximum and minimum,Merge sort, Quick Sort, Selection, Strassen's matrix multiplication.

At the end of the unit, students will be able to:

- Understand growth functions and Asymptotic notations
- Derive the recurrence equation for running time of a given algorithm and solve.
- Understand the general principle of Divide and Conquer and identify suitable problems toapply Divide and Conquer paradigm
- Analyze the time complexities of Binary Search, Finding the maximum and minimum,and Strassen's matrix multiplication algorithms.
- Compare complexities of Merge sort, Quick sort and Selection sort techniques

UNIT II

Greedy Method: General method, Knapsack problem, Job Scheduling with Deadlines, Minimumcost Spanning Trees, Optimal storage on tapes, Single-source shortest paths.

Dynamic programming: General Method, Multistage graphs, All-pairs shortest paths, Optimalbinary search trees, 0/1 knapsack, the traveling salesperson problem.

At the end of the unit, students will be able to:

- Understand optimization problems and the general principles of Greedy and Dynamic
- Programming paradigms to solve them.
- Apply subset and ordering paradigms of greedy strategy for Knapsack problem, Job
- Scheduling with Deadlines, Minimum cost Spanning Trees, Optimal storage on tapes,
- and finding Single-source shortest paths.
- Define Principle of optimality with examples.
- Differentiate Greedy and Dynamic programming paradigms.
- Apply dynamic programming strategy for Optimal binary search trees, Multistage graphs,
- All-pairs shortest paths, 0/1 knapsack, the traveling salesperson problem.

UNIT III

Basic Traversal and Search Techniques: Techniques for binary trees, Techniques for Graphs,Connected components and Spanning trees, Bi-connected components and DFS.

Back tracking: General Method, 8 – queens problem, Sum of subsets problem, Graph coloringand Hamiltonian cycles, Knapsack Problem.

At the end of the unit, students will be able to:

- Define solution space tree.
- Illustrate graph search strategies : BFS, DFS and D-Search .
- Determine articulation points and bi-connected components in a given graph using Depth
- First Spanning Trees.
- Demonstrate the recursive and iterative backtracking algorithms.
- Apply backtracking strategy to solve N – queens problem, Sum of subsets problem and
- Knapsack problem.
- Apply backtracking to solve m-colorability optimization problem.
- Determine all possible Hamiltonian Cycles in a graph using backtracking algorithm.

UNIT IV

Branch and Bound: The method, Travelling salesperson, 0/1 Knapsack problem, Efficiencyconsiderations.

Lower Bound Theory: Comparison trees, Lower bounds through reductions – Multiplyingtriangular matrices, inverting a lower triangular matrix, computing the transitive closure.

At the end of the unit, students will be able to:

- Illustrate the state space search techniques; FIFO, LIFO and LC.
- Analyze the advantage of bounding functions in Branch and Bound technique to solve the
- Travelling Salesperson problem.
- Compare the LC and FIFO branch and bound solutions for 0/1 knapsack problem.
- Understand lower bound theory concept in solving algebraic problems.

UNIT V

NP – Hard and NP – Complete Problems: NP Hardness, NP Completeness, Consequences ofbeing in P, Cook‘s Theorem, Reduction Source Problems, Reductions: Reductions for someknown problems.

At the end of the unit, students will be able to:

- Differentiate deterministic and Non-deterministic algorithms.
- Define P, NP, NP –hard and NP-complete classes of problems.
- Understand the satisfiability problem.
- State Cook’s Theorem.
- Understand the reduction techniques.

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Course Outcomes

- Determine the time complexity of an algorithm by solving the corresponding recurrenceequation
- Apply the Divide and Conquer strategy to solve searching, sorting and matrixmultiplication problems.

- Analyze the efficiency of Greedy and Dynamic Programming design techniques to solvethe optimization problems.
- Apply Backtracking technique for solving constraint satisfaction problems.
- Analyze the LC and FIFO branch and bound solutions for optimization problems, andcompare the time complexities with Dynamic Programming techniques.
- Define and Classify deterministic and Non-deterministic algorithms; P, NP, NP –hardand NP-complete classes of problems.

Text Books

1. Ellis Horowitz, SartajSahni and Rajasekaran, “Fundamentals of Computer Algorithms”,2nd Edition, 2012, University Press.

2. ParagHimanshu Dave and HimanshuBhalchandra Dave, “Design and Analysis ofAlgorithms”, Second Edition, Pearson Education.

References

1. Anany Levitin, “Introduction to the Design and Analysis of Algorithms”, Third Edition,Pearson Education, 2012.

2. Thomas H.Cormen, Charles E.Leiserson, Ronald L. Rivest and Clifford Stein,“Introduction to Algorithms”, Third Edition, PHI Learning Private Limited, 2012.

3. Alfred V. Aho, John E. Hopcroft and Jeffrey D. Ullman, “Data Structures andAlgorithms”, Pearson Education, Reprint 2006.

4. Donald E. Knuth, “The Art of Computer Programming”, Volumes 1& 3 PearsonEducation, 2009.
Steven S. Skiena, “The Algorithm Design Manual”, Second Edition,Springer, 2008.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0514T	3	0	0	3	CIA	30 M
Course Title	:	Computer Networks					SEE	70 M

Course Objectives:

This course is designed to:

- Understand the basic concepts of Computer Networks.
- Introduce the layered approach for design of computer networks
- Familiarize with the applications of Internet
- Explore the network protocols used in Internet environment
- Explain the format of headers of IP, TCP and UDP
- Elucidate the design issues for a computer network

Unit – 1: Computer Networks and the Internet

What is the Internet?, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and their Service Models, Networks under attack, History of Computer Networking and the Internet

Learning Outcomes:

At the end of the unit, students will be able to:

- Enumerate the hardware components of a computer network (L1)
- List the layers of a Computer Network (L1)
- Identify the performance metrics of a computer network (L3)

Unit – 2: Application Layer

Principles of Network Applications, The web and HTTP, File transfer: FTP, Electronic mail in the internet, DNS-The Internet's Directory Service, Peer-to-Peer Applications

Learning outcomes:

At the end of the unit, students will be able to:

- Design new applications of a computer network (L6)
- Analyze the application protocols (L4)
- Extend the existing applications (L2)

Unit – 3 : Transport Layer

Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Principles of Reliable Data transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control

Learning outcomes:

At the end of the unit, students will be able to:

- Design Congestion control algorithms (L6)

- Select the appropriate transport protocol for an application (L3)
- Identify the transport layer services (L3)

Unit – 4 :The Network Layer

Introduction, Virtual Circuit and Datagram Networks, The Internet Protocol(IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing

Learning outcomes:

At the end of the unit, students will be able to:

- Compare routing algorithms (L4)
- Design routing algorithms (L6)
- Extend the existing routing protocols (L2)

Unit – 5 :The Layer: Links, Access Networks, and LANs

Introduction to the Link Layer, Error-Detection and Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page Request

Learning outcomes:

At the end of the unit, students will be able to:

- Compare medium access protocols (L4)
- Classify the computer networks (L2)
- Design a Data Centre for an organization (L6)

Course Outcomes:

Upon completion of the course, the students should be able to:

1. Identify the software and hardware components of a Computer network (L3)
2. Develop new routing, and congestion control algorithms (L3)
3. Assess critically the existing routing protocols (L5)
4. Explain the functionality of each layer of a computer network (L2)
5. Choose the appropriate transport protocol based on the application requirements (L3)

Text Books:

1. James F. Kurose, Keith W. Ross, “Computer Networking: A Top-Down Approach”, 7th edition, Pearson, 2019.

References:

1. Forouzan, “Datacommunications and Networking”, 5th Edition, McGraw Hill Publication.
2. Andrew S.Tanenbaum, David j.wetherall, “Computer Networks”, 5th Edition, PEARSON.
3. Youlu Zheng, Shakil Akthar, “Networks for Computer Scientists and Engineers”, Oxford Publishers, 2016.

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(V Semester CSE)

Course Category	:	Professional Elective	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0501	3	0	0	3	CIA	30 M
Course Title	:	Data Warehousing and Data Mining					SEE	70 M

COURSE OBJECTIVES:

This course is designed to:

- Familiarize with mathematical foundations of data mining tools.
- Introduce classical models and algorithms in data warehouses and data mining.
- Investigate the kinds of patterns that can be discovered by association rule mining, classification and clustering.
- Explore data mining techniques in various applications like social, scientific and environmental context.

UNIT I:

Basic Concepts – Data Warehousing Components – Building a Data Warehouse – Database Architectures for Parallel Processing – Parallel DBMS Vendors – Multidimensional Data Model –Data Warehouse Schemas for Decision Support, Concept Hierarchies -Characteristics of OLAP Systems – Typical OLAP Operations, OLAP and OLTP.

Learning Outcomes:

At the end of the unit, students will be able to:

- Identify the component of Data warehouse (L1)
- Create the architecture of Data warehouse (L6)
- Apply different types of OLAP operations (L3)

UNIT II:

Introduction to Data Mining Systems – Knowledge Discovery Process – Data Mining Techniques – Issues – applications- Data Objects and attribute types, Statistical description of data, Data Preprocessing – Cleaning, Integration, Reduction, Transformation and discretization, Data Visualization, Data similarity and dissimilarity measures.

Learning Outcomes:

At the end of the unit, students will be able to:

- Summarize the data processing steps (L2)
- Apply data cleaning process (L3)

UNIT III:

Mining Frequent Patterns, Associations and Correlations – Mining Methods- Pattern Evaluation Method – Pattern Mining in Multilevel, Multi Dimensional Space – Constraint Based Frequent Pattern Mining, Classification using Frequent Patterns.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand Association Rules(L2)
- Apply different Mining Methods (L3)
- Review Classification using Frequent Patterns (L2)

UNIT IV:

Decision Tree Induction – Bayesian Classification – Rule Based Classification – Classification by Back Propagation – Support Vector Machines — Lazy Learners – Model Evaluation and Selection-Techniques to improve Classification Accuracy. Clustering Techniques – Cluster analysis-Partitioning Methods – Hierarchical Methods – Density Based Methods – Grid Based Methods – Evaluation of clustering – Clustering high dimensional data- Clustering with constraints, Outlier analysis-outlier detection methods.

Learning Outcomes:

At the end of the unit, students will be able to:

- Creating Decision Tree (L6)
- Evaluate Classification techniques (L5)

UNIT V: WEKA TOOL

Datasets – Introduction, Iris plants database, Breast cancer database, Auto imports database – Introduction to WEKA, The Explorer – Getting started, Exploring the explorer, Learning algorithms, Clustering algorithms, Association–rule learners.

Learning Outcomes:

At the end of the unit, students will be able to:

- Investigate WEKA tool (L4)
- Explain learning, clustering algorithms (L2)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Design a Data warehouse system and perform business analysis with OLAP tools (L6).
- Apply suitable pre-processing and visualization techniques for data analysis (L3)
- Apply frequent pattern and association rule mining techniques for data analysis (L3)
- Design appropriate classification and clustering techniques for data analysis (L6)
- Infer knowledge from raw data (L4)

TEXT BOOK:

1.Jiawei Han and Micheline Kamber, ―Data Mining Concepts and Techniques, Third Edition, Elsevier, 2012.

REFERENCES:

1.Alex Berson and Stephen J.Smith, ―Data Warehousing, Data Mining & OLAP‖, Tata McGraw – Hill Edition, 35th Reprint 2016.

2.K.P. Soman, Shyam Diwakar and V. Ajay, ―Insight into Data Mining Theory and Practice, Eastern

Economy Edition, Prentice Hall of India, 2006.
3.Ian H.Witten and Eibe Frank, ―Data Mining: Practical Machine Learning Tools and Techniques, Elsevier, Second Edition.

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(V Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0502	3	0	0	3	CIA	30 M
Course Title	:	Web Technologies					SEE	70 M

Course Objectives:

This course is designed to:

- Familiarize the tags of HTML.
- Understand different Client side Scripting.
- Learn -specific web services of server side Programming.
- Connect different applications using PHP &XML .
- Connect XHTML, Java Scripting, Servlet Programming, Java Server Pages.

UNIT I WEBSITE BASICS, HTML 5, CSS 3, WEB 2.0

Web Essentials: Clients, Servers and Communication – The Internet – Basic Internet protocols – World wide web – HTTP Request Message – HTTP Response Message – Web Clients – Web Servers – HTML5

– Tables – Lists – Image – HTML5 control elements – Semantic elements – Drag and Drop – Audio – Video controls - CSS3 – Inline, embedded and external style sheets – Rule cascading – Inheritance – Backgrounds – Border Images – Colors – Shadows – Text – Transformations – Transitions – Animations.

Learning Outcomes:

At the end of the unit, students will be able to:

- Create standard tags of HTML tags and Knowing the features of designing static webpages. (L6)
- List different types of CSS to design webpage attractively. (L1)
- Utilize different tools like Adobe Dream weaver and Microsoft Frontpage.(L3)

UNIT II CLIENT SIDE PROGRAMMING

Java Script: An introduction to JavaScript–JavaScript DOM Model-Date and Objects,-Regular Expressions- Exception Handling-Validation-Built-in objects-Event Handling - DHTML with JavaScript-JSON introduction – Syntax – Function Files – Http Request – SQL.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain different types of client side scripting. (L2)
- Construct dynamic webpages using DHTML.(L6)
- Illustrate validation for webpages.(L2)

UNIT III SERVER SIDE PROGRAMMING

Servlets: Java Servlet Architecture- Servlet Life Cycle- Form GET and POST actions-Session Handling-Understanding Cookies- Installing and Configuring Apache Tomcat Web Server- DATABASE CONNECTIVITY: JDBC perspectives, JDBC program example - JSP: Understanding Java Server Pages- JSP Standard Tag Library (JSTL)-Creating HTML forms by embedding JSP code.

Learning Outcomes:

At the end of the unit, students will be able to:

- Analyze the importance of Server side scripting. (L4)
- Demonstrate deployment of the application using Tomcat Server.(L2)
- Experiment with Storing and Retrieving data from JDBC. (L3)

UNIT IVPHP and XML

An introduction to PHP: PHP- Using PHP- Variables- Program control- Built-in functions-Form Validation- Regular Expressions - File handling – Cookies - Connecting to Database. XML: Basic XML- Document Type Definition- XML Schema DOM and Presenting XML, XML Parsers and Validation, XSL and XSLT Transformation, News Feed (RSS and ATOM).

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand how XML interacts with different applications. (L1)
- Develop PHP Programs using WAMP and XAMPP Server.(L3)
- Examine background applications using XSL and XSLT.(L4)

UNIT V INTRODUCTION TO AJAX and WEB SERVICES

AJAX: Ajax Client Server Architecture-XML Http Request Object-Call Back Methods; Web Services: Introduction- Java web services Basics – Creating, Publishing, Testing and Describing a Web services (WSDL)-Consuming a web service, Database Driven web service from an application –SOAP.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain the importance of AJAX Architecture.
- Integrate and test web services.

Course Outcomes:

At the end of the course, the students should be able to:

- Construct a basic website using HTML and Cascading Style Sheets.(L3)
- Build dynamic web page with validation using Java Script objects and by applying different event handling mechanisms.(L6)
- Develop server side programs using Servlets and JSP.(L3)
- Construct simple web pages in PHP and represent data in XML format. (L6)
- Utilize AJAX and web services to develop interactive web applications.(L3)

Text Books:

1. Deitel and Deitel and Nieto, ―Internet and World Wide Web - How to Program‖, Prentice Hall, 5th Edition, 2011.
2. Web Technologies, Uttam K. Roy, Oxford Higher Education., 1st edition, 10th impression, 2015.
3. The Complete Reference PHP by Steven Holzner, MGH HILL Education, Indian Edition, 2008.

References:

1. Stephen Wynkoop and John Burke ―Running a Perfect Website‖, QUE, 2nd Edition,1999.
2. Chris Bates, Web Programming – Building Intranet Applications, 3rd Edition, WileyPublications, 2009.
3. Jeffrey C and Jackson, ―Web Technologies A Computer Science PerspectivePearson Education, 2011.
4. Gopalan N.P. and Akilandeswari J., ―Web Technology, Prentice Hall of India, 2011.

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(V Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0503	3	0	0	3	CIA	30 M
Course Title	:	Software Project Management					SEE	70 M

Course Objectives:

The main goal of software development projects is to create a software system with apredetermined functionality and quality in a given time frame and with given costs. Forachieving this goal, models are required for determining target values and forcontinuously controlling these values. This course focuses on principles, techniques,methods & tools for model-based management of software projects, assurance ofproduct quality and process adherence (quality assurance), as well as experiencebased creation & improvement of models (process management). The goals of thecourse can be characterized as follows:

- Understanding the specific roles within a software organization as related toproject and process management
- Describe the principles, techniques, methods & tools for model-basedmanagement of software projects, assurance of product quality and processadherence (quality assurance), as well as experience-based creation &improvement of models (process management).
- Understanding the basic infrastructure competences (e.g., process modelingand measurement)
- Understanding the basic steps of project planning, project management,quality assurance, and process management and their relationships

UNIT I

Conventional Software Management: The waterfall model, conventional softwareManagement performance. Evolution of Software Economics: Software Economics,pragmatic software cost estimation

UNIT II

Improving Software Economics: Reducing Software product size, improving softwareprocesses, improving team effectiveness, improving automation, Achieving requiredquality, peer inspections.The old way and the new: The principles of conventional software engineering,principles of modern software management, transitioning to an iterative process

UNIT III

Life cycle phases: Engineering and production stages, inception, Elaboration,construction, transition phases.Artifacts of the process: The artifact sets, Management artifacts, Engineeringartifacts, programmatic artifacts. Model based software architectures: A Managementperspective and technical perspective.

UNIT IV

Work Flows of the process: Software process workflows, Inter Trans workflows.Checkpoints of the Process: Major Mile Stones, Minor Milestones, Periodic statusassessments. Iterative Process Planning: Work breakdown structures, planningguidelines, cost and schedule estimating, Interaction planning process, Pragmaticplanning.

Project Organizations and Responsibilities: Line-of-Business Organizations, ProjectOrganizations, evolution of Organizations.

Process Automation: Automation Building Blocks, The Project Environment

UNIT V

Project Control and Process instrumentation: The server care Metrics, Managementindicators, quality indicators, life cycle expectations pragmatic Software Metrics, Metricsautomation. Tailoring the Process: Process discriminates, Example.Future Software Project Management: Modern Project Profiles Next generationSoftware economics, modern Process transitions.

Course Outcomes:

- Describe and determine the purpose and importance of project managementfrom the perspectives of planning, tracking and completion of project.
- Compare and differentiate organization structures and project structures
- Implement a project to manage project schedule, expenses and resourceswith the application of suitable project management tools

Text Books:

1. Software Project Management, Walker Royce, Pearson Education.
2. Software Project Management, Bob Hughes & Mike Cotterell, Fifthedition, Tata McGraw Hill

Reference Books:

1. Applied Software Project Management, Andrew Stellman & Jennifer Greene,O"Reilly, 2006
2. Head First PMP, Jennifer Greene & Andrew Stellman, O"Reilly,2007
3. Software Engineering Project Managent, Richard H. Thayer & Edward Yourdon,second edition,Wiley India, 2004.
4. Agile Project Management, Jim Highsmith, Pearson education, 2004
5. The art of Project management, Scott Berkun, O"Reilly, 2005.
6. Software Project Management in Practice, Pankaj Jalote, Pearson Education,2002

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(V Semester CSE)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0101	3	0	0	3	CIA	30 M
Course Title	:	Experimental Stress Analysis					SEE	70 M

Course Objective:

To bring awareness on experimental method of finding the response of the structure to different types of load.

- Demonstrates principles of experimental approach.
- Teaches regarding the working principles of various strain gauges.
- Throws knowledge on strain rosettes and principles of non destructive testing of concrete.
- Gives an insight into the principles of photo elasticity.

UNIT-I

PRINCIPLES OF EXPERIMENTAL APPROACH: - Merits of Experimental Analysis Introduction, uses of experimental stress analysis advantages of experimental stress analysis, Different methods – Simplification of problems.

Learning outcomes:

At the end of the unit, students will be able to:

- Demonstrate the merits and principles of experimental approach
- Give an insight into the uses and advantages of experimental stress analysis

UNIT-II

STRAIN MEASUREMENT USING STRAIN GAUGES: - Definition of strain and its relation of experimental Determinations Properties of Strain Gauge Systems-Types of Strain Gauges – Mechanical, Acoustic and Optical Strain Gauges. Introduction to Electrical strain gauges - Inductance strain gauges – LVDT – Resistance strain gauges – various types –Gauge factor – Materials of adhesion base.

Learning outcomes:

At the end of the unit, students will be able to:

- Introduce various strain gauge systems and their properties
- Give information regarding the gauge factor and materials of adhesion bases

UNIT-III

STRAIN ROSSETTES AND NON –DESTRUCTIVE TESTING OF CONCRETE:-

Introduction – the three elements Rectangular Rosette – The Delta Rosette Corrections for Transverse Strain Gauge. Ultrasonic Pulse Velocity method –Application to Concrete. Hammer Test – Application to Concrete.

Learning outcomes:

At the end of the unit, students will be able to:

- Introduces various strain rosettes and corrections for strain gauges

- Gives an insight into the destructive and non destructive testing of concrete

UNIT-IV

THEORY OF PHOTOELASTICITY: - Introduction –Temporary Double refraction – The stress Optic Law –Effects of stressed model in a polariscope for various arrangements – Fringe Sharpening. Brewster"s Stress Optic law.

Learning outcomes:

At the end of the unit, students will be able to:

- Introduces stress optic laws.
- Gives the arrangements and working principles of polariscope.

UNIT-V

TWO DIMENSIONAL PHOTOELASTICITY: - Introduction – Iso-chromatic Fringe patterns- Isoclinic Fringe patterns passage of light through plane Polariscope and Circular polariscope Isoclinic Fringe patterns – Compensation techniques – Calibration methods – Separation methods – Scaling Model to prototype Stresses – Materials for photo – Elasticity Properties of Photoelastic Materials.

Learning outcomes:

At the end of the unit, students will be able to:

- Introduces the understanding of different fringe patterns.
- Introduces model analysis and properties of photo elastic materials.

Course Outcomes:

After completion of the course

- The student will be able to understand different methods of experimental stress analysis
- The student will be able to understand the use of strain gauges for measurement of strain
- The student will be exposed to different Non destructive methods of concrete
- The student will be able to understand the theory of photo elasticity and its applications in analysis of structures

TEXT BOOKS:-

1. J.W.Dally and W.F.Riley, “Experimental stress analysis College House Enterprises”
2. Dr.Sadhu Singh, “Experimental stress analysis”, khanna Publishers

REFERENCE BOOKS:

1. U.C.Jindal, “Experimental Stress analysis”, Pearson Publications.
2. L.S.Srinath, “Experimental Stress Analysis”, MC.Graw Hill Company Publishers.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0102	3	0	0	3	CIA	30 M
Course Title	:	Building Technology					SEE	70 M

Course Objectives:
- To impart to know different types of buildings, principles and planning of the buildings.
- To identify the termite control measure in buildings, and importance of grouping circulation, lighting and ventilation aspects in buildings.
- To know the different modes of vertical transportation in buildings.
- To know the utilization of prefabricated structural elements in buildings.
- To know the importance of acoustics in planning and designing of buildings.

UNIT-I

Overview of the course, basic definitions, buildings-types-components- economy and design- principles of planning of buildings and their importance. Definitions and importance of grouping and circulation-lighting and ventilation-consideration of the above aspects during planning of building.

Learning outcomes:

At the end of the unit, students will be able to:
- To be able to plan the building with economy and according to functional requirement.

UNIT-II

Termite proofing: Inspection-control measures and precautions- lighting protection of buildings- general principles of design of openings-various types of fire protection measures to be considered while panning a building.

Learning outcomes:

At the end of the unit, students will be able to:
- Able to know the termite proofing technique to the building and protection form lightening effects.
- To be able to know the fire protection measure that are to be adopted while planning a building.

UNIT-III

Vertical transportation in a building: Types of vertical transportation-stairs-different forms of stairs-planning of stairs- other modes of vertical transportation – lifts-ramps-escalators.

Learning outcomes:

At the end of the unit, students will be able to:
- To be able to know the different modes of vertical transportation and their suitability

UNIT-IV

Prefabrication systems in residential buildings- walls-openings-cupboards-shelves etc., planning and modules and sizes of components in prefabrication. Planning and designing of residential buildings against the earthquake forces, principles, seismic forces and their effect on buildings.

Learning outcomes:

At the end of the unit, students will be able to:

- Identify the adoption of prefabricated elements in the building.
- Know the effect of seismic forces on buildings

UNIT-V

Acoustics – effect of noise – properties of noise and its measurements, principles of acoustics of building. Sound insulation- importance and measures.

Learning outcomes:

At the end of the unit, students will be able to:

- To know the effect of noise, its measurement and its insulation in planning the buildings

Course Outcomes:

After completion of the course the student will be able to

- Understand the principles in planning and design the buildings.
- Know the different methods of termite proofing in buildings.
- Know the different methods of vertical transportation in buildings.
- Know the implementation of prefabricated units in buildings and effect of earthquake on buildings.
- Know the importance of acoustics in planning and designing of buildings.

TEXT BOOKS :

1. Varghese, “Building construction”, PHI Learning Private Limited.
2. Punmia.B.C, “Building construction”, Jain.A.K and Jain.A.K Laxmi Publications.
3. S.P.Arora and S.P.Brndra “Building construction”, Dhanpat Rai and Sons Publications, New Delhi
4. “Building construction-Technical teachers training institute”, Madras, Tata McGraw Hill.

REFERENCE BOOKS:

1. National Building Code of India, Bureau of Indian Standards

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0201	3	0	0	3	CIA	30 M
Course Title	:	Electrical Engineering Materials					SEE	70 M

Course Objectives:

To make the students learn about

- Classification of materials.
- Properties of materials and its applications.
- Domestic wiring and earthing

UNIT-I Conducting Materials

Introduction – classification of materials – Metals and Non metals, physical, thermal, mechanical and electrical properties of materials – classification of electrical materials – concept of atom – electron configuration of atom, conductors, general properties of conductors, factors effecting resistivity of electrical materials –electrical/mechanical/thermal properties of copper, aluminum, iron, steel, lead, tin and their alloys – applications.

Learning outcomes:

At the end of the unit, students will be able to:

- Understand the classification of conducting materials.
- Analyze the properties of different conducting materials
- Apply the materials where it is applicable
- Know about electron configuration of atom

UNIT-II Dielectric and High Resistivity Materials

Introduction – solid, liquid and gaseous dielectrics, leakage current, permittivity, dielectric constant, dielectric loss – loss angle – loss constant, Breakdown voltage and dielectric strength of– solid, liquid and gaseous dielectrics, effect of break down– electrical and thermal effects, Polarization – electric, ionic and dipolar polarization. Effect of temperature and Frequency on dielectric constant of polar dielectrics. High Resistivity materials – electrical / thermal / mechanical properties of Manganin, Constantan, Nichrome, Tungsten, Carbon and Graphite and their applications in electrical equipment.

Learning outcomes:

At the end of the unit, students will be able to:

- Understand the classification of dielectric and high resistivity materials.
- Analyze the properties of dielectric and high resistivity materials
- Understand about concept of polarization and dipolar polarization
- Apply the materials where it is applicable

UNIT-III Solid Insulating Materials

Introduction – characteristics of a good electrical insulating materials – classification of insulating materials – electrical, thermal, chemical and mechanical properties of solid insulating materials - Asbestos, Bakelite, rubber, plastics, thermo plastics. Resins, polystyrene, PVC, porcelain, glass, cotton and paper.

Learning outcomes:

At the end of the unit, students will be able to:

- Understand about various characteristics of solid insulating materials
- Understand the classification of solid insulating materials.
- Analyze the properties of solid insulating materials
- Apply the materials where it is applicable

UNIT-IV Liquid & Gas Insulating Materials

Liquid insulating materials – Mineral oils, synthetic liquids, fluorinated liquids – Electrical, thermal and chemical properties – transformer oil – properties – effect of moisture on insulation properties Gaseous insulators – classification based on dielectric strength – dielectric loss, chemical stability properties and their applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the classification of liquid insulating materials.
- Analyze the properties of liquid insulating materials
- Apply the materials where it is applicable
- Understand about properties and classification of gaseous insulators

UNIT-V Domestic Wiring

Wiring materials and accessories – Types of wiring – Types of Switches - Specification of Wiring – Stair case wiring - Fluorescent lamp wiring- Godown wiring – Basics of Earthing – single phase wiring layout for a residential building.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand about wiring materials and accessories
- Understand about earthing and wiring layout of domestic buildings
- Design and develop Residential wiring
- Know about godown wiring

Course Outcomes:

After completing the course, the student should be able to:

- Understand the classification of materials, domestic wiring materials andearthing.
- Analyze the properties of different electrical materials
- Apply where the materials are applicable based on properties of materials
- Design and develop Residential wiring, godown wiring and earthing.

ext Books:

1. G.K. Mithal, “Electrical Engineering Materials”, Khanna publishers, 2nd edition, 1991.
2. R.K. Rajput, A course in “Electrical Engineering Materials”, Laxmi publications, 2009.

Reference Books:

1. C.S. Indulkar and S. Thiruvengadam, “An Introduction to Electrical Engineering Materials” S Chand & Company, 2008.
2. Technical Teachers Training Institute, “Electrical engineering Materials”, 1st Edition, Madras, McGraw Hill Education, 2004.

3. by S.P. Seth, “A course in Electrical Engineering Materials Physics Properties & Applications”, Dhanapat Rai & Sons Publications, 2018.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0301	3	0	0	3	CIA	30 M
Course Title	:	Introduction to Hybrid and Electric Vehicles					SEE	70 M

Course Objectives:

- Provide good foundation on hybrid and electrical vehicles.
- To address the underlying concepts and methods behind power transmission in hybrid and electrical vehicles.
- Familiarize energy storage systems for electrical and hybrid transportation.
- To design and develop basic schemes of electric vehicles and hybrid electric vehicles.

UNIT I: Electric Vehicle Propulsion and Energy Sources

Introduction to electric vehicles, vehicle mechanics - kinetics and dynamics, roadway fundamentals propulsion system design - force velocity characteristics, calculation of tractive power and energy required, electric vehicle power source - battery capacity, state of charge and discharge, specific energy, specific power, Ragone plot. battery modeling - run time battery model, first principle model, battery management system- soc measurement, battery cell balancing. Traction batteries - nickel metal hydride battery, Li-Ion, Lipolymer battery.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Summaries the concepts of electrical vehicle propulsion and energy sources. (l2)
- Identify the types of power sources for electrical vehicles.(l3)
- Demonstrate the design considerations for propulsion system. (l2)
- Solve the problems on tractive power and energy required. (l3)

UNIT II: Electric Vehicle Power Plant And Drives

Introduction electric vehicle power plants. Induction machines, permanent magnet machines, switch reluctance machines. Power electronic converters-DC/DC converters - buck boost converter, isolated DC/DC converter. Two quadrant chopper and switching modes. AC drives- PWM, current control method. Switch reluctance machine drives - voltage control, current control.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Choose a suitable drive scheme for developing an electric vehicles depending on resources.(l1)
- List the various power electronic converters. (l1)
- Describe the working principle dc/dc converters and buck boost convertor. (l2)
- Explain about ac drives. (l2)

UNIT III: Hybrid And Electric Drive Trains

Introduction hybrid electric vehicles, history and social importance, impact of modern drive trains in energy supplies. Hybrid traction and electric traction. Hybrid and electric drive train topologies. Power flow control and energy efficiency analysis, configuration and control of DC motor drives and induction motor drives, permanent magnet motor drives, switch reluctance motor drives, drive system efficiency.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Identify the social importance of hybrid vehicles. (l3)
- Discus impact of modern drive trains in energy supplies. (l6)
- Compare hybrid and electric drive trains.(l2)
- Analyze the power flow control and energy efficiency. (l6)

UNIT IV: Electric and Hybrid Vehicles - Case Studies

Parallel hybrid, series hybrid -charge sustaining, charge depleting. Hybrid vehicle case study – Toyota Prius, Honda Insight, Chevrolet Volt. 42 V system for traction applications. Lightly hybridized vehicles and low voltage systems. Electric vehicle case study - GM EV1, Nissan Leaf, Mitsubishi Miev. Hybrid electric heavy duty vehicles, fuel cell heavy duty vehicles.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- List the various electric and hybrid vehicles in the present market. (l1)
- Discus lightly hybridized vehicle and low voltage systems.(l6)
- Explain about hybrid electric heavy duty vehicles and fuel cell heavy duty vehicles. (l2)

UNIT V: Electric And Hybrid Vehicle Design :

Introduction to hybrid vehicle design. Matching the electric machine and the internal combustion engine. Sizing of propulsion motor, power electronics, drive system. Selection of energy storage technology, communications, supporting subsystem. Energy management strategies in hybrid and electric vehicles - energy management strategies- classification, comparison, implementation.

Learning Outcomes:

After successful completion of this unit, the students will be able to

- Illustrate matching the electric machine and the internal combustion engine. (l2)
- Select the energy storage technology. (l3)
- Select the size of propulsion motor. (l3)
- Design and develop basic schemes of electric and hybrid electric vehicles. (l3)

Course outcomes:

After learning the course the students will be able to:

- Explain the working of hybrid and electric vehicles. (l2)
- Choose a suitable drive scheme for developing an hybrid and electric vehicles depending on resources. (l3)
- Develop the electric propulsion unit and its control for application of electric vehicles.(l3)
- Choose proper energy storage systems for vehicle applications. (l3)
- Design and develop basic schemes of electric vehicles and hybrid electric vehicles.(l3)

Text Books :

1. Iqbal Hussein, “Electric and Hybrid Vehicles: Design Fundamentals”, 2nd edition, CRC Press,

2003.

2. Amir Khajepour, M. Saber Fallah, Avesta Goodarzi, "Electric and Hybrid Vehicles: Technologies, Modeling and Control - A Mechatronic Approach", illustrated edition, John Wiley & Sons, 2014.

3. Mehrdad Ehsani, YimiGao, Sebastian E. Gay, Ali Emadi, "Modern Electric, Hybrid Electric and Fuel Cell Vehicles: Fundamentals, Theory and Design", CRC Press, 2004.

References:

1. James Larminie, John Lowry, "Electric Vehicle Technology", Explained, Wiley, 2003.

2. John G. Hayes, G. Abas Goodarzi, "Electric Powertrain: Energy Systems, Power Electronics and Drives for Hybrid, Electric and Fuel Cell Vehicles", 1st edition, Wiley- Blackwell, 2018.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0302	3	0	0	3	CIA	30 M
Course Title	:	Rapid Prototyping					SEE	70 M

Course Objectives:

- Familiarize techniques for processing of CAD models for rapid prototyping.
- Explain fundamentals of rapid prototyping techniques.
- Demonstrate appropriate tooling for rapid prototyping process.
- Focus Rapid prototyping techniques for reverse engineering.
- Train Various Pre – Processing, Processing and Post Processing errors in RP Processes.

UNIT – I 10 Hours

Introduction: Introduction to Prototyping, Traditional Prototyping Vs. Rapid Prototyping (RP), Need for time compression in product development, Usage of RP parts, Generic RP process, Distinction between RP and CNC, other related technologies, Classification of RP.

RP Software: Need for RP software, MIMICS, Magics, SurgiGuide, 3-matic, 3D-Doctor, Simplant, Velocity2, VoXim, SolidView, 3DView, etc., software, Preparation of CAD models, Problems with STL files, STL file manipulation, RP data formats: SLC, CLI, RPI, LEAF, IGES, HP/GL, CT, STEP.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain prototyping process. (l2)
- Classify different rapid prototyping processes. (l2)
- Summarize rp software's and represent a 3d model in stl format, other rp data formats. (l2)

UNIT – II 8 Hours

Solid and Liquid Based RP Systems: Stereolithography (SLA): Principle, Process, Materials, Advantages, Limitations and Applications. Solid Ground Curing (SGC): Principle, Process, Materials, Advantages, Limitations, Applications.

Fusion Deposition Modeling (FDM): Principle, Process, Materials, Advantages, Limitations, Applications. Laminated Object Manufacturing (LOM): Principle, Process, Materials, Advantages, Limitations, Applications.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the principles, advantages, limitations and applications of Solid and Liquid based AM systems. (L2)
- Identify the materials for Solid and Liquid based AM systems. (L2)

UNIT – III 8 Hours

Powder Based RP Systems: Principle and Process of Selective Laser Sintering (SLS), Advantages, Limitations and Applications of SLS, Principle and Process of Laser Engineered Net Shaping (LENS),

Advantages, Limitations and Applications of LENS, Principle and Process of Electron Beam Melting (EBM), Advantages, Limitations and Applications of EBM.
Other RP Systems: Three Dimensional Printing (3DP): Principle, Process, Advantages, Limitations and Applications. Ballastic Particle Manufacturing (BPM): Principle, Process, Advantages, Limitations, Applications. Shape Deposition Manufacturing (SDM): Principle, Process, Advantages, Limitations, Applications.

Learning Outcomes:
At the end of the unit, the student will be able to

- Explain the principles, advantages, limitations and applications of powder based AM systems. (L2)
- Understand the principles, advantages, limitations and applications of other Additive Manufacturing Systems such as 3D Printing, Ballistic Particle Manufacturing and Shape Deposition Modeling. (L2)

UNIT – IV 8 Hours

Rapid Tooling: Conventional Tooling Vs. Rapid Tooling, Classification of Rapid Tooling, Direct and Indirect Tooling Methods, Soft and Hard Tooling methods.
Reverse Engineering (RE): Meaning, Use, RE – The Generic Process, Phases of RE Scanning, Contact Scanners and Noncontact Scanners, Point Processing, Application Geometric Model, Development.

Learning Outcomes:
At the end of the unit, the student will be able to

- Classify Rapid Tooling methods. (L2)
- Explain the concepts of reverse engineering and scanning tools. (L2)

UNIT – V 8 Hours

Errors in RP Processes: Pre-processing, processing, post-processing errors, Part building errors in SLA, SLS, etc.
RP Applications: Design, Engineering Analysis and planning applications, Rapid Tooling, Reverse Engineering, Medical Applications of RP.

Learning Outcomes:
At the end of the unit, the student will be able to

- Identify various Pre – Processing, Processing and Post – Processing errors in RP processes. (L2)
- Apply of RP in engineering design analysis and medical applications. (L3)

Course Outcomes:
At the end of the course, the student will be able to

- Use techniques for processing of CAD models for rapid prototyping. (L3)
- Understand and apply fundamentals of rapid prototyping techniques. ((L3)
- Use appropriate tooling for rapid prototyping process. (L3)
- Use rapid prototyping techniques for reverse engineering. (L3)

● Identify Various Pre – Processing, Processing and Post Processing errors in RP processes. (L3)

Text Books:

1. Chua C.K., Leong K.F. and Lim C.S., “Rapid Prototyping: Principles and Applications”, 2nd edition, World Scientific Publishers, 2003.
2. Ian Gibson, David W. Rosen, Brent Stucker, “Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing”, 1st Edition, Springer, 2010.
3. Rafiq Noorani, “Rapid Prototyping: Principles and Applications in Manufacturing”, John Wiley & Sons, 2006.

Reference Books:

1. Liou W. Liou, Frank W., Liou, “Rapid Prototyping and Engineering Applications: A Tool Box for Prototype Development”, CRC Press, 2007.
2. Pham D.T. and Dimov S.S., “Rapid Manufacturing; The Technologies and Application of RPT and Rapid tooling”, Springer, London 2001.
3. Gebhardt A., “Rapid prototyping”, Hanser Gardener Publications, 2003.
4. Hilton P.D. and Jacobs P.F., “Rapid Tooling: Technologies and Industrial Applications”, CRC Press, 2005.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0401	3	0	0	3	CIA	30 M
Course Title	:	Analog Electronics					SEE	70 M

Course Objectives:

- To understand the characteristics of various types of electronic devices and circuits (L1).
- To apply various principles of electronic devices and circuits to solve complex Engineering problems (L2).
- To analyze the functions of various types of electronic devices and circuits (L3).
- To evaluate the functions of various types of electronic devices and circuits in real time applications (L3).
- To design various types of electronic circuits for use in real time applications (L4).

UNIT-I:

Diodesand Applications

Properties of intrinsic and extrinsic semiconductor materials. Characteristics of PN junction diode and Zener diode. Applications of PNdiode as a switch, rectifier and Zener diode as regulator. Special purpose diodes: Schottky diode, Tunnel diode, Varactor diode, photodiode and LED.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the characteristics of various types of diodes (L1).
- Apply the principles of diodes to solve complex Engineering problems (L2).
- Analyze the functions of diodes in forward and reverse bias conditions (L3).
- Evaluate the functions of diodes in real time applications (L3).
- Design rectifiers and switches using diodes (L4).

UNIT-II:

BJT and its Applications

Construction, Operation, and Characteristics in CE, CB and CC configurations. Fixed-Bias and Voltage Divider-Bias. Applications as switch and amplifier.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the characteristics and biasing of BJT (L1).
- Apply the principles of BJT to solve complex Engineering problems (L2).
- Analyse the functions of BJT in various configurations (L3).
- Evaluate the functions of BJT in real time applications (L3).
- Design amplifiers and switches using BJT (L4).

UNIT-III:

FETs and Applications

JFETs:Construction, Operation, and Characteristics in CS configurations. Fixed-Bias and Voltage Divider -Bias. Applications as switch and amplifier.

MOSFETs:Construction, Operation, and Characteristics of Enhancement and Depletion modes in CS configurations. Biasing in Enhancement and Depletion modes. Applications as switch.

Learning Outcomes:
At the end of the unit, the student should be able to
- Understand the characteristics and biasing of FETs (L1).
- Apply the principles of FETsto solve complex Engineering problems (L2).
- Analyze the functions of FETs in CSconfiguration (L3).
- Evaluate the functions of FETs in real time applications (L3).
- Design amplifiers and switches using FETs (L4).

UNIT-IV:
Feedback Amplifiers and Oscillators
Feedback Amplifiers: Concept of feedback, General characteristics of negative feedback amplifiers, Voltage-series, Current-series, Voltage-shunt, and Current-shunt feedback amplifiers. Oscillators: Conditions for oscillations, Hartley and Colpitts oscillators, RC phase-shift and Wien-bridge oscillators.

Learning Outcomes:
At the end of the unit, the student should be able to
- Understand the concept of negative & positive feedback and characteristics feedback amplifiers (L1).
- Apply the principles of feedback amplifiers and oscillators to solve complex Engineering problems (L2).
- Analyze the functions of feedback amplifiers and oscillators (L3).
- Evaluate the functions of feedback amplifiers and oscillators in real time applications (L3).
- Design feedback amplifiers and oscillators for specific applications (L4).

UNIT-V:
Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits
Wave-Shaping & Multivibrator Circuits: Introduction, Waveform Shaping Circuits –RC and RL Circuits. Clippers, Comparator and Clampers. Bistable, Schmitt Trigger, Monostable and Astable Multivibrators.
Linear Integrated Circuits: Operational Amplifier: Introduction, Block diagram, Basic applications – Inverting, Non-inverting, Summing amplifier, Subtractor, Voltage Follower. IC 555 Timer and IC 7805 Regulator.

Learning Outcomes:
At the end of the unit, the student should be able to
- Understand the operation of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits (L1).
- Apply the principles of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits to complex Engineering solve problems (L2).
- Analyse the functions of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits (L3).
- Evaluate the functions of Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits in real time applications (L3).
- Design Wave-Shaping & Multivibrator Circuits and Linear Integrated Circuits for specific applications (L4).

Note: In all the units, only qualitative treatment is required.

Course Outcomes:

At the end of the course, the student should be able to

- Understand the characteristics of various types of electronic devices and circuits
- Apply various principles of electronic devices and circuits to solve complex
- Engineering problems
- Analyse the functions of various types of electronic devices and circuits, Evaluate the functions of various types of electronic devices and circuits in real time applications
- Design various types of electronic circuits for use in real time applications.

TEXT BOOKS:

1. S. Salivahanan and N. Suresh Kumar, “Electronic Devices and Circuits”, 4th Edition, McGraw Hill Education (India) Pvt Ltd., 2017.

REFERENCES:

1. J. Milliman, Christos C Halkias, and Satyabrata Jit, “Electronics Devices and Circuits”, 4th Edition, McGraw Hill Education (India) Pvt Ltd., 2015.
2. David A. Bell “Electronics Devices and Circuits”, 5th Edition, Oxford University Press, 2008.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0402	3	0	0	3	CIA	30 M
Course Title	:	Digital Electronics					SEE	70 M

Course Objectives:

- To introduce different methods for simplifying Boolean expressions
- To analyze logic processes and implement logical operations using combinational logic circuits
- To understand characteristics of memory and their classification.
- To understand concepts of sequential circuits and to analyze sequential systems in terms of state machines
- To understand concept of Programmable Devices

UNIT- I

Minimization Techniques and Logic Gates Minimization Techniques: Boolean postulates and laws – De-Morgan's Theorem - Principle of Duality - Boolean expression - Minimization of Boolean expressions –– Minterm – Maxterm - Sum of Products (SOP) – Product of Sums (POS)– Karnaugh map Minimization – Don't care conditions – Quine - McCluskey method of minimization. Logic Gates: AND, OR, NOT, NAND, NOR, Exclusive–OR and Exclusive–NOR Implementations of Logic Functions using gates, NAND– NOR implementations – Multi level gate implementations- Multi output gate implementations. TTL and CMOS Logic and their characteristics – Tristate gates.

Learning Outcomes:

At the end of the unit, the student should be able to:

- Learn Boolean algebra and logical operations in Boolean algebra. (L1)
- Apply different logic gates to functions and simplify them. (L2)
- Analyze the redundant terms and minimize the expression using Kmaps and tabulation methods (L3)

UNIT- II

Combinational Circuits -Design procedure – Half adder – Full Adder – Half subtractor – Full subtractor – Parallel binary adder, parallel binary Subtractor – Fast Adder - Carry Look Ahead adder – Serial Adder/Subtractor - BCD adder – Binary Multiplier – Binary Divider - Multiplexer/ Demultiplexer – decoder - encoder – parity checker – parity generators – code converters - Magnitude Comparator.

Learning Outcomes:

At the end of the unit, the student should be able to:

- Apply the logic gates and design of combinational circuits(L2)
- Design of different combinational logic circuits(L4)

UNIT -III

Sequential Circuits-Latches, Flip-flops - SR, JK, D, T, and Master-Slave – Characteristic table and equation –Application table – Edge triggering – Level Triggering – Realization of one flip flop using other flip flops – serial adder/subtractor- Asynchronous Ripple or serial counter – Asynchronous Up/Down counter - Synchronous counters – Synchronous Up/Down counters – Programmable counters

– Design of Synchronous counters: state diagram- State table –State minimization –State assignment - Excitation table and maps-Circuit implementation - Modulo–n counter, Registers – shift registers - Universal shift registers – Shift register counters – Ring counter – Shift counters - Sequence generators.

Learning Outcomes:

At the end of the unit, the student should be able to:

- Understand the clock dependent circuits (L1)
- Identify the differences between clocked and clock less circuits, apply clock dependent circuits(L2)
- Design clock dependent circuits(L4)

UNIT -IV

Memory Devices Classification of memories – ROM - ROM organization - PROM – EPROM – EEPROM –EAPROM, RAM – RAM organization – Write operation – Read operation – Memory cycle - Timing wave forms – Memory decoding – memory expansion – Static RAM Cell- Bipolar RAM cell – MOSFET RAM cell – Dynamic RAM cell –Programmable Logic Devices – Programmable Logic Array (PLA) - Programmable Array Logic (PAL) – Field Programmable Gate Arrays (FPGA) - Implementation of combinational logic circuits using ROM, PLA, PAL

Learning Outcomes:

At the end of the unit, the student should be able to:

- Understand the principle of operation of basic memory devices, and programmable logic devices. (L1)

- Implement combinational logic circuits using memory and programmable logic devices (L2)

UNIT -V

Synchronous and Asynchronous Sequential Circuits Synchronous Sequential Circuits: General Model – Classification – Design – Use of Algorithmic State Machine – Analysis of Synchronous Sequential Circuits Asynchronous Sequential Circuits: Design of fundamental mode and pulse mode circuits – Incompletely specified State Machines – Problems in Asynchronous Circuits – Design of Hazard Free Switching circuits.

Learning Outcomes:

At the end of the unit, the student should be able to:

- Understand how synchronous and asynchronous sequential circuit works (L1)
- Understand the FSM and its design principles. (L1)
- Analyze the procedure to reduce the internal states in sequential circuits (L3)
- Illustrate minimization of complete and incomplete state machines and to write a minimal cover table(L2)

Course Outcomes:

- Explain switching algebra theorems and apply them for logic functions, discuss about digital logic gates and their properties, Identify the importance of SOP and POS canonical forms in the minimization of digital circuits.

• Evaluate functions using various types of minimizing algorithms like Boolean algebra, Karnaugh map or tabulation method.

• Analyze the design procedures of Combinational & sequential logic circuits.

• Design of different combinational logic circuits, and compare different semiconductor memories.

Text Books:

1. M. Morris Mano, “Digital Design”, 4th Edition, Prentice Hall of India Pvt. Ltd., 2008 / Pearson Education (Singapore) Pvt. Ltd., New Delhi, 2003.
2. Zvi Kohavi, “Switching and Finite Automata Theory”, 3rd Edition, South Asian Edition, 2010,

References:

1. John F.Wakerly, “Digital Design”, Fourth Edition, Pearson/PHI, 2008
2. John.M Yarbrough, “Digital Logic Applications and Design”, Thomson Learning, 2006.

3. Charles H.Roth. “Fundamentals of Logic Design”, 6th Edition, Thomson Learning, 2013.
4. Donald P.Leach and Albert Paul Malvino, “Digital Principles and Applications”, 6th Edition, TMH, 2006.
5. Thomas L. Floyd, “Digital Fundamentals”, 10th Edition, Pearson Education Inc, 2011
6. Donald D.Givone, “Digital Principles and Design”, TMH, 2003.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0504	3	0	0	3	CIA	30 M
Course Title	:	Free And Open Source Systems					SEE	70 M

Course Objectives:

This course is designed to:

- Understand the context and operation of free and open source software (FOSS) communities and associated software projects.
- Motivate the students to contribute in FOSS projects
- Familiarize with programming languages like Python, Perl, Ruby
- Elucidate the important FOSS tools and techniques

UNIT I PHILOSOPHY

Notion of Community--Guidelines for effectively working with FOSS community--, Benefits of Community based Software Development --Requirements for being open, free software, open source software –Four degrees of freedom - FOSS Licensing Models - FOSS Licenses – GPL- AGPL-LGPL - FDL - Implications – FOSS examples.

Learning outcomes:

At the end of the unit, students will be able to:

- Analyze the benefits of Community based Software Development. (L4)
- Explain the degrees of Freedom. (L2)

UNIT II LINUX

Linux Installation and Hardware Configuration – Boot Process-The Linux Loader (LILO) - The Grand Unified Bootloader (GRUB) - Dual-Booting Linux and other Operating System - Boot- Time Kernel Options- X Windows System Configuration-System Administration – Backup and Restore Procedures- Strategies for keeping a Secure Server.

Learning outcomes:

At the end of the unit, students will be able to:

- Demonstrate Linux Installation and hardware configuration. (L2)
- Compare Linux and Windows System Configurations. (L4)

UNIT III PROGRAMMING LANGUAGES

Programming using languages like Python, Perl, Ruby

Learning outcomes:

At the end of the unit, students will be able to:

- Explain the syntax of programming Languages Python, Perl and Ruby. (L2)
- Develop applications in the Open source programming Languages. (L6)

UNIT IV PROGRAMMING TOOLS AND TECHNIQUES

Usage of design Tools like Argo UML or equivalent, Version Control Systems like Git or equivalent, – Bug Tracking Systems- Package Management Systems

Learning outcomes:

At the end of the unit, students will be able to:

- List various programming tools and explain their uses (L1)
- Make use of the various tools while building applications (L3)

UNIT V FOSS CASE STUDIES

Open Source Software Development - Case Study – Libre office -Samba

Learning outcomes:

At the end of the unit, students will be able to:

- Elaborate the open Source Software Development(L6)
- Compare Libre office with its proprietary equivalent (L5)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Demonstrate Installation and running of open-source operating systems.(L2)
- Justify the importance of Free and Open Source Software projects. (L5)
- Build and adapt one or more Free and Open Source Software packages. (L6)
- Utilize a version control system. (L3)
- Develop software to and interact with Free and Open Source Software development projects.(L3)

TEXT BOOK:

Ellen Siever, Stephen Figgins, Robert Love, Arnold Robbins, “Linux in a Nutshell”, Sixth Edition, OReilly Media, 2009.

REFERENCES:

1. Philosophy of GNU URL: http://www.gnu.org/philosophy/.
2. Linux Administration URL: http://www.tldp.org/LDP/lame/LAME/linux-admin-made-easy/.
3. The Python Tutorial available at http://docs.python.org/2/tutorial/.
4. Perl Programming book at http://www.perl.org/books/beginning-perl/.
5. Ruby programming book at http://ruby-doc.com/docs/ProgrammingRuby/.
6. Version control system URL: http://git-scm.com/.
7. Samba: URL : http://www.samba.org/.
8. Libre office: http://www.libreoffice.org/.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0503	3	0	0	3	CIA	30 M
Course Title	:	Computer Graphics And Multimedia Animation					SEE	70 M

Course Objectives:

This course is designed to:

- Introduce the use of the components of a graphics system and become familiar with the building approach of graphics system components and related algorithms.
- Understand the basic principles of 3- 3-dimensional computer graphics.
- Provide insites on how to scan, convert the basic geometrical primitives, how to transform the shapes to fit them as per the picture definition.
- Provide an understanding of mapping from world coordinates to device coordinates, clipping, and projections.
- Discuss the application of computer graphics concepts in the development of computer games, information visualization, and business applications.

UNIT I OVERVIEW OF COMPUTER GRAPHICS SYSTEM

OverView of Computer Graphics System – Video display devices – Raster Scan and random scan system – Input devices – Hard copy devices.

Learning outcomes:

At the end of the unit, students will be able to:

- Explain the overview of computer graphics with visualization. (L2)
- Classify the Input devices. (L2)
- Distinguish raster scan and random scan systems. (L4)

UNIT II OUTPUT PRIMITIVES AND ATTRIBUTES

Drawing line, circle and ellipse generating algorithms – Scan line algorithm – Character Generation – attributes of lines, curves and characters – Antialiasing.

Learning outcomes:

At the end of the unit, students will be able to:

- Analyse output primitives and attributes. (L4)
- Design algorithms based on output. (L6)

UNIT III TWO DIMENSIONAL GRAPHICS TRANSFORMATIONS AND VIEWING:

Two-dimensional Geometric Transformations – Windowing and Clipping – Clipping of lines and clipping of polygons.

Learning outcomes:

At the end of the unit, students will be able to:

- Create two-dimensional graphics. (L6)
- Examine the clipping of polygon. (L4)
- Compare different forms of variations. (L2)

UNIT IV THREE DIMENSIONAL GRAPHICS AND VIEWING

Three-dimensional concepts – Object representations- Polygon table, Quadric surfaces, Splines, Bezier curves and surfaces – Geometric and Modelling transformations – Viewing - Parallel and perspective projections.

Learning outcomes:

At the end of the unit, students will be able to:

- Create three-dimensional graphics. (L6)
- Explain the Quadric surfaces and polygon table. (L2)
- Define modelling transformations. (L1)

UNIT V REMOVAL OF HIDDEN SURFACES

Visible Surface Detection Methods – Computer Animation.

Learning outcomes:

At the end of the unit, students will be able to:

- List the different types of detection methods. (L1)
- Compare various computer animations. (L2)

Course outcomes:

Upon completion of the course, the students should be able to:

- Explain the basic concepts used in computer graphics. (L2)
- Inspect various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping. (L4)
- Assess the importance of viewing and projections. (L5)
- Define the fundamentals of animation, virtual reality and its related technologies. (L3)
- Analyze the typical graphics pipeline (L4)

TEXTBOOK

1. Hearn, D. and Pauline Baker,M., Computer Graphics (C-Version), 2nd Edition, Pearson Education, 2002.

REFERENCES

1. Neuman, W.M., and Sproull, R.F., Principles of Interactive Computer Graphics, Mc Graw Hill Book Co., 1979.
2. Roger, D.F., Procedural elements for Computer Graphics, Mc Graw Hill Book Co., 1985.
3. Asthana, R.G.S and Sinha, N.K., Computer Graphics, New Age Int. Pub. (P) Ltd., 1996.
4. Floey, J.D., Van Dam, A, Feiner, S.K. and Hughes, J.F, Computer Graphics, Pearson Education, 2001.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0501	3	0	0	3	CIA	30 M
Course Title	:	Brewing Technology					SEE	70 M

PREAMBLE

This course covers the origin of brewing and ingredients used, methods and equipment used and innovations in this field.

Coues Objectives

- To understand the Beer manufacturing, ingredients and their roles.
- To understand overall view of a brewing industry

UNIT – I

Introduction of brewing, history of brewing; Raw materials: barley, hops, water, yeast; Adjuncts for beer production: Maize, rice, millet, wheat, sugar etc. Malt production, role of enzymes for malting; Barley storage, steeping, germination, kilning, cooling, storage;

Learning Outcomes:

At the end of the unit, the student should be able to:

- Introduction of brewing, history of brewing
- Raw materials like barley, hops, water, yeast
- Adjuncts for beer production: Maize, rice, millet, wheat, sugar etc
- Malt production, role of enzymes for malting
- Barley storage, steeping, germination, kilning, cooling, storage

UNIT – II

Malt from other cereals, caramel malt, roasted malt, smoked malt, malt extract; Malt quality evaluation, Wort production, malt milling, Mashing, Mashing vessels; Wort boiling, clarification, cooling and aeration Enzyme properties, starch degradation, b-glucan degradation; Conversion of fatty matter, Biological acidification

Learning Outcomes:

At the end of the unit, the student should be able to:

- Malt from other cereals, caramel malt, roasted malt, smoked malt, malt extract
- Malt quality evaluation, Wort production, malt milling, Mashing, Mashing vessels
- Wort boiling, clarification, cooling and aeration Enzyme properties, starch degradation, b-glucan degradation
- Conversion of fatty matter, Biological acidification

UNIT – III

Beer production methods, fermentation technology, changes during fermentation; Filtration procedure and equipment, beer stabilization conditions and durations, beer carbonation process; Packaging equipment and packaging materials, storage conditions and distribution process

Learning Outcomes:

At the end of the unit, the student should be able to:

- Beer production methods, fermentation technology, changes during fermentation
- Filtration procedure and equipment, beer stabilization conditions and durations, beer carbonation process
- Packaging equipment and packaging materials, storage conditions and distribution process

UNIT – IV

Brewing Equipment. Grain mill, kettles, siphons, carboys, fermentation equipment, wort chillers, pumps beer bottles, cans, labels, bottle caps, sanitation equipments Preventive Production of beer against technology, ling phenomenon of beer, possible measures against staling reactions, oxidation

Learning Outcomes:

At the end of the unit, the student should be able to:

- Brewing Equipments like Grain mill, kettles, siphons, carboys, fermentation equipment, wort chillers
- pumps beer bottles, cans, labels, bottle caps, sanitation equipments
- Preventive Production of beer against technology, ling phenomenon of beer, possible measures against staling reactions, oxidation

UNIT – V

Recent advances: Immobilized Cell Technology in Beer Production, immobilized yeast cell technology Energy management in the brewery and maltings; waste water treatment Automation and plant planning

Learning Outcomes:

At the end of the unit, the student should be able to:

- Immobilized Cell Technology in Beer Production, immobilized yeast cell technology
- Energy management in the brewery and maltings
- waste water treatment Automation and plant planning

Course Outcomes:

By the end of this course, students will attain the:

- Knowledge of beer making, chemistry of ingredients used for brewing,
- Knowledge on brewing industry, Unit operations and equipments involved.

TEXT BOOKS

1. Brewing: "Science and Practice, Brookes and Roger Stevens", Dennis E. Briggs, Chris A. Boulton, Peter A. 2004, Woodhead publishing limited.
2. Die Deutsche "Bibliothek Technology: "Brewing and Malting", Wolfgang Kunze. 2010, Bibliographic information published

REFERENCES

1. "Handbook of Brewing": Process, Technology, Markets, Hans Michael Eblinger. 2009, Wiley-VCH Verlag GmbH & Co.
2. Brewing: "New Technologies", Charles W. Bamforth. 2006, Woodhead Pub.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0303	3	0	0	3	CIA	30 M
Course Title	:	Optimization Techniques					SEE	70 M

Course Objectives:

The student will be able to learn:

- The basic concepts of Optimization
- The emphasis of this course is on different classical Optimization techniques linear programming and simplex algorithms.
- About optimality of balanced transportation Problems
- About Constrained and unconstrained nonlinear programming.
- About principle of optimality and dynamic programming

UNIT – I Introduction and Classical Optimization Techniques:

of an Optimization problem – design vector – design constraints – constraint surface – objective function – objective function surfaces – classification of Optimization problems. Classical Optimization Techniques: Single variable Optimization – multi variable Optimization without constraints – necessary and sufficient conditions for minimum/maximum – multivariable Optimization with equality constraints. Solution by method of Lagrange multipliers – multivariable Optimization with inequality constraints – Kuhn – Tucker conditions – Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To know how to formulate statement of optimization problem with or without constraints
- To know about classification of single and multivariable optimization problems
- To know about necessary and sufficient conditions in defining the optimization problems
- To understand how to formulate Kuhn-Tucker conditions and to solve numerical problems

UNIT – II Linear Programming

Standard form of a linear programming problem – geometry of linear programming problems – definitions and theorems – solution of a system of linear simultaneous equations – pivotal reduction of a general system of equations – motivation to the simplex method – simplex algorithm – Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To know about formulation of LPP
- To know about formulations of GPP
- To understand various theorems in solving simultaneous equations
- To understand about necessity of Simplex method and to solve numerical problems

UNIT – III Nonlinear Programming – One Dimensional Minimization methods

Introduction, Unimodal function, Elimination methods- Unrestricted Search, Exhaustive Search, Dichotomous Search, Fibonacci Method, Golden Section Method and their comparison; Interpolation

methods - Quadratic Interpolation Method, Cubic Interpolation Method and Direct Root Methods – Numerical examples.
Learning Outcomes:

At the end of unit, students will be able to understand the following

- To know about NLP in one dimensional optimization problems
- To understand about various search methods
- To learn about various interpolation methods
- To distinguish and compare the various elimination methods with numerical examples

UNIT – IV Unconstrained & Constrained Nonlinear Programming

Unconstrained Optimization Techniques: Introduction- Classification of Unconstrained Minimization Methods, General Approach, Rate of Convergence, Scaling of Design Variables; Direct Search methods- Random Search Methods, Grid Search Method, Pattern Directions, Powell's Method and Simplex Method

Constrained Optimization Techniques: Introduction, Characteristics of a Constrained Problem, Direct Search Methods - Random Search Methods, Basic Approach in the Methods of Feasible Directions, Rosen's Gradient Projection Method, Generalized Reduced Gradient Method and Sequential Quadratic Programming.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To distinguish between unconstrained and constrained optimization problems
- To learn about direct search methods in unconstrained NLP problems and comparison
- To understand about direct search methods in constrained NLP problems and comparison
- To do exercises for solving numerical examples of various methods

UNIT – V Dynamic Programming

Dynamic programming multistage decision processes – types – concept of sub optimization and the principle of optimality – computational procedure in dynamic programming – examples illustrating the calculus method of solution - examples illustrating the tabular method of solution– Numerical examples.

Learning Outcomes:

At the end of unit, students will be able to understand the following

- To know what is DP problem?
- To know about computational procedure in solving DPP
- To know Calculus and Tabular methods of solving with numerical examples of various methods

Course Outcomes:

The student gets thorough knowledge on:

- Basic methods, principles in optimization
- Formulation of optimization models, solution methods in optimization
- Finding initial basic feasible solutions.
- Methods of linear and non-linear (constrained and unconstrained) programming.
- Applications to engineering problems.

TEXT BOOKS:

1. S. S. Rao, “Engineering optimization”: Theory and practice 3rd edition, New Age International (P) Limited, 1998.
2. H.S. Kasana & K.D. Kumar, “Introductory Operations Research Springer (India)”, 2004.

REFERENCES:

1. R Fletcher, “Practical Methods of Optimization” , 2nd Edition, Wiley Publishers, 2000.
2. Jorge Nocedal and Wright S, “Numerical Optimization Springer”, 1st Edition, 1999.
3. by K.V. Mital and C. Mohan, “Optimization Methods in Operations Research and systems Analysis” 3rd Edition, New Age International (P) Limited, 1996.
4. by S.D. Sharma, “Operations Research”, Kedar Nath, 2012.
5. by H.A. Taha, “Operations Research”, 9th Edition, An Introduction Pearson, 2010.
6. G. Hadley, “Linear Programming”, Narosa, 2002.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Open Elective - I	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE9901	3	0	0	3	CIA	30 M
Course Title	:	Technical Communication And Presentation Skills					SEE	70 M

Course Objectives:

- To develop awareness in students of the relevance and importance of technical communication and presentation skills.
- To prepare the students for placements
- To sensitize the students to the appropriate use of non-verbal communication
- To train students to use language appropriately for presentations and interviews
- To enhance the documentation skills of the students with emphasis on formal and informal writing

UNIT -1:

Basics of Technical Communication – Introduction – Objectives & Characteristics of Technical Communication – Importance and need for Technical communication - LSRW Skills– Barriers to effective communication

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of LSRW skills
- Identify and overcome the barriers to effective communication
- Realize the need and importance of technical communication

UNIT -II

Informal and Formal Conversation - Verbal and Non-verbal communication –Kinesics, Proxemics, Chronemics, Haptics, Paralanguage

Learning Outcomes:

At the end of the module, the learners will be able to

- State the difference between formal and informal conversation.
- Apply the knowledge of the difference between the verbal and non-verbal communication
- Evaluate the different aspects of non-verbal communication.

UNIT -III

Written communication – Differences between spoken and written communication – Features of effective writing –Advantages and disadvantages of spoken and written communication- Art of condensation- summarizing and paraphrasing

Learning Outcomes:

At the end of the module, the learners will be able to

- Know the difference between written and spoken communication
- Apply the awareness of features of effective writing.
- Implement the understanding of summarizing and paraphrasing.

UNIT -IV

Presentation Skills – Nature and importance of oral presentation – Defining the purpose – Analyzing the audience - Planning and preparing the presentation, organizing and rehearsing the presentation – Individual and group presentations - Handling stage fright

Learning Outcomes:

At the end of the module, the learners will be able to

- State the importance of presentation skills in corporate climate.
- Analyze the demography of the audience.
- Plan, prepare and present individual and group presentations.

UNIT -V

Interview Skills – The Interview process –Characteristics of the job interview – Pre-interview preparation techniques – Projecting the positive image – Answering Strategies

Learning Outcomes:

At the end of the module, the learners will be able to

- Identify the characteristics of the job interview.
- Understand the process of Interviews.
- Develop a positive image using strategies in answering FAQs in interviews

Course Outcomes

- Understand the importance of effective technical communication
- Apply the knowledge of basic skills to become good orators
- Analyze non-verbal language suitable to different situations in professional life
- Evaluate different kinds of methods used for effective presentations
- Create trust among people and develop employability skills

TEXT BOOKS:

1. Ashrif Rizvi, “Effective Technical Communication”, TataMcGrahill, 2011
2. Meenakshi Raman &Sangeeta Sharma, “Technical Communication”, 3rd Edition, O U Press 2015

REFERENCES:

1. Pushpalatha & Sanjay Kumar, “Communication Skills”, Oxford Univsesity Press
2. Barron’s/Books on TOEFL/GRE/GMAT/CAT/IELTS DELTA/Cambridge University Press.2012.
3. Butterfield Jeff, “Soft Skills for Everyone”, Cengage Publications, 2011.
4. Universities Press (India) Pvt Ltd., “Management Shapers Series”, Himayatnagar, Hyderabad 2008.
5. John Hughes & Andrew Mallett, “Successful Presentations” Oxford.
6. Edgar Thorpe and Showick Thorpe, “Winning at Interviews” Pearson
7. Munish Bhargava, “Winning Resumes and Successful Interviews”, McGraw Hill

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9905	3	0	0	0	CIA	30 M
Course Title	:	Essence of Indian Knowledge Tradition					SEE	--

Course Objectives:

To facilitate the students with the concepts of Indian traditional knowledge and to make themunderstand the Importance of roots of knowledge system

- The course aim of the importing basic principle of third process reasoning and inference sustainability is at the course of Indian traditional knowledge system
- To understand the legal framework and traditional knowledge and biological diversity act 2002 and geographical indication act 2003
- The courses focus on traditional knowledge and intellectual property mechanism of traditional knowledge and protection
- To know the student traditional knowledge in different sector

UNITI

Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge, the physical and social contexts in which traditional knowledge develop, the historical impact of social change on traditional knowledge systems. Indigenous Knowledge (IK), characteristics, traditional knowledge vis-à-vis indigenous knowledge, traditional knowledge Vs western knowledge traditional knowledge vis-à-vis formal knowledge

Learning Outcomes:

At the end of the unit, the student will able to:

- Understand the traditional knowledge.
- Contrast and compare characteristics importance kinds of traditional knowledge.
- Analyze physical and social contexts of traditional knowledge.
- Evaluate social change on traditional knowledge.

UNIT II

Protection of traditional knowledge: the need for protecting traditional knowledge Significance ofTK Protection, value of TK in global economy, Role of Government to harness TK.

Learning Outcomes:

At the end of the unit, the student will able to:

- Know the need of protecting traditional knowledge.
- Apply significance of tk protection.
- Analyze the value of tk in global economy.
- Evaluate role of government

UNIT III

Legal framework and TK: A: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmers Rights Act,2001 (PPVFR Act);B:The Biological Diversity Act 2002 and Rules 2004, the protection oftraditional knowledge bill, 2016. Geographical indications act 2003.

Learning Outcomes:

At the end of the unit the student will able to:

- Understand legal framework of TK.
- Contrast and compare the ST and other traditional forest dwellers
- Analyze plant variant protections
- Evaluate farmers right act

UNIT IV

Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Certain non IPR mechanisms of traditional knowledge protection, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, global legal FORA for increasing protection of Indian Traditional Knowledge.

Learning Outcomes:

At the end of the unit, the student will able to:

- Understand TK and IPR
- Apply systems of TK protection.
- Analyze legal concepts for the protection of TK.
- Evaluate strategies to increase the protection of TK.

UNIT V

Traditional knowledge in different sectors: Traditional knowledge and engineering, Traditional medicine system, TK and biotechnology, TK in agriculture, Traditional societies depend on it fortheir food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK.

Learning Outcomes:

At the end of the unit, the student will able to:

- Know TK in different sectors.
- Apply TK in engineering.
- Analyze TK in various sectors.
- Evaluate food security and protection of TK in the country.

Reference Books:

1) Traditional Knowledge System in India, by Amit Jha, 2009.
2) Traditional Knowledge System and Technology in India by Basanta Kumar Mohanta and Vipin Kumar Singh, PratibhaPrakashan 2012.
3) Traditional Knowledge System in India by Amit Jha Atlantic publishers, 2002
4) "Knowledge Traditions and Practices of India" Kapil Kapoor, Michel Danino

e-Resources:

1) https://www.youtube.com/watch?v=LZP1StpYEPM
2) http://nptel.ac.in/courses/121106003/

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0512P	0	0	3	1.5	CIA	30 M
Course Title	:	Artificial Intelligence Laboratory					SEE	70 M

Course Objectives:

This course is designed to:

1. Explore the methods of implementing algorithms using artificial intelligence techniques
2. Illustrate search algorithms
3. Demonstrate building of intelligent agents

List of Experiments:

1. Write a program to implement DFS and BFS

2. Write a Program to find the solution for travelling salesman Problem

3. Write a program to implement Simulated Annealing Algorithm

4. Write a program to find the solution for wampus world problem

5. Write a program to implement 8 puzzle problem

6. Write a program to implement Towers of Hanoi problem

7. Write a program to implement A* Algorithm

8. Write a program to implement Hill Climbing Algorithm

9. Build a Chatbot using AWS Lex, Pandora bots.

10. Build a bot which provides all the information related to your college.

11. Build a virtual assistant for Wikipedia using Wolfram Alpha and Python

12. The following is a function that counts the number of times a string occurs in another string: # Count the number of times string s1 is found in string s2

```
def countsubstring(s1,s2):
count = 0
for i in range(0,len(s2)-len(s1)+1):
if s1 == s2[i:i+len(s1)]:
count += 1 return count
```

For instance, countsubstring('ab','cabalaba') returns 2.

Write a recursive version of the above function. To get the rest of a string (i.e. everything but the first character).

14. Higher order functions. Write a higher-order function count that counts the number of elements in a list that satisfy a given test. For instance: count(lambda x: x>2, [1,2,3,4,5]) should return 3, as there are three elements in the list larger than 2. Solve this task without using any existing higher-order function.

15. Brute force solution to the Knapsack problem. Write a function that allows you to generate random problem instances for the knapsack program. This function should generate a list of items containing N items that each have a unique name, a random size in the range 1 5

and a random value in the range 1 10.

Next, you should perform performance measurements to see how long the given knapsack solver take to solve different problem sizes. You should peform atleast 10 runs with different randomly generated problem instances for the problem sizes 10,12,14,16,18,20 and 22. Use a

backpack size of 2:5 x N for each value problem size N. Please note that the method used to generate random numbers can also affect performance, since different distributions of values can make the initial conditions of the problem slightly more or less demanding.

How much longer time does it take to run this program when we increase the number of items? Does the backpack size affect the answer?

Try running the above tests again with a backpack size of 1 x N and with 4:0 x N.

16. Assume that you are organising a party for N people and have been given a list L of people who, for social reasons, should not sit at the same table. Furthermore, assume that you have C tables (that are infinitly large).

Write a function layout(N,C,L) that can give a table placement (ie. a number from 0 : : :C -1) for each guest such that there will be no social mishaps.

For simplicity we assume that you have a unique number 0 ......N-1 for each guest and that the list of restrictions is of the form [(X,Y), ...] denoting guests X, Y that are not allowed to sit together. Answer with a dictionary mapping each guest into a table assignment, if there are no possible layouts of the guests you should answer False.

References:

1 Tensorflow: https://www.tensorflow.org/
2 Pytorch:
https://pytorch.org/ https://github.com/pytorch
3 Keras: https://keras.io/
https://github.com/keras-team
4 Theano:
http://deeplearning.net/software/theano/ https://github.com/Theano/Theano
5 Cafee2: https://caffe2.ai/
https://github.com/caffe2
6 Deeplearning4j: https://deeplearning4j.org/
7 Scikit-learn:https://scikit-learn.org/stable/ https://github.com/scikit-learn/scikit-learn
8 Deep Learning.Ai: https://www.deeplearning.ai/

9 OpenCv: https://opencv.org/
https://github.com/qqwweee/keras-yolo3
10 YOLO:
https://www.pyimagesearch.com/2018/11/12/yolo-object-detection-with-opencv/ nVIDIA:CUDA
https://developer.nvidia.com/cuda-math-library
11 David Poole, Alan Mackworth, Randy Goebel, ”Computational Intelligence : a logical approach”, Oxford University Press, 2004.
12 G. Luger, “Artificial Intelligence: Structures and Strategies for complex problem solving”, Fourth Edition, Pearson Education, 2002.
13 J. Nilsson, “Artificial Intelligence: A new Synthesis”, Elsevier Publishers, 1998.
14 Artificial Neural Networks, B. Yagna Narayana, PHI
15 Artificial Intelligence , 2nd Edition, E.Rich and K.Knight, TMH.
16 Artificial Intelligence and Expert Systems, Patterson, PHI.

Course Outcomes:

Upon completion of the course, the students should be able to:

1. Implement search algorithms (L3)
2. Solve Artificial intelligence problems (L3)
3. Design chatbot and virtual assistant (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0514P	0	0	3	1.5	CIA	30 M
Course Title	:	Computer Networks Laboratory					SEE	70 M

Course Objectives:

This course is designed to:

- Understand the different types of networks
- Discuss the software and hardware components of a network
- Enlighten the working of networking commands supported by operating system
- Impart knowledge of Network simulator 2/3
- Familiarize the use of networking functionality supported by JAVA
- Familiarize with computer networking tools.

List of Experiments

1. Study different types of Network cables (Copper and Fiber) and prepare cables (Straight and Cross) to connect Two or more systems. Use crimping tool to connect jacks. Use LAN tester to connect the cables.

Install and configure Network Devices: HUB, Switch and Routers. Consider both manageable and non-manageable switches. Do the logical configuration of the system. Set the bandwidth of different ports.

Install and Configure Wired and Wireless NIC and transfer files between systems in Wired LAN and Wireless LAN. Consider both adhoc and infrastructure mode of operation.

2. Work with the commands Ping, Tracert, Ipconfig, pathping, telnet, ftp, getmac, ARP, Hostname, Nbtstat, netdiag, and Nslookup

3. Use Sniffers for monitoring network communication (Ethereal)

4. Find all the IP addresses on your network. Unicast, Multicast, and Broadcast on your network.

5. Use Packet tracer software to build network topology and configure using Distance vector routing protocol.

6. Use Packet tracer software to build network topology and configure using Link State routing protocol.

7. Using JAVA RMI Write a program to implement Basic Calculator

8. Implement a Chatting application using JAVA TCP and UDP sockets.

9. Hello command is used to know whether the machine at the other end is working or not. Echo command is used to measure the round trip time to the neighbour. Implement Hello and Echo commands using JAVA.

10. Use Ethereal tool to capture the information about packets.

11. Install Network Simulator 2/3. Create a wired network using dumbbell topology. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

12. Create a static wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

13. Create a mobile wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

Course outcomes:

Upon completion of the course, the students should be able to:

- Design scripts for Wired network simulation (L6)
- Design scripts of static and mobile wireless networks simulation (L6)
- Analyze the data traffic using tools (L4)
- Design JAVA programs for client-server communication (L6)
- Construct a wired and wireless networks using the real hardware (L3)

Reference Books:

1. Shivendra S.Panwar, Shiwen Mao, Jeong-dong Ryoo, and Yihan Li, “TCP/IP Essentials A Lab-Based Approach”, Cambridge University Press, 2004.
2. Cisco Networking Academy, “CCNA1 and CCNA2 Companion Guide”, Cisco Networking Academy Program, 3rd edition, 2003.
3. Ns Manual, Available at: https://www.isi.edu/nsnam/ns/ns-documentation.html, 2011.
4. Elloitte Rusty Harold, “Java Network Programming”, 3rd edition, O’REILLY, 2011.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(V Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0511P	0	0	2	1	CIA	30 M
Course Title	:	Object-Oriented Analysis, Design And Testing Lab					SEE	70 M

Course Objectives:

This course is designed to:

- Understand and define the context and the external interaction with the System
- Identify the principle objects in the system
- Develop the design models
- Familiarize with usage of open source UML Case tools
- Apply testing tools Viz. Cobertura, JMeter…

Laboratory Experiments

1. Initial Familiarization to a UML CASE tool such as the free tool Argo UML
2. Drawing Class diagram for a very simple problem such as the following in Argo UML and generating skeletal code in Java and C++
   - A country has a capital city
   - A dining philosopher uses a fork
   - A file is an ordinary file or a directory file
   - Files contain records
   - A class can have several attributes
   - A relation can be association or generalization
   - A polygon is composed of an ordered set of points
   - A person uses a computer language on a project
3. Use UML tool (such as Argo UML) for use case modeling for a given problem
4. Use UML tool (such as Argo UML) for development of domain model for a given problem
5. Use UML tool (such as Argo UML) to develop sequence and collaboration diagrams for a given problem [2 Classes]
6. Use UML tool (such as Argo UML) to develop state model for a given problem
7. Generate C++/Java skeletal code for the design solution developed for a given problem
8. Complete the skeletal code generated by UML tool (such as Argo UML) to generate complete code [2 Classes]
9. Perform class level testing and measure coverage using tools such as Cobertura
10. Develop integration test cases from Sequence diagram and perform integration testing.
11. Perform performance testing using tools such as JMeter

Course Outcomes

Upon completion of the course, the students should be able to:

1. Design use case, sequence and collaboration diagrams (L6)
2. Develop the different models to document an Object-oriented design.(L3)
3. Demonstrate class level and system integration testing (L2)

Text Book:

1. Rajib Mall, “Fundamentals of Software Engineering”, 5th Edition, PHI, 2018 (Chapters 7 and 8)

Reference Books:

1. Rumbaugh and Blaha, Object-oriented Modeling and design with UML, Pearson, 2007
2. Bernd Bruegge and, Allen H. Dutoit, Object-Oriented Software Engineering Using UML,

Patterns, and Java, Pearson, 2009

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0515	3	0	0	3	CIA	30 M
Course Title	:	Systems Software and Compiler Design					SEE	70 M

Course Objectives:

The Course is designed to:

- Understand the System Programming concepts viz. assemblers, loaders, linkers and editors
- Introduce the basic principles of the compiler construction
- Explain the Concept of Context Free Grammars, Parsing and various Parsing Techniques.
- Explore the process of intermediate code generation.
- Illustrate the process of Code Generation and various Code optimization techniques.

Unit-I:

Introduction to Systems Software: Basic Assembler functions, Machine Dependant Assembler features, Machine Independent Assembler features, Basic Loader functions, Machine Dependant Loader features, Machine Independent Loader features, Text Editors, Language processors, The Structure of a Compiler.

A Simple Syntax-Directed Translator: Introduction, Syntax Definition, Syntax-Directed Translation, Parsing, A Translator for Simple Expressions, Lexical Analysis, Symbol Tables, Intermediate Code Generation.

Learning Outcomes:

At the end of the module, the learners will be able to

- Recognize the importance of Systems software (L1)
- Identify the phases of a Compiler (L3)
- Outline the syntax rules (L2)

Unit-II:

Lexical Analysis: The Role of the Lexical Analyzer, Input Buffering, Specification of Tokens, Recognition of Tokens, The Lexical-Analyzer Generator Lex, Finite Automata, From Regular Expressions to Automata, Design of a Lexical-Analyzer Generator, Optimization of DFA-Based Pattern Matchers.

Learning Outcomes:

At the end of the module, the learners will be able to

- Identify the tokens in a program. (L3)
- Explain the process of lexical analysis (L2)

Unit – III:

Syntax Analysis: Introduction, Context-Free Grammars, Writing a Grammar, Writing a Grammar, Bottom-Up Parsing, Introduction to LR Parsing: Simple LR, More Powerful LR Parsers, Using Ambiguous Grammars, Parser Generators.

Learning Outcomes:

At the end of the module, the learners will be able to

- Examine the syntax of program constructs (L4)
- Evaluate the correctness of a program (L5)

Unit – IV:

Syntax-Directed Translation: Syntax-Directed Definitions, Evaluation orders for SDD’s, Application of SDT, SDT schemes, Implementing L-attribute SDD’s.

Intermediate Code Generation: Variants of Syntax Trees, Three address code, Translation of Expressions, Control Flow

Learning Outcomes:

At the end of the module, the learners will be able to

- Explain the process of syntax directed translation (L1)
- Develop intermediate code (L6)

Unit-V:

Code Generation: Issues in the Design of a Code Generator, The Target Language, Addresses in the Target Code, A Simple Code Generator, Peephole Optimization, Register Allocation and Assignment, Instruction Selection by Tree Rewriting, Optimal Code Generation for Expression, Dynamic Programming Code-Generation, The Principal Sources of Optimizations.

Learning Outcomes:

At the end of the module, the learners will be able to

- Generate code (L6)
- Create optimized code (L6)

Course Outcomes:

Students will be able to:

- Differentiate the various phases of a compiler (L4).
- Identify the tokens and verify the code (L4)
- Design code generator (L6)
- Apply code optimization techniques (L3)
- Design a compiler for a small programming language (L6)

Text Books :

1. Leland L. Beck, “System Software – An Introduction to Systems Programming”,3rd Edition, Pearson Education Asia, 2008.
2. Alfred V. Aho, Monica S. Lam, Ravi Sethi, Jeffrey D. Ullman, “Compilers Principles, Techniques and Tools”, 2nd Edition, Pearson.

Reference Books

1. Yunlin Su, Song Y. Yan, “Principles of Compilers”, Springer, 2012.
2. Andrew W. Appel, “Modern Compiler Implementation in JAVA”, 2nd edition, Cambridge University Press, 2004.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0516	3	0	0	3	CIA	30 M
Course Title	:	Machine Learning					SEE	70 M

Course Objectives:

This course is designed to:

- Understand the basic theory underlying machine learning
- Formulate machine learning problems corresponding to different applications.
- Illustrate a range of machine learning algorithms along with their strengths and weaknesses
- Apply machine learning algorithms to solve problems of moderate complexity.
- Understand how Machine Learning imbibes the philosophy of Human learning.

UNIT I

Introduction: Learning Problems – Perspectives and Issues – Concept Learning – Version Spaces and Candidate Eliminations – Inductive bias – Decision Tree learning – Representation – Algorithm – Heuristic Space Search.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explore how to build computer programs that improve their performance at some task through experience. (L6).
- Interpret Decision tree learning as practical methods for inductive inference. (L2)

UNIT II

NEURAL NETWORKS AND GENETIC ALGORITHMS: Neural Network Representation – Problems – Perceptrons – Multilayer Networks and Back Propagation Algorithms – Advanced Topics – Genetic Algorithms – Hypothesis Space Search – Genetic Programming – Models of Evolution and Learning.

Learning Outcomes:

At the end of the unit, students will be able to:

- Appraise artificial neural networks as one of the most effective learning methods currently known to interpret complex real-world sensor data,. (L5).
- Illustrates the use of the genetic algorithm approach, and examine the nature of its hypothesis space search.(L2)

UNIT III

BAYESIAN AND COMPUTATIONAL LEARNING: Bayes Theorem – Concept Learning– Maximum Likelihood – Minimum Description Length Principle – Bayes Optimal Classifier– Gibbs Algorithm – Naïve Bayes Classifier – Bayesian Belief Network – EM Algorithm – Probability Learning – Sample Complexity – Finite and Infinite Hypothesis Spaces – Mistake Bound Model.

Learning Outcomes:

At the end of the unit, students will be able to:

- Illustrate the principles of Probability for classification as an important area of Machine Learning Algorithms. (L2)

- Analyze sample complexity and computational complexity for several learning Problems (L4)

UNIT IV

INSTANCE BASED LEARNING: K- Nearest Neighbor Learning – Locally weighted Regression – Radial Bases Functions – Case Based Learning.

Learning Outcomes:

At the end of the unit, students will be able to:

- Infer that the Instance based algorithms can be used to overcome memory complexity and overfitting problems. (L2).

UNIT V

ADVANCED LEARNING : Learning Sets of Rules – Sequential Covering Algorithm – Learning Rule Set – First Order Rules – Sets of First Order Rules – Induction on Inverted Deduction – Inverting Resolution – Analytical Learning – Perfect Domain Theories – Explanation Base Learning – FOCL Algorithm – Reinforcement Learning – Task – Q- Learning – Temporal Difference Learning

Learning Outcomes:

At the end of the unit, students will be able to:

- Infer that the combined methods outperform both purely inductive and purely analytical learning methods. (L2)
- Recognize the importance of Reinforcement Learning in the industry.

Course Outcomes:

Upon completion of the course, the students should be able to:

- Identify machine learning techniques suitable for a given problem. (L3)
- Solve the real world problems using various machine learning techniques. (L6)
- Apply Dimensionality reduction techniques for data preprocessing. (L3)
- Explain what is learning and why it is essential in the design of intelligent machines. (L2)
- Implement Advanced learning models for language, vision, speech, decision making etc. (L1)

Text Books:

1) T.M. Mitchell, “Machine Learning”, McGraw-Hill, 1997.

Reference Books:

1) Ethern Alpaydin, “Introduction to Machine Learning”, MIT Press, 2004.
2) Stephen Marsland, “Machine Learning -An Algorithmic Perspective”, Second Edition, Chapman and Hall/CRC Machine Learning and Pattern Recognition Series, 2014.
3) Andreas C. Müller and Sarah Guido “Introduction to Machine Learning with Python: A Guide for Data Scientists”, Oreilly.

e-Resources:

1) Andrew Ng, “Machine Learning Yearning” https://www.deeplearning.ai/machine-learning-yearning/
2) Shai Shalev-Shwartz , Shai Ben-David, “Understanding Machine Learning: From Theory to Algorithms”, Cambridge University Press https://www.cse.huji.ac.il/~shais/UnderstandingMachineLearning/index.html

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(VI Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0517T	3	0	0	3	CIA	30 M
Course Title	:	Mobile Application Development					SEE	70 M

COURSE OBJECTIVES:

This course is designed to:

- Facilitate students to understand android SDK
- Help students to gain a basic understanding of Android application development
- Inculcate working knowledge of Android Studio development tool

UNIT-I: Introduction to Android: The Android Platform, Android SDK, Eclipse Installation, Android Installation, Building you First Android application, Understanding Anatomy of Android Application, Android Manifest file.

Learning Outcomes:

At the end of the unit, students will be able to:

- Make use of the Android platform (L3)
- Create and Run Android project using SDK (L6)
- Define the Anatomy of Android Application. (L1)

UNIT-II:Android Application Design Essentials: Anatomy of an Android applications, Android terminologies, Application Context, Activities, Services, Intents, Receiving and Broadcasting Intents, Android Manifest File and its common settings, Using Intent Filter, Permissions

Learning Outcomes:

At the end of the unit, students will be able to:

1. Explain the terminology used in Android applications (L2)
2. Develop first level Android applications that can accept information from the users (L3)
3. Illustrate the Android Manifest File and its common settings (L2)

UNIT-III:Android User Interface Design Essentials: User Interface Screen elements, Designing User Interfaces with Layouts, Drawing and Working with Animation.

Learning Outcomes:

At the end of the unit, students will be able to:

- Design Android application screen with various elements for improving users experience(L6)
- Develop Android application with animations (L6)

UNIT-IV: Testing Android applications, Publishing Android application, Using Android preferences, Managing Application resources in a hierarchy, working with different types of resources.

Learning Outcomes:

At the end of the unit, students will be able to:

- Demonstrate Testing and publishing of their developed Android applications in the internet. (L2)

- Explain how to manage Application resources in a hierarchy (L2)

UNIT V: Using Common Android APIs: Using Android Data and Storage APIs, Managing data using Sqlite,Sharing Data between Applications with Content Providers, Using Android Networking APIs, Using Android Web APIs, Using Android Telephony APIs, Deploying Android Application to the World.

Learning Outcomes:

At the end of the unit, students will be able to:

- Develop top end applications that work with data storing and sharing facility.(L6)
- Interpret and Develop applications based on customer perspective (L5)
- Utilize various Android API's for improving users experience (L3)

Course Outcomes

Upon completion of the course, the students should be able to:

- Identify various concepts of mobile programming that make it unique from programming forother platforms (L3)
- Evaluate mobile applications on their design pros and cons. (L5)
- Utilize rapid prototyping techniques to design and develop sophisticated mobile interfaces. (L3)
- Develop mobile applications for the Android operating system that use basic and advanced phone features. (L6)
- Demonstrate the deployment of applications to the Android marketplace for distribution. (L2)

TEXT BOOKS:

1. Lauren Darcey and Shane Conder, "Android Wireless Application Development", Pearson Education, 3nd ed. (2013)

REFERENCE BOOKS:

1. Reto Meier, "Professional Android 2 Application Development", Wiley India Pvt Ltd
2. Mark L Murphy, "Beginning Android", Wiley India Pvt Ltd
3. Android Application Development All in one for Dummies by Barry Burd, Edition: I

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester CSE)

Course Category	:	Professional Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0504	3	0	0	3	CIA	30 M
Course Title	:	Mobile Computing					SEE	70 M

Course Objectives:

- To make the student understand the concept of mobile computing paradigm, its novel applications and limitations.
- To understand the typical mobile networking infrastructure through a popularGSMprotocol
- To understand the issues and solutions of various layers of mobile networks, namely MAC layer, Network Layer & Transport Layer
- To understand the database issues in mobile environments & data delivery models.
- To understand the ad hoc networks and related concepts.
- To understand the platforms and protocols used in mobile environment.

UNIT-I:

Introduction: Mobile Communications, Mobile Computing – Paradigm, Promises/Novel Applications, Architecture, Mobile and Handheld Devices, Limitations of Mobile and Handheld Devices.

GSM and Other Networks: Services, System Architecture, Radio Interfaces, Protocols, Localization, Calling, Handover, Security, New Data Services, GPRS,Wireless Medium AccessControl,3G and 4G communication networks.

UNIT-II:

Mobile Network Layer: IP: IPV4 and IPV6 and Mobile IP Network Layers, Packet Delivery Agent Discovery, Registration, Tunneling and Encapsulation, Route Optimization, DHCP.

Introduction to Mobile Adhoc network: fixed infrastructure architecture, MANETinfrastructureArchitecture, MANET: properties, spectrum, applications, Security in Ad-hoc network, Wirelesssensor networks, sensor network applications.

UNIT-III:

Mobile Transport Layer: Conventional TCP/IP Protocols, Indirect TCP, Snooping TCP,Mobile TCP, Other Transport Layer Protocols for Mobile Networks.

Database Issues: Database Hoarding & Caching Techniques, Client-Server Computing &Adaptation, Transactional Models, Query processing, Data Recovery Process &QoS Issues.

UNIT-IV:

Data Dissemination and Synchronization: Communications Asymmetry, Classification ofData Delivery Mechanisms, Data Dissemination, Broadcast Models, Selective Tuning andIndexing Methods, Data Synchronization: Introduction, Software, and Protocols.

UNIT -V:

File Systems: Coda, Little work, Ficus, Mio-NFS and Rover

Protocols and Platforms for Mobile Computing: WAP, Bluetooth, XML, J2ME, Java Card,PalmOS, Windows CE, SymbianOS, Linux for Mobile Devices, Android.

Course Outcomes:

- Understand the fundamentals of wireless communications.
- Able to develop new ad hoc network applications or algorithms or protocols.
- To solve various issues arises while transferring data from one device to another in thenetwork.

- To know different data delivery methods and synchronization protocols.
- Develop applications that are mobile-device specific and demonstrate current Practice inmobile computing contexts.

TEXT BOOKS:

1. Jochen Schiller, “Mobile Communications”, Addison-Wesley.
2. Raj Kamal, “Mobile Computing”, Oxford University Press.

REFERENCE BOOKS:

1. Asoke K Talukder and Roopa R Yavagal, Mobile Computing, Tata-McGraw-Hill.
2. “Principles of Mobile Computing,”, UWE Hansmann, LotherMerk, Martin S. Nocklous,Thomas Stober, Springer.

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(VI Semester CSE)

Course Category	:	Professional Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0505	3	0	0	3	CIA	30 M
Course Title	:	Data Science using Python					SEE	70 M

Course Objectives

This course is designed to:

- Understand the approaches for handling data related problems
- Explore the mathematical concepts required for Data science
- Explain the basic concepts of data science.
- Elucidate various Machine Learning algorithms.
- Introduce Natural Language Processing and Recommender Systems

UNIT- I

Introduction to Data Science, A Crash Course in Python, Visualising Data.

Learning Outcomes:

At the end of the unit, students will be able to:

- Describe the importance of data analysis (L1).
- Identify the key connectors of Data Science (L4).
- Interpret and Visualize the data using bar charts, line charts and scatter plots (L3).

UNIT-II

Linear Algebra, Statistics, Probability, Hypothesis and Inference, Gradient Descent.

Learning Outcomes:

At the end of the unit, students will be able to:

- Identify the Correlation between two vectors (L4).
- Test a given hypothesis (L3).
- Compute mean, median and mode for the given data (L3).

UNIT-III

Getting Data, Working with Data, Machine Leaning, k-Nearest Neighbors, Naïve Bayes.

Learning Outcomes:

At the end of the unit, students will be able to:

- Compute dimensionality reduction using PCA (L3).
- Differentiate supervised and unsupervised learning methods (L4).
- Describe overfitting, under fitting, bias, variance and goodness of learning (L1).
- Solve classification problem using k-nearest neighbour classifier (L3).
- Apply Naïve Bayes classifier to solve decision making problem (L3).

UNIT-IV

Simple Linear Regression, Multiple Regression, Logistic Regression, Decision Trees, Neural Networks.

Learning Outcomes:

At the end of the unit, students will be able to:

- Describe gradient descent approach, maximum likelihood estimation and method of least squares (L1).
- Apply SVM to determine a hyperplane with maximum margin (L3).
- Determine decision tree for given data (L5).
- Describe Perceptron and Back Propagation (L3).

UNIT-V

Clustering, Natural Language Processing, Network Analysis, Recommender Systems. Database and SQL, MapReduce

Learning Outcomes:

At the end of the unit, students will be able to:

- Determine Clusters in data using k-means and Hierarchical Clustering methods (L5).
- Apply basic SQL Operations using NotQuiteABase (L3).
- Compare User-Based and Item-Based Collaborative Filtering (L2).
- Describe Grammer and MapReduce (L1).

Course Outcomes:

After completion of this course the student would be able to

- Visualize the data using bar charts, line charts and scatter plots (L4).
- Analyse Correlation between two data objects (L4).
- Demonstrate feature selection and dimensionality reduction.(L2)
- Solve decision making problems using k-NN, Naïve Bayes, SVM and Decision. Trees (L3).
- Determine Clusters in data using k-means and Hierarchical Clustering methods (L3).
- Design basic SQL Operations using NotQuiteABase (L6)
- Demonstrate the way to use machine learning algorithms using python. (L2)

Text Books:

1. Data Science from Scratch, First Principles with Python - Joel Grus, O'Reilly, First Edition.

Reference Books:

1. The Data Science Handbook, Field Cady, WILEY.
2. An Introduction to Data Science, Jeffrey M. Stanton, Jeffrey Stanton, 2012

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester CSE)

Course Category	:	Professional Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0506	3	0	0	3	CIA	30 M
Course Title	:	Design Patterns					SEE	70 M

Course Objectives:

This course is designed to:

- Understand design patterns and their underlying objects oriented concepts.
- Learn the day-to-day problems faced by object-oriented designers and how design patterns solve them
- Provide an interface for creating families of related objects without specifying their concrete classes.
- To know the consequences of combining patterns on the overall quality of a system.

UNIT-I

Introduction to Design Patterns

Design Pattern Definition, Design Patterns in Small Talk MVC, Describing Design Patterns, Catalog of Design Patterns, Organizing the Catalog, Solving of Design Problems using Design Patterns, Selection of a Design Pattern, Use of Design Patterns.

Learning Outcomes:

At the end of the unit, students will be able to:

- Develop design patterns in Small Talk MVC (L6).
- How to select and use a Design Pattern (L1).
- Solve problems using design patterns (L3).

UNIT-II

Designing A Document Editor: A Case Study

Design problems, Document structure, Formatting, Embellishing the User Interface, Supporting Multiple Look and Feel standards, Supporting Multiple Window Systems, User Operations, Spelling Checking and Hyphenation. Creational Patterns: Abstract Factory, Builder, Factory Method, Prototype, Singleton, Discussion of Creational Patterns.

Learning Outcomes:

At the end of the unit, students will be able to:

- Apply eight different patterns to Lexi's design. (L3).
- Specify the kinds of objects to create new objects using prototype(L4).

UNIT-III

Structural Patterns-1: Adapter, Bridge, Composite.

Structural Patterns-2: Decorator, Facade, Flyweight, Proxy, Discuss of Structural Patterns.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand structural patterns (L2).
- Explain adapter, bridge and composite structural patterns (L2).

- Create decorator, facade, flyweight and proxy structural patterns (L6).

UNIT-IV

Behavioral Patterns-1: Chain of Responsibility, Command, Interpreter, Iterator. Behavioral Patterns-2: Mediator, Memento, Observer.

Learning Outcomes:

At the end of the unit, students will be able to:

- Define behavioral patterns (L1).
- Demonstrate object scope behavioral patterns (L2).
- Justify description for different types of behavioral patterns (L5).

UNIT-V

Behavioral Patterns-2(cont'd): State, Strategy, Template Method, Visitor, and Discussion of Behavioral Patterns.

What to Expect from Design Patterns, a Brief History. The Pattern Community An Invitation, A Parting Thought.

Learning Outcomes:

At the end of the unit, students will be able to:

- Identify behavioural patterns (L6).
- Justify different types of behavioural patterns (L5).
- Determine community for patterns (L4).

Course Outcomes:

Upon completion of the course, the students should be able to:

- Develop own way of working with design patterns. (L6).
- Critique well-known design patterns (L5).
- Distinguish different categories of design patterns (L4).
- Apply common design patterns to incremental/iterative development (L3).
- Identify appropriate patterns for solving a given problem (L3).

TEXT BOOK:

1. Erich Gamma, “Design Patterns”, Pearson Education.

REFERENCE BOOKS:

1. Mark Grand, “Pattern's in JAVA” , Vol-I, Wiley DreamTech.
2. Mark Grand, “Pattern's in JAVA”, Vol-II By, Wiley DreamTech.
3. Mark Grand, “JAVA Enterprise Design Patterns”, Vol-III, Wiley DreamTech.
4. Buschmann & others, “Pattern Oriented Software Architecture”, John Wiley & Sons.

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(VI Semester CSE)

Course Category	:	Open Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0104	3	0	0	3	CIA	30 M
Course Title	:	Industrial Waste And Waste Water Management					SEE	70 M

Course Objectives:

- To teach Health and Environment Concerns in waste water management
- To teach material balance and design aspects of the reactors used in waste water treatment.
- To impart knowledge on selection of treatment methods for industrial waste water
- To teach common methods of treatment in different industries
- To provide knowledge on operational problems of common effluent treatment plant

UNIT –I

Industrial water Quantity and Quality requirements:

Boiler and cooling waters–Process water for Textiles, Food processing, Brewery Industries, power plants, fertilizers, sugar mills Selection of source based on quality, quantity and economics. Use of Municipal wastewater in Industries – Adsorption, Reverse Osmosis, Ion Exchange, Ultra filtration, Freezing, Elutriation, Removal of Colour, Odour and Taste.

Learning Outcomes:

At the end of the unit, students will be able to:

- Learn the procedures for assessment of quality of Industrial water
- Suggest different processes of handling waste water

UNIT –II

Basic theories of Industrial Wastewater Management: Industrial waste survey - Measurement of industrial wastewater Flow-generation rates – Industrial wastewater sampling and preservation of samples for analysis -Wastewater characterization-Toxicity of industrial effluents-Treatment of wastewater-unit operations and processes-Volume and Strength reduction – Neutralization and Equalization, Segregation and proportioning- recycling, reuse and resources recovery

Learning Outcomes:

At the end of the unit, students will be able to:

- Measure industrial waste water flow
- Characterize waste water
- Suggest techniques for treatment of waste water.

UNIT –III

Industrial wastewater disposal management: Discharges into Streams, Lakes and oceans and associated problems, Land treatment - Common Effluent Treatment Plants: advantages and suitability, Limitations and challenges- Recirculation of Industrial Wastes- Effluent Disposal Method

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand options for waste water disposal.
- Explain functioning of common effluent treatment plants

UNIT – IV

Process and Treatment of specific Industries-1: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Steel plants, Fertilizers, Textiles, Paper and Pulp industries, Oil Refineries, Coal and Gas based Power Plants

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand the character of waste water from Steel plants and refineries
- Suggest suitable waste water treatment techniques

UNIT – V

Process and Treatment of specific Industries-2: Manufacturing Process and origin, characteristics, effects and treatment methods of liquid waste from Tanneries, Sugar Mills, Distillers, Dairy and Food Processing industries, Pharmaceutical Plants

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand the character of waste water from tanneries and distilleries
- Suggest suitable waste water treatment techniques

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Design treatment methods for any industrial wastewater.
- Examine the manufacturing process of various industries.
- Assess need for common effluent treatment plant for an industry
- Test and analyze BOD, COD, TSS and MPN in waste water.

TEXT BOOK

1. M. N. Rao and A. K. Dutta, “Wastewater Treatment”, Oxford & IBH, New Delhi.
2. K.V. S. G. Murali Krishna, “Industrial Water and Wastewater Management”.

REFERENCES

1. A. D. Patwardhan, “Industrial Wastewater treatment”, PHI Learning, Delhi
2. Metcalf and Eddy Inc., “Wastewater Engineering”, Tata McGraw Hill co., New Delhi.
3. G. L. Karia & R.A. “Christian Wastewater Treatment- Concepts and Design Approach”, Prentice Hall of India.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester CSE)

Course Category	:	Open Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0103	3	0	0	3	CIA	30 M
Course Title	:	Building Services And Maintenance					SEE	70 M

Course Objectives:

- To impart knowledge in concepts of building maintenance
- To insists the student to observe various practices of good building maintenance
- To teach the importance safety in buildings
- To demonstrate the use of ventilation in buildings.
- To give the list of different types of machineries in buildings

UNIT – I

PLUMBING SERVICES: Water supply system- fixing of pipes in buildings – maintenance of buildings-water meters-sanitary fittings-design of building drainage- gas supply systems

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand water supply system
- Understand the building drainage system.

UNIT – II

VENTILATION: Necessity of ventilation – functional requirements – systems of ventilation-natural ventilation-artificial ventilation-air conditioning-systems of air conditioning-essentials of air conditioning-protection against fire caused by air conditioning systems.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand concepts of ventilation
- Understand concepts of air conditioning

UNIT – III

THERMAL INSULATION: Heat transfer system-thermal insulating materials-methods of thermal insulation-economics of thermal insulation-thermal insulation of exposed walls, doors,windows and roofs.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand methods of insulation
- Understand materials of insulation

UNIT – IV

FIRE SAFETY: Causes of fire in buildings-fire safety regulations-charecteristics of fire resisting materials- fire resistant construction-heat and smoke detecters-fire alarms-fire fighting pump and water storage.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand safety regulations of fire system
- Know about the implementation and usage of various fire resistant materials in building construction

UNIT – V

MACHINERIES IN BUILDINGS: Lifts-essential requirements-design considerations- escalators-essential requirements-electrical installations in buildings-lighting in buildings-methods of electrical wiring-earthing

Learning Outcomes:

At the end of the unit, students will be able to:

- Understanding of different machineries of buildings
- Understanding of electrical installation of buildings

Course Outcomes:

Student will be able to understand

- Concepts of plumbing, drainage system and gas supply system
- Concepts of ventilation and air conditioning
- Concepts of thermal insulation and economics of thermal insulation
- Concepts of fire safety in buildings and fire resistant construction
- Concepts of different machineries of buildings

TEXT BOOKS:

1. B.C.Punmia, Er. Ashok K jain, Arun K Jain “Building construction”, Laxmi publications pvt.ltd. New Delhi.
2. Janardhan Jah, S.K Sinha, “Building construction”, Khanna publishers
3. Rangwala, “Building construction”, Charothar publishing house.

REFERENCE BOOKS:

1. David V Chaddrton, “Building services engineering”, Outledge
2. P.C Varghees “Building construction”, Printice hall india

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(VI Semester CSE)

Course Category	:	Open Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0304	3	0	0	3	CIA	30 M
Course Title	:	Industrial Automation					SEE	70 M

Course Objectives:

- To understand the basic concepts of Automation
- To understand the concepts of automation cycle and hardware components
- To gain knowledge about pneumatic and hydraulic devices
- To understand the concepts of sensors and actuators
- To know the use of Robotics used in industries automation

UNIT -I:

Introduction to Automation

Definition and fundamentals of automation, reasons for Automating, basic elements of an automated system: Power, Program and control system, safety, maintenance & repair diagnosis, error detection and recovery, Automation principles and strategies: USA principle, strategies of automation and production system, automation migration strategy

Learning Outcomes:

At the end of the unit, students will be able to:

- To understand the fundamental concepts of automation and its basic elements
- To understand system safety requirements
- To understand about maintenance and repair strategies
- To know about production system automation

UNIT- II:

Mechanization and Automation

Basic principles of Mechanization and automation, product cycle, hard Vs flexible automation, Capital-intensive Vs low cost automation. Types of systems-mechanical, electrical, hydraulic, pneumatic and hybrid systems, Automation using CAMS, Geneva mechanisms, gears etc.

Assembly line Automation: automated assembly systems, transfer systems, vibratory bowl feeders, non-vibratory feeders, part orienting, feed track, part placing & part escapement systems. Introduction to Material storage/ handling and transport systems, and its automation using AS/RS, AGVS and conveyors etc.

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about how to analyse the various automation methods
- To know about assembling and placing of various parts
- To distinguish between mechanization and automation of systems
- To know about material storage, handling and automation using various approaches

UNIT -III:

Pneumatics and hydraulics

Hydraulic and pneumatic devices-Different types of valves, Actuators and auxiliary elements in Pneumatics &hydraulics , their applications and use of their ISO symbols. Synthesis and design of circuits (up to 3 cylinders)–pneumatic, electro pneumatics and hydraulics. Design of Electro- Pneumatic Circuits using single solenoid and double solenoid valves; with and without grouping.

Learning Outcomes:

At the end of the unit, students will be able to:

- To know design of various pneumatic and hydraulic components
- To understand about synthesis and design of Pneumatic circuits
- To understand about electro pneumatic circuits
- To design using various solenoid valves with and without grouping

UNIT -IV:

Sensors & Actuators Sensors

Selection of sensors (Displacement, temperature, acceleration, force /pressure) based on static and dynamic characteristics. Interfacing: Concept of interfacing, bit accuracy and sampling speed, amplifying electronics, and microcontroller. Actuators: Principle and selection of electro mechanical actuators (1) DC motors (2) Stepper Motors (3) Solenoid Actuators (4) Servo Motors(5) BLDC

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about selection of sensors and actuators based on dynamic characteristics
- To understand about necessity of interfacing sensors with Microcontroller
- To understand principle and selection of actuators
- To apply various electro mechanical actuators to certain machines

UNIT- V:

Robots and their applications

Introduction to robots, Types, Classifications, Selection of robots, Robot Degrees of freedom, Robot configuration, Accuracy and repeatability, Specification of a robot, Robot feedback controls: Point to point control and Continuous path control, Control system for robot joint, Adaptive control, Drives and transmission systems, End effectors, Industrial robot applications of robots

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about Robots, classification, selection and specifications
- To understand the use of robotics in industrial applications
- To know about various feedback controls of Robot
- To understand how adaptive control strategies can be used in Robots

Course Outcomes:

1. Understand the basic concepts of Industrial automation
2. Design and analysis of automation methods, placing and assembling of various parts
3. Design of various processing and control circuits using pneumatic and hydraulic elements
4. Selection of sensors based on the industrial application
5. Role of robotics in industrial applications

TEXT BOOKS:

1. Stamatios Manesis and George Nikolakopoulos, “Introduction to Industrial Automation”, CRC Press, 2018.
2. Frank Lamb, “Industrial Automation”, Hands on, Mc Graw Hill Education, 2013.

REFERENCES:

1. Richerd L. Shell and Ernest L. Hall, “Hand Book of Industrial Automation”, CRC Press, 2000.

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Course Category	:	Open Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0202	3	0	0	3	CIA	30 M
Course Title	:	System Reliability Concepts					SEE	70 M

Course Objectives:

To make the students learn about:

- The Basic concepts, rules for combining probabilities of events, failure density and distribution functions.
- Evaluation of network Reliability / Unreliability and types of redundancies.
- Evaluation of network Reliability / Unreliability using conditional probability method.
- Expected value and standard deviation of Exponential distribution and Measures of reliability.
- Evaluation of Limiting State Probabilities of one, two component repairable models.

UNIT-I:

Basic Probability Theory

Basic concepts – Rules for combining Probabilities of events – Failure Density and Distribution functions – Bernoulli’s trials – Binomial distribution – Expected value and standard deviation for binomial distribution – Examples

Learning Outcomes:

At the end of the unit, students will be able to:

- To know about basic rules for probabilities of events
- To distinguish between pdf and cdf
- Get detailed information about Probability of failure density and distribution functions
- Obtain the expected value and standard deviation for binomial distribution.

UNIT-II:

Network Modeling and Reliability Evaluation

Basic concepts – Evaluation of network Reliability / Unreliability – Series systems, Parallel systems, Series - Parallel systems, partially redundant systems – Types of redundancies - Evaluation of network Reliability / Unreliability using conditional probability method – Paths based and Cutset based approach – complete event tree and reduced event tree methods - Examples.

Learning Outcomes:

At the end of the unit, students will be able to:

- How to find the Probability of success and failures of network using different approaches for series-parallel configurations.
- Classification of redundancies.
- To find reliability / unreliability of complex systems using different methods
- Comparison of approaches to solve probability index of SISO system

UNIT-III:

Time Dependent Probability

Basic concepts – Reliability functions f(t), Q(t), R(t), h(t) – Relationship between these functions–

Bath tub curve – Exponential failure density and distribution functions - Expected value and standard deviation of Exponential distribution – Measures of reliability – MTTF, MTTR, MTBF–

Evaluation of network reliability / Unreliability of simple Series, Parallel, Series-Parallel systems - Partially redundant systems - Evaluation of reliability measure – MTTF for series and parallel systems – Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of time domain functions and relationship between them.
- Obtain the expected value and standard deviation for exponential distribution.
- Obtain the values of probabilistic measures for series and parallel configurations.
- To obtain probabilistic measures for fully redundant andpartially redundant configurations

UNIT-IV:

Discrete Markov Chains & Continuous Markov Processes

Markov Chains:Basic concepts – Stochastic transitional Probability matrix – time dependent probability evaluation – Limiting State Probability evaluation – Absorbing states.

Markov Processes: Modeling concepts – State space diagrams – time dependent reliability evaluation of single component repairable model – Evaluation of Limiting State Probabilities of one, two component repairable models – Frequency and duration concepts – Frequency balance approach - Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of Stochastic Transitional Probability Matrix, Limiting State Probability
- To know about evaluation for one and two component repairable models.
- Understand the concept of Frequency balance approach.
- To distinguish between Markov chains and Markov processes

UNIT-V:

Multi Component & Approximate System Reliability Evaluation

Recursive relation for evaluation of equivalent transitional rates– cumulative probability and cumulative frequency and 'n' component repairable model – Series systems, Parallel systems, Basic probability indices – Series, Parallel systems – Complex Systems– Cutset approach – Examples.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concepts of recursive relation for evaluation of equivalent transitional rates.
- Obtain the cumulative probability and cumulative frequency for different systems
- To know about computation of basic probability indices for series, parallel configurations
- To know how to evaluate basic probability indices using cut set approach

Course Outcomes:

After completing the course, the student should be able to do the following:

• Understand the concepts for combining Probabilities of events, Bernoulli's trial, and Binomial distribution.

• Network Reliability/Unreliability using conditional probability, path and cutset based approach, complete event tree and reduced event tree methods.

• Understanding Reliability functions and to develop relationship between these functions, expected value and standard deviation of Exponential distribution and measures of reliabilities.

• Analyze the time dependent reliability evaluation of single component repairable model, frequency and duration concepts, Frequency balance approach.

• Recursive relation for evaluation of equivalent transitional rates, cumulative probability and cumulative frequency and ‘n’ component repairable model.

Text Books:

1. Roy Billinton and Ronald N. Allan, “Reliability Evaluation of Engineering Systems”, Reprinted in India B. S. Publications, 2007.
2. E. Balagurusamy, “Reliability Engineering”, Tata McGraw Hill, 2003.

Reference Books:

1. E. E. Lewis , “Introduction to Reliability Engineering” Wiley Publications.
2. Charles E. Ebeling, “Reliability and Maintainability Engineering”, Tata McGraw Hill, 2000.
3. by Ajit Kumar Verma, Srividya Ajit and Durga Rao Karanki, Springer, “Reliability and Safety Engineering” 2nd edition, 2016.
4. Rausand and Arnljot Hoyland, “System Reliability Theory Marvin”, Wiley Publictions.

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(VI Semester CSE)

Course Category	:	Open Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0305	3	0	0	3	CIA	30 M
Course Title	:	Introduction To Mechatronics					SEE	70 M

Course Objectives:

- Familiarize the technologies behind modern mechatronic systems.
- Explain fundamentals for the development of fully automated system.
- Develop a robotic or automated systems focusing on the hardware and software integration.
- Demonstrate the development and design of mechatronic system and MEMS.

UNIT – I

Introduction: Definition of Mechatronics, Need for Mechatronics in Industry, Objectives of mechatronics, mechatronics design process, Mechatronics key elements, mechatronics applications – Computer numerical control (CNC) machines, Tool monitoring systems, Flexible manufacturing system (FMS), Industrial Robots, Automatic packaging systems, Automatic inspection systems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the role of mechatronics in industry.(l2)
- Identify the application of mechatronics in automation industry.(l3)

UNIT – II

Sensors: Static characteristics of sensors, Displacement, Position and Proximity sensors, Force and torque sensors, Pressure sensors, Flow sensors, Temperature sensors, Acceleration sensors, Level sensors, Light sensors, Smart material sensors, Micro and Nano sensors, Selection criteria for sensors.

Learning Outcomes:

At the end of the unit, the student will be able to

- Classify various types of sensors. (l2)
- Choose sensors for particular application. (l3)
- Measure different quantity's using sensors. (l4)

UNIT – III

Actuators: Mechanical, Electrical, Hydraulic and Pneumatic Actuation systems, Characteristics and their limitations, Design of Hydraulic and Pneumatic circuits, Piezoelectric actuators, Shape memory alloys, Selection criteria for actuators.

Learning Outcomes:

At the end of the unit, the student will be able to

- Classify various actuation systems. (l2)
- Choose the criterion for different actuators. (l1)

UNIT – IV

Microprocessors, Microcontrollers and Programmable Logic Controllers: Architecture of of

Microprocessor, Microcontroller and Programmable Logic Controller, PLC Programming using ladder diagrams, logics, latching, sequencing, timers relays and counters, data handling, Analog input/output, selection of controllers.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the architecture of microprocessors, microcontrollers and PLC. (L2)
- Formulate various programs using PLC. (L6)

UNIT – V

Design of mechotronics systems, Mechotronics design elements, Traditional mechatronics systems, Embedded systems, Procedure for designing a mechotronic systems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understanding design of mechotronics . (L2)
- Various Mechotronics systems. (L4)
- Design Aspects of Mechotronic systems. (L2)

Course Outcomes

Upon successful completion of this unit, the student will be able to:

- Explain mechatronics systems in industry. (l2)
- Identify mechatronic systems encountered in practice. (l3)
- Examine the components of a typical mechatronic system. (l4)
- Compare the various techniques used for development of mems. (l4)
- Develop programs using plc. (l6)

Text books:

1. Er R. Rajput, “ A Text book of Mechatronics”, S.Chand,2nd edition-2016.
2. James J Allen, “Micro Electro Mechanical Systems Design”, CRC Press Taylor & Francis group, 2005.

Reference Text books:

1. WBolton, “Mechatronics Electronics Control Systems in Mechanical and Electrical Engineering”, 3rd edition, Pearson Education Press, 2005.
2. Devadas Shetty and Richard A Kolk, “Mechatronic System Design”, 2nd edition, Cengage learning, 2010.
3. Clarence W. de Silva, “Mechatronics an Integrated Approach”, CRC Press, 2004.
4. Ganesh S Hedge, “Mechatronics”, Jones & Bartlett Learning, 2010.

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(VI Semester CSE)

Course Category	:	Open Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0406	3	0	0	3	CIA	30 M
Course Title	:	Optimization Techniques Through Matlab					SEE	70 M

Course Objectives

- Introduce basics of MATLAB
- Familiarize the fundamentals of optimization
- Explain single variable optimization using various methods
- Implement multi variable optimization using various methods
- Train various evolutionary algorithms.

UNIT -I

Introduction to MAT LAB: Overview, MATLAB Preliminaries, Basics of MATLAB, Beyond the Basics of MATLAB, Popular Functions and Commands, Plotting using MATLAB, Optimization with MATLAB.

Learning Outcomes:

After completion of this unit, students will be able to

- Write simple codes in MATLAB. (L3)
- Plot the data using MATLAB. (L3)
- Implement optimization models in MATLAB. (L3)

UNIT -II

Introduction to Optimization: Statement of an optimization problem, Classifications of optimization Problems: Single variable optimization, Multi variable optimization with no constraints, Multi variable optimization with equality constraints, Multi variable optimization with inequality constraints, Convex and Concave programming.

Learning Outcomes:

After completion of this unit, students will be able to

- Build optimization problem. (l1)
- Solve various optimization problems(l3)
- Compare convex and concave programming (l4)

UNIT -III

Single Variable Optimization: Finite difference method, Central difference method, Runge- Kutta method, interval halving method, golden section method with MATLAB code.

Learning Outcomes:

After completion of this unit, students will be able to

- Understand various methods involving single variable optimization. (l2)
- Develop codes in matlab for different methods. (l3)
- Identify methods for solving a single variable optimization problem. (l3)

UNIT- IV

Multi Variable Optimization: Conjugate gradient method, Newton's method, Powell's method, Flectcher-Reeves method, Hook and Jeeves method, interior penalty function with MATLAB code.

Learning Outcomes:

After completion of this unit, students will be able to

- Apply various methods involving multi variable optimization. (l2)
- Develop codes in matlab for solving various multi variable optimization problems. (l3)
- Choose methods for solving a multi variable optimization problem. (l3)

UNIT -V

Evolutionary Algorithms: Overview, Genetic Algorithms: Basics of Genetic Algorithms, Options in MATLAB, Multi Objective Optimization using Genetic Algorithms, Ant Colony Optimization, Simulated Annealing, Particle Swarm Optimization.

Learning Outcomes:

After completion of this unit, students will be able to

- Apply different types of genetic algorithms. (l3)
- Model optimization problems using genetic algorithms in matlab. (l3)
- Compare different genetic algorithms for performance. (l5)

Course Outcomes:

After completion of this course the student can be able to

- Use optimization terminology and concepts, and understand how to classify an optimization problem.(l4)
- Apply optimization methods to engineering problems.(l3)
- Implement optimization algorithms.(l3)
- Compare different genetic algorithms. (l5)
- Solve multivariable optimization problems. (l4)

TEXT BOOKS:

1. Rao V.Dukkipati, MATLAB: “An Introduction with Applications”, Anshan, 2010.
2. Achille Messac, “Optimization in practice with MATLAB”, Cambridge University Press, 2015.
3. Jasbir S Arora, “Introduction to optimum design”, 2nd edition. Elsevier, 2004.

REFERENCES:

1. Cesar Perez Lopez, “MATLAB Optimization Techniques”, Academic press, Springer publications, 2014.
2. Steven C.Chapra, “Applied Numerical Methods with MATLAB for Engineers and scientists”: 4th edition, McGraw-Hill Education, 2018.

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Course Category	:	Open Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0404	3	0	0	3	CIA	30 M
Course Title	:	Basics of VLSI					SEE	70 M

Course Objectives:

The objectives of the course are to

- Learn and Understand IC Fabrication process steps required for various MOS circuits
- Understand and Experience VLSI Design Flow
- Learn Transistor-Level CMOS Logic Design
- Understand VLSI Fabrication and Experience CMOS Physical Design
- Learn to Analyze Gate Function and Timing Characteristics

UNIT – I

Introduction: Introduction to MOS Technology – MOS, PMOS, NMOS, CMOS and BiCMOStechnologies, fabrication fundamentals: Oxidation, Lithography, Diffusion, Ionimplantation, Metallization and Encapsulation.

Basic Electrical Properties: Basic Electrical Properties of MOS,CMOS and BiCMOS Circuits, IDS-VDSrelationships, MOS transistor threshold Voltage, gm, gds, figure of merit ωo,
Passtransistor, NMOS inverter, Various pull - ups, Determination of pull-up to pulldown ratio
(Zpu / Zpd) , CMOS Inverter analysis and design, BiCMOS inverters, Latch-up in CMOS circuits.

Learning Outcomes:

After completion of this unit, students will be able to

- Demonstrate a clear understanding of CMOS fabrication flow and technology scaling (L2)
- Analyze the electrical properties of MOS and BiCMOS circuits (L3)
- Design MOSFET based logic circuit (L4)

UNIT – II

VLSI Circuit Design Processes:VLSI Design Flow, MOS Layers, Stick Diagrams, Design Rules and Layouts,Lambda based design rules, Contact cuts , CMOS Lambda based design rules,Layout Diagrams for logic gates, Transistor structures, wires and vias, Scaling ofMOS circuits- Scaling models, scaling factors, scaling factors for device parameters, Limitations of Scaling.

Learning Outcomes:

After completion of this unit, students will be able to

- Understand the design rules and layout diagram for logic gates, limitations of scaling (L1)
- Draw the Layout of simple MOS circuit using Lambda based design rules (L2)

UNIT – III

Gate Level Design and Layout: Architectural issues, Switch logic networks: Gate logic, Alternate gate circuit:Pseudo-NMOS Dynamic CMOS logic. Basic circuit concepts, Sheet ResistanceRS and its concept to MOS, Area Capacitance Units, Calculations, The delay unitT, Inverter Delays, Driving large Capacitive Loads, Wiring Capacitances, Fan-inand fan-out, Choice of layers

Learning Outcomes:

After completion of this unit, students will be able to

- Apply basic circuit concepts to MOS circuits. (L2)
- Estimate the propagation delays in CMOS circuits (L3).

UNIT – IV

Subsystem Design:Subsystem Design, Shifters, Adders, ALUs, Multipliers: Array multiplier, SerialParallel multiplier, Parity generator, Comparators, Zero/One Detectors, Up/DownCounter, Memory elements: SRAM, DRAM, ROM, Serial Access Memories.

Learning Outcomes:

After completion of this unit, students will be able to

- Apply the Lambda based design rules for subsystem design (L2)
- Design of Adders, Multipliers and memories etc(L4)
- Design digital systems using MOS circuits(L4)

UNIT – V

Semiconductor Integrated Circuit Design:PLDs, FPGAs, CPLDs, Standard Cells, Programmable Array Logic,Programmable Logic Array Design Approach.

Learning Outcomes:

After completion of this unit, students will be able to

- Analyze various architectures and device technologies of PLDs(L3)
- Design simple logic circuit using PLA, PAL, FPGA and CPLD.(L4)

Course Outcomes:

- Learn the basic fabrication process of MOS transistors, study CMOS inverter circuits, basic circuit concepts such as Sheet Resistance, Area Capacitance and Delay calculation, Field programmable gate arrays and realization techniques, CPLDs and FPGAs for implementing the various logic functions.

- Apply CMOS technology-specific layout rules in the placement and routing of transistors and interconnect, and to verify the functionality.

- Analyze the performance of CMOS Inverter circuits

- Compare various Scaling models and understand the effect of scaling on device parameters

TEXT BOOKS:

1. Kamran Eshraghian, “Essentials of VLSI circuits and systems”, EshraghianDouglesand
A. Pucknell, PHI, 2005 Edition
2. Wayne Wolf, “Modern VLSI Design”, 3rd Edition, Pearson Education, 1997.

REFERENCE BOOKS:

1. John .P. Uyemura, “CMOS logic circuit Design”, Springer, 2007.
2. Neil H. E Weste, “CMOS VLSI Design – A Circuits and Systems Perspective”, 3rd edition,

DavidHarris, Ayan Banerjee, Pearson, 2009.

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(VI Semester CSE)

Course Category	:	Open Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0506	3	0	0	3	CIA	30 M
Course Title	:	Fundamentals of VR/AR/MR					SEE	70 M

Course Objectives:

This course is designed to:

- Explore the history of spatial computing and design interactions
- Understand the foundational principles describing how hardware, computer vision algorithms function
- Learn Virtual reality animation and 3D Art optimization
- Demonstrate Virtual reality
- Introduce to the design of visualization tools

UNIT-I

How Humans interact with Computers: Common term definition, introduction, modalities through the ages (pre- 20th century, through world war-II, post world war-II, the rise of personal computing, computer miniaturization), why did we just go over all of this?, types of common HCI modalities, new modalities, the current state of modalities for spatial computing devices, current controllers for immersive computing systems, a note on hand tracking and hand pose recognition.

Designing for our Senses, **Not our Devices**: Envisioning a future, sensory technology explained, who are we building this future for?, sensory design, five sensory principles, Adobe's AR story.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain common modalities and their pros and cons.(L2)
- Demonstrate Mapping modalities to current industry inputs(L2)
- Explore the importance of design with spatial computing(L5)

UNIT-II

Virtual Reality for Art: A more natural way of making 3D art, VR for animation.

3D art optimization: Introduction, draw calls, using VR tools for creating 3D art, acquiring 3D models vs making them from scratch.

How the computer vision that makes augmented reality possible works: Who are we?, a brief history of AR, how and why to select an AR platform, mapping, platforms, other development considerations, the AR cloud.

Learning Outcomes:

At the end of the unit, students will be able to:

- Utilize VR tools for creating 3D Animations(L3)
- Analyze how and why to Select an AR Platform(L4)

UNIT-III

Virtual reality and augmented reality: cross platform theory: Why cross platform? The role of game engines, understanding 3D graphics, portabiltity lessons from video game design, simplifying the controller input.

Virtual reality toolkit: open source framework for the community: What is VRTK and why people use it?, the history of VRTK, welcome to the steam VR unity toolkit, VRTK v4, the future of VRTK, success of VRTK.

Three virtual reality and augmented reality development practices: Developing for virtual reality and augmented reality, handling locomotion, effective use of audio, common interaction paradigms.

Learning Outcomes:

At the end of the unit, students will be able to:

- Explain why the design approach should be considered at a holistic high level based on the goal of the experience (L2)
- Build VR solutions using Virtual reality toolkit (L6)
- Interpret the development practices in three Virtual reality and Augmented reality development (L2)

UNIT-IV

Data and machine learning visualization design and development in spatial computing: Introduction, understanding data visualization, principles for data and machine learning visualization design and development in spatial computing, why data and machine learning visualization works in spatial computing, 2D data visualization vs 3D data visualization in spatial computing, interactivity in data visualizations and in spatial computing, animation, failures in data visualization, good data visualization design optimize 3D spaces, data representations, info graphics, and interactions, defining distinctions in data visualization and big data for machine, how to create data visualization: data visualization creation pipeline, webXR, data visualization challenges in XR, data visualization industry use case examples of data visualization, 3D reconstruction and direct manipulation of real world data, data visualization is for everyone, hands on tutorials, how to create data visualization, resources.

Learning Outcomes:

At the end of the unit, students will be able to:

- Understand, define, and set data and machine visualization design and development principles in embodied reality(L1)
- Demonstrate best practices, and practical tools to create beautiful and functional data visualizations.(L2)

UNIT-V

Character AI and Behaviors: Introduction, behaviors, current practice: Reactive AI, more intelligence in the system, Deliberative AI, machine learning.

The virtual and augmented reality health technology ecosystem: VR/AR health technology application design, standard UX isn’t intuitive, tutorial: insight Parkinson’s experiment, companies, case studies from leading Academic institutions.

Learning Outcomes:

At the end of the unit, students will be able to:

- Design a behavioral AI system for a video game(L6)
- Identify issues related to design of virtual reality (VR) and augmented reality (AR) experiences deployed in a health-care context(L3)

- Explain the use of motion data from controllers to reduce the visible tremor of a Parkinson's patient in a virtual environment(L2)

Course outcomes

Upon completion of the course, the students should be able to:

- Explain how the humans interact with computers (L2)
- Apply technical and creative approaches to make successful applications and experiences. (L3)
- Design audio and video interaction paradigms (L6)
- Design Data visualization tools (L6)
- Apply VR/MR/AR in various fields in industry (L3)

Text book

1. Erin Pangilinan, Steve lukas, and Vasanth Mohan, "Creating Augmented & Virtual Realities", 1st edition, O'REILLY, 2019.

References

1. Steve Aukstakalnis, "Practical Augmented Reality", Pearson Education, 2017.

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(VI Semester CSE)

Course Category	:	Open Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0505	3	0	0	3	CIA	30 M
Course Title	:	Data Science using python					SEE	70 M

Course Objectives

This course is designed to:

- Understand the approaches for handling data related problems
- Explore the mathematical concepts required for Data science
- Explain the basic concepts of data science.
- Elucidate various Machine Learning algorithms.
- Introduce Natural Language Processing and Recommender Systems

UNIT- I

Introduction to Data Science, A Crash Course in Python, Visualising Data.

Learning Outcomes:

At the end of the unit, students will be able to:

- Describe the importance of data analysis (L1).
- Identify the key connectors of Data Science (L4).
- Interpret and Visualize the data using bar charts, line charts and scatter plots (L3).

UNIT-II

Linear Algebra, Statistics, Probability, Hypothesis and Inference, Gradient Descent.

Learning Outcomes:

At the end of the unit, students will be able to:

- Identify the Correlation between two vectors (L4).
- Test a given hypothesis (L3).
- Compute mean, median and mode for the given data (L3).

UNIT-III

Getting Data, Working with Data, Machine Leaning, k-Nearest Neighbors, Naïve Bayes.

Learning Outcomes:

At the end of the unit, students will be able to:

- Compute dimensionality reduction using PCA (L3).
- Differentiate supervised and unsupervised learning methods (L4).
- Describe overfitting, under fitting, bias, variance and goodness of learning (L1).
- Solve classification problem using k-nearest neighbour classifier (L3).
- Apply Naïve Bayes classifier to solve decision making problem (L3).

UNIT-IV

Simple Linear Regression, Multiple Regression, Logistic Regression, Decision Trees, Neural Networks.
Learning Outcomes:

At the end of the unit, students will be able to:

- Describe gradient descent approach, maximum likelihood estimation and method of least squares (L1).
- Apply SVM to determine a hyperplane with maximum margin (L3).
- Determine decision tree for given data (L5).
- Describe Perceptron and Back Propagation (L3).

UNIT-V

Clustering, Natural Language Processing, Network Analysis, Recommender Systems. Database and SQL, MapReduce

Learning Outcomes:

At the end of the unit, students will be able to:

- Determine Clusters in data using k-means and Hierarchical Clustering methods (L5).
- Apply basic SQL Operations using NotQuiteABase (L3).
- Compare User-Based and Item-Based Collaborative Filtering (L2).
- Describe Grammer and MapReduce (L1).

Course Outcomes:

After completion of this course the student would be able to

- Visualize the data using bar charts, line charts and scatter plots (L4).
- Analyse Correlation between two data objects (L4).
- Demonstrate feature selection and dimensionality reduction.(L2)
- Solve decision making problems using k-NN, Naïve Bayes, SVM and Decision. Trees (L3).
- Determine Clusters in data using k-means and Hierarchical Clustering methods (L3).
- Design basic SQL Operations using NotQuiteABase (L6)
- Demonstrate the way to use machine learning algorithms using python. (L2)

Text Books:

1. Data Science from Scratch, First Principles with Python - Joel Grus, O'Reilly, First Edition.

Reference Books:

1. The Data Science Handbook, Field Cady, WILEY.
2. An Introduction to Data Science, Jeffrey M. Stanton, Jeffrey Stanton, 2012

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester CSE)

Course Category	:	Open Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0407	3	0	0	3	CIA	30 M
Course Title	:	Wavelet Transforms and Its Applications					SEE	70 M

Course Objective:
This course provides the students to understand Wavelet transforms and its applications.

UNIT-I
Wavelets
Wavelets and Wavelet Expansion Systems - Wavelet Expansion- Wavelet Transform- Wavelet System- More Specific Characteristics of Wavelet Systems -Haar Scaling Functions and Wavelets -effectiveness of Wavelet Analysis -The Discrete Wavelet Transform The Discrete- Time and Continuous Wavelet Transforms.

Learning Outcomes:
Students will be able to
- Understand wavelets and wavelet expansion systems.
- Find wavelet transforms in continuous as well as discrete domains.

UNIT-II-
A Multiresolution Formulation of Wavelet Systems
Signal Spaces -The Scaling Function -Multiresolution Analysis - The Wavelet Functions - The Discrete Wavelet Transform- A Parseval's Theorem - Display of the Discrete Wavelet Transform and the Wavelet Expansion.

Learning Outcomes:
Students will be able to
- Illustrate the multi resolution analysis, scaling function.
- Implement parseval theorem.

UNIT-III-
Filter Banks and the Discrete Wavelet Transform : Analysis - From Fine Scale to Coarse Scale- Filtering and Down-Sampling or Decimating -Synthesis - From Coarse Scale to Fine Scale -Filtering and Up-Sampling or Stretching - Input Coefficients - Lattices and Lifting - - Different Points of View.

Learning Outcomes:
Students will be able to
- Form fine scale to coarse scale analysis.
- Perform decimating synthesis.
- Find the lattices and lifting.

UNIT-IV
Multiresolution versus Time-Frequency Analysis- Periodic versus Nonperiodic Discrete Wavelet Transforms -The Discrete Wavelet Transform versus the Discrete-Time Wavelet Transform- Numerical

Complexity of the Discrete Wavelet Transform.

Learning Outcomes:

Students will be able to

- Perform multi resolution versus time frequency analysis.
- Perform numerical complexity of discrete wavelet transforms.

UNIT-V

Bases, Orthogonal Bases, and Biorthogonal Bases -Matrix Examples - Fourier Series Example - Sine Expansion Example - Frames and Tight Frames - Matrix Examples -Sine Expansion as a Tight Frame Example.

Learning Outcomes:

Students will be able to

- Understand the orthogonal bases and Biorthogonal Bases.
- Find the Frames and Tight Frames using Fourier series.

Course Outcomes:

After the completion of course, students will be able to

- Understand wavelets and wavelet expansion systems.
- Illustrate the multi resolution analysis ad scaling functions.
- Form fine scale to coarse scale analysis.
- Find the lattices and lifting.
- Perform numerical complexity of discrete wavelet transforms.
- Find the frames and tight frames using fourier series.

TEXT BOOKS:

1. C. Sidney Burrus, Ramesh A. Gopinath, “Introduction to Wavelets and Wavelets Transforms”,Prentice Hall, (1997).
2. James S. Walker, “A Primer on Wavelets and their Scientific Applications”, CRC Press, (1999).

REFERENCE BOOKS:

1. Raghuveer Rao, “Wavelet Transforms”, Pearson Education, Asia.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester CSE)

Course Category	:	Open Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE9902	3	0	0	3	CIA	30 M
Course Title	:	Soft Skills					SEE	70 M

Course Objectives

- To develop awareness in students of the relevance and importance of soft skills
- To provide students with interactive practice sessions to make them internalize softskills
- To develop Time management, Positive thinking & Decision making skills
- To enable to manage stress effectively
- To enable them to develop employability skills

UNIT – I
INTRODUCTION

Definition – Scope – Importance- – Methods of improving soft skills – Limits- Analysis – Interpersonal and intrapersonal skills - Verbal and Non-verbal skills.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of soft skills
- Identify the methods of improving soft skills
- Analyze various soft skills in different situations
- Distinguish various soft skills
- Apply various soft skills in day to day life and in workplace

UNIT – II INTRAPERSONAL SKILLS

Knowing self/temperaments/traits - Johari windows – quotient skills(IQ, EQ, SQ), creativity, decision-making-Attitude – Confidence Building - Positive Thinking –Time Management – Goal setting.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand self and its temperament.
- Apply various techniques to know the self.
- Develop positive thinking
- Develop creative thinking and decision-making skills
- Apply self-knowing tools in day to day and professional life.

UNIT – III INTERPERSONAL SKILLS

Leadership Skills – Negotiation skills –- Team-building – Crisis Management – Event Management – Ethics and Etiquettes.

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of interpersonal skills
- Analyze various tactics in negotiation skills.

- Develop team building spirit.
- Develop crisis management
- Apply interpersonal skills through etiquettes.

UNIT – IV VERBAL SKILLS

Importance of verbal skills in corporate climate, Listening skills –Mother Tongue Influence (MTI) - Speaking skills – Public speaking - Oral presentations - Writing skills –E-mail etiquettes– Memos- Indianism

Learning Outcomes:

At the end of the module, the learners will be able to

- Understand the importance of verbal skills in corporate climate.
- Explain the need of listening skills.
- Explore MTI and suggest remedies to avoid it.
- Interpret various contexts of speaking.
- Apply verbal skills in personal and professional life.

UNIT – V NON-VERBAL SKILLS

Importance of body language in corporate culture – body language-Facial expressions – eye contact – posture – gestures – Proxemics – Haptics – Dress Code – Paralanguage –Tone, pitch, pause& selection of words

Learning Outcomes:

At the end of the module, the learners will be able to

- Comprehend the importance of non-verbal communication.
- Expound the need of facial expressions, postures and gestures.
- Analyze proxemics,haptics etc.
- Understand the importance of dress code.
- Apply various techniques to use para language

Course Outcomes

- Recognize the importance of verbal and non verbal skills
- Develop the interpersonal and intrapersonal skills
- Apply the knowledge in setting the SMART goals and achieve the set goals
- Analyze difficult situations and solve the problems in stress-free environment
- Create trust among people and develop employability skills

Text Books

1. Meenakshi Raman &ShaliniUpadhyay " Soft Skills",Cengage Learning, 2018.
2. S. Balasubramaniam, "Soft Skills for Interpersonal Communication", Orient Black Swan, 2017.

References

1. Barun K. Mitra, "Personality Development and Soft Skills", –OXFORD Higher Education 2018.
2. AlkaWadkar, "Life Skills for Success ", Sage Publications 2016.
3. Robert M Sheffield, "Developing Soft Skills", Pearson, 2010.
4. DianaBooher, "Communicate With Confidence",Tata McGrawhill, 2012.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester CSE)

Course Category	:	Open Elective – II	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0507	3	0	0	3	CIA	30 M
Course Title	:	Human Computer Interaction					SEE	70 M

Course Objective:

- Gain an overview of Human-Computer Interaction (HCI), with an understanding of user interface design.
- Become familiar with the vocabulary associated with sensory and cognitive systems as relevant to task performance by humans
- Be able to apply models from cognitive psychology to predicting user performance in various human computer interaction tasks and recognize the limits of human performance as they apply to computer operation
- Be familiar with a variety of both conventional and non-traditional user interface paradigms

UNIT I

Introduction: Importance of user Interface: Definition, Importance of Good Design, Benefits of Good Design, A Brief History of Screen Design.

The Graphical User Interface: Popularity of Graphics, the Concept of Direct Manipulation, Graphical System, Characteristics,

Web User – Interface Popularity, Characteristics- Principles of User Interface.

UNIT II

Design process – Understanding how people interact with computers, importance of human characteristics human consideration, Human interaction speeds, and understanding business functions.

Screen Designing: Design goals – Screen meaning and purpose, organizing screen elements, ordering onscreen data and content – screen navigation and flow – Visually pleasing composition – amount of information– focus and emphasis – presentation information simply and meaningfully – information retrieval on web –statistical graphics – Technological consideration in interface design

UNIT III

System menus: Structures of Menus, Functions of Menus, Content of Menus, Kinds of Graphical menus

Windows: Window characteristics, Components of a window, Window presentation styles, Types of windows, Windom management

UNIT IV

Controls: Characteristics of device based controls, selecting the proper device based controls, Operable controls, Text Entry/Read-only controls, Selection controls, Combination Entry/selection controls, Selectingthe proper controls.

UNIT V

Graphics: Icons, Multimedia, Colour-what is it, Colour uses, Colour and Human vision, Choosing colours

Testing: The purpose and importance of usability testing, Scope of testing, Prototypes, Kinds of Tests, Developing and conducting the test

Learning Outcome:

At the end of the course students will be assessed to determine whether they are able to

- Find innovative ways of interacting with computers
- Help the disabled by designing non-traditional ways of interacting
- Use cognitive psychology in the design of devices for interaction

Text Books:

1. The essential guide to user interface design, Wilbert O Galitz, 2nd edition, 2013, Wiley.

Reference Books:

1. Designing the user interface, 3rd Edition Ben Shneidermann, Pearson Education Asia.
2. Human –Computer Interaction, D.R.Olsen, Cengage Learning.
3. Human – Computer Interaction, I.Scott Mackenzie, Elsevier Publishers.
4. Interaction Design, Prece, Rogers, Sharps, Wiley Dreamtech.
5. User Interface Design, Soren Lauesen, Pearson Education.
6. Human –Computer Interaction, Smith - Atakan, Cengage Learning

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester CSE)

Course Category	:	Humanities Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9908	2	0	0	2	CIA	30 M
Course Title	:	Management Science					SEE	70 M

Course objectives:

The objectives of this course are

- To provide fundamental knowledge on Management, Administration, Organization & its concepts.
- To make the students understand the role of management in Production
- To impart the concept of HRM in order to have an idea on Recruitment, Selection, Training & Development, job evaluation and Merit rating concepts
- To create awareness on identify Strategic Management areas & the PERT/CPM for better Project Management
- To make the students aware of the contemporary issues in management

UNIT- I

INTRODUCTION TO MANAGEMENT

Management - Concept and meaning - Nature-Functions - Management as a Science and Art and both. Schools of Management Thought - Taylor's Scientific Theory-Henry Fayol's principles - Eltan Mayo's Human relations - Systems Theory - Organisational Designs - Line organization - Line & Staff Organization - Functional Organization - Matrix Organization - Project Organization - Committee form of Organization - Social responsibilities of Management.

Learning Outcomes:

At the end if the Unit, the learners will be able to

- Understand the concept of management and organization
- Apply the concepts & principles of management in real life industry.
- Analyze the organization chart & structure for an enterprise.
- Evaluate and interpret the theories and the modern organization theory.

UNIT II

OPERATIONS MANAGEMENT

Principles and Types of Plant Layout - Methods of Production (Job, batch and Mass Production), Work Study - Statistical Quality Control - Deming's contribution to Quality. Material Management - Objectives - Inventory-Functions - Types, Inventory Techniques - EOQ-ABC Analysis - Purchase Procedure and Stores Management - Marketing Management - Concept - Meaning - Nature- Functions of Marketing - Marketing Mix - Channels of Distribution - Advertisement and Sales Promotion - Marketing Strategies based on Product Life Cycle.

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand the core concepts of Management Science and Operations Management
- Apply the knowledge of Quality Control, Work-study principles in real life industry.
- Evaluate Materials departments & Determine EOQ

- Analyze Marketing Mix Strategies for an enterprise.
- Create and design advertising and sales promotion

UNIT III

HUMAN RESOURCES MANAGEMENT (HRM)

HRM - Definition and Meaning – Nature - Managerial and Operative functions - Evolution of HRM - Job Analysis - Human Resource Planning(HRP) - Employee Recruitment-Sources of Recruitment - Employee Selection - Process and Tests in Employee Selection - Employee Training and Development - On-the- job & Off-the-job training methods - Performance Appraisal Concept - Methods of Performance Appraisal – Placement - Employee Induction - Wage and Salary Administration

Learning Outcomes:

At the end if the Unit, the learners will

- Understand the concepts of HRM in Recruitment, Selection, Training& Development
- Apply Managerial and operative Functions
- Analyze the need of training
- Evaluate performance appraisal
- Design the basic structure of salaries and wages

UNIT IV

STRATEGIC & PROJECT MANAGEMENT

Definition& Meaning - Setting of Vision - Mission - Goals - Corporate Planning Process - Environmental Scanning - Steps in Strategy Formulation and Implementation - SWOT Analysis - Project Management - Network Analysis - Programme Evaluation and Review Technique (PERT) - Critical Path Method (CPM) Identifying Critical Path - Probability of Completing the project within given time - Project Cost-Analysis - Project Crashing (Simple problems).

Learning Outcomes:

At the end of the Unit, the learners will be able to

- Understand Mission, Objectives, Goals & strategies for an enterprise
- Apply SWOT Analysis to strengthen the project
- Analyze Strategy formulation and implementation
- Evaluate PERT and CPM Techniques
- Creative in completing the projects within given time

UNIT V

CONTEMPORARY ISSUES IN MANAGEMENT

The concept of Management Information System(MIS) - Materials Requirement Planning (MRP) - Customer Relations Management(CRM) - Total Quality Management (TQM) - Six Sigma Concept - Supply Chain Management(SCM) - Enterprise Resource Planning (ERP) - Performance Management - Business Process Outsourcing (BPO) - Business Process Re- engineering and Bench Marking - Balanced Score Card - Knowledge Management.

Learning Outcomes:

At the end if the Unit, the learners will be able to

- Understand modern management techniques

- Apply Knowledge in Understanding in modern
- Analyze CRM, MRP, TQM
- Evaluate Six Sigma concept and SCM

Course Outcomes:

At the end of the course, students will be able to

- Understand the concepts & principles of management and designs of organization in a practical world
- Apply the knowledge of Work-study principles & Quality Control techniques inindustry
- Analyze the concepts of HRM in Recruitment, Selection and Training &Development.
- Evaluate PERT/CPM Techniques for projects of an enterprise and estimate time &cost of project & to analyze the business through SWOT.
- Create Modern technology in management science.

TEXT BOOKS:

1. A.R Aryasri, “Management Science”, TMH, 2013
2. Stoner, Freeman, Gilbert, Management, Pearson Education, New Delhi, 2012.

REFERENCES:

1. Koontz & Weihrich, “Essentials of Management”, 6th edition, TMH, 2005.
2. Thomas N.Duening & John M.Ivancevich, “Management Principles and Guidelines”, Biztantra.
3. Kanishka Bedi, “Production and Operations Management”, Oxford University Press, 2004.
4. Samuel C.Certo, “Modern Management”, 9th edition, PHI, 2005

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester CSE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9906	3	0	0	0	CIA	30 M
Course Title	:	Research Methodology					SEE	--

COURSE OBJECTIVES:

The objective of this course is

- To understand the basic concepts of research and research problem
- To make the students learn about various types of data collection and sampling design
- To enable them to know the method of statistical evaluation
- To make the students understand various testing tools in research
- To make the student learn how to write a research report
- To create awareness on ethical issues n research

UNIT- I

Meaning of Research – Objectives of Research – Types of Research – Research Approaches – Guidelines for Selecting and Defining a Research Problem – Research Design – Concepts related to Research Design – Basic Principles of Experimental Design.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of research and its process
- Explain various types of research
- Know the steps involved in research design
- Understand the different research approaches

UNIT -II

Sampling Design – steps in Sampling Design –Characteristics of a Good Sample Design – Random Sampling Design. Measurement and Scaling Techniques-Errors in Measurement – Tests of Sound Measurement – Scaling and Scale Construction Techniques – Time Series Analysis – Interpolation and Extrapolation. Data Collection Methods – Primary Data – Secondary data – Questionnaire Survey and Interviews.

Learning Outcomes:-

After completion of this unit student will

- Understand the concept of sampling and sampling design
- Explain various techniques in measurement and scaling
- Learn various methods of data collection
- Design survey questionnaires for different kinds of research
- Analyze the questionnaires

UNIT- III

Correlation and Regression Analysis – Method of Least Squares – Regression vs Correlation – Correlation vs Determination – Types of Correlations and Their Applications

Learning Outcomes:-

After completion of this unit student will

- Know the association of two variables

- Understand the importance of correlation and regression
- Compare and contrast correlation and regression
- Learn various types of correlation
- Apply the knowledge of C&R Analysis to get the results

UNIT -IV

Statistical Inference: Tests of Hypothesis – Parametric vs Non-parametric Tests – Hypothesis Testing Procedure – Sampling Theory – Sampling Distribution – Chi-square Test – Analysis of variance and Co-variance – Multivariate Analysis

Learning Outcomes:-

After completion of this unit student will

- Know the statistical inference
- Understand the hypothesis testing procedure
- Compare and contrast Parametric and Non-parametric Tests
- Understand the use of chi-square test in investigating the distribution of categorical variables
- Analyze the significance of variance and covariance

UNIT -V

Report Writing and Professional Ethics: Interpretation of Data – Report Writing – Layout of a Research Paper – Techniques of Interpretation- Making Scientific Presentations in Conferences and Seminars – Professional Ethics in Research.

Learning Outcomes:-

After completion of this unit student will

- Learn about report writing
- Understand how to write research paper
- Explain various techniques of interpretation
- Understand the importance of professional ethics in research
- Design a scientific paper to present in the conferences/seminars

Course Outcomes:

At the end of the course, students will be able to

- Understand basic concepts and its methodologies
- Demonstrate the knowledge of research processes
- Read. comprehend and explain research articles in their academic discipline
- Analyze various types of testing tools used in research
- Design a research paper without any ethical issues

Text books:

1. C.R.Kothari, "Research Methodology:Methods and Techniques",2nd edition, New Age International Publishers.
2. A Step by Step Guide for Beginners, "Research Methodology": Ranjit Kumar, Sage Publications

REFERENCES:

1. P.Narayana Reddy and G.V.R.K.Acharyulu, "Research Methodology and Statistical Tools", 1st Edition, Excel Books,New Delhi.
2. Donald R. "Business Research Methods", Cooper & Pamela S Schindler, 9th edition.
3. S C Gupta, "Fundamentals of Statistics", 7th edition Himalaya Publications

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0517P	0	0	3	1.5	CIA	30 M
Course Title	:	Mobile Application Development Laboratory					SEE	70 M

Course Objectives:

- To understand fundamentals of android operating systems.
- Illustrate the various components, layouts and views in creating android applications
- To understand fundamentals of android programming.

1. Setting Up the Development Environment

1.1 Download/Install the SDK

For in-depth instructions, visit Android Installation Documentation. Otherwise perform the following steps.

- Go to http://developer.android.com/sdk/index.html.
- Unpack to a convenient location - Remember the full path to this location,we will refer to it as <android_sdk_dir> for the rest of the lab.
    - <android_sdk_dir> would then be /home/<username>/android_dir.
- Add the path to the <android_sdk_dir>/tools directory to your system PATH
    - o Windows:

        1. Right-click My Computer.
        2. Click Properties.
        3. Click Advanced tab.
        4. Click Environment Variables button.
        5. Double Click Path under System Variables.
        6. Add ;<android_sdk_dir>/tools;<android_sdk_dir>/platform-toolsto the end of the Variable Values text field.
- Navigate to your <android_sdk_dir>/tools directory and type android. Add the appropriate components. See step 4 in http://developer.android.com/sdk/installing.html.
- Test your installation by running adb from the command line. If you did everything right, you should get a long list of help instructions.

1.2 Download/Install the Eclipse Plugin

- It is recommended that you use Eclipse 3.4 or later
    - o Lab Machines - Fedora Eclipse based on 3.4.2

The version of Eclipse used by the lab machines is missing a vitalcomponent and requires adding anadditional Eclipse plugin in order to
use the Android plugin:
1. Click the menu Help -> Software Updates.
2. Click the tab Available Software -> Add Site button.
3. Enter http:// download.eclipse.org/releases/ganymede into
the Location field.
4. Click OK button.
5. Enter WST Common UI into the search/text box at the top of thewindow (give it a second, it tries to search

as you type and its kind ofslow).
6. Click the checkbox next to WST Common UI.
7. Click the Install button.
8. Click the Next button.
9. Accept the terms, click Finish.
10. Restart Eclipse.
11. Follow the steps in the next bullet 3.4 Ganymede

o Eclipse 3.4 Ganymede:
1. Click the menu Help -> Software Updates.
2. Click Available Software tab -> Add Site button.
3. Enter https://dl-ssl.google.com/andriod/eclipse into the "Location" field.
4. Click OK button.
5. Click the checkbox next to Developer Tools.
6. Click the Install button.
7. Click the Next button.
8. Accept the terms, click Finish.
9. Restart Eclipse.

o Eclipse 3.5 Galileo:
1. Click Help -> Install New Software.
2. Click Add... button.
3. Enter a name for the site into the Name field.
4. Enter htpps://dl-ssl/google.com/android/eclipse/ into the Location field.
5. Click OK button.
6. Click the checkbox next to Developer Tools.
7. Click the Next button.
8. Accept the terms, click Finish.
9. Restart Eclipse.

- Point Eclipse to <android_sdk_dir>:
  1. Click the menu Window -> Preferences.
  2. Click Android from the Hierarchy view on the left hand side.
  3. Enter <android_sdk_dir> into the SDK Location field.
  4. Click the Apply button.
  5. Click the OK button

1.3 Download/Install the SDK Platform Components

At the time of writing this lab there are are eight different versions of the AndroidPlatform available, ranging from 1.1 to 2.2. It is best practice to develop for the oldestplatform available that still provides the functionality you need. This way you can beassured that your application will be supported by as many devices as possible.However, you will still want to download newer versions of the platforms so that you cantest your applications against these as well. Due to the size of each platform componentyou will only be required to download and develop on one platform for the whole class.We will target the highest platform that the G1 phones support, Android 1.6 (API4). Before we can begin developing we must download and install this platform:

- Select the menu Window -> "Android SDK and AVD Manager", or click on theblack phone shaped icon in the toolbar.
- Select Available Packages on the left hand side.
- Expand the Google Android site in the "Site, Packages, and Archives" Tree.
- Check the following items:
  - SDK Plaform Android 1.6, API 4 Revision 3
  - Google APIs by Google Inc., Android API 4, Revision 2

  - NOTE: Those of you developing on Lab Machines should follow these instructions: http://sites.google.com/site/androidhowto/how-to1/set-up-the-sdk-on-lab-machines-linux.

- Click Install Selected.
- Accept the Terms for all packages and click Install Accepted.

We're now ready to develop our application.

2. Create "Hello World" Application
    2.1 Create a new Android Project
    2.2 Run "Hello World" on the Emulator
    2.3 On a Physical Device
    2.4 Greeting the User

3. Create Application by Using Widgets
    3.1 Creating the Application by using the Activity class
        (i) onCreate()
        (ii) onStart()
        (iii) onResume()
        (iv) onPause()
        (v) onStop()
        (vi) onDestroy()
        (vii) onRestart()
    3.2 Creating the Application by using Text Edit control.
    3.3 Creating the Application Choosing Options
        (i) CheckBox
        (ii) RadioButton
        (iii) RadioGroup
        (iv) Spinner

4. Create Application by Using Building Blocks for Android Application Design
    4.1 Design the Application by using
        (i) Linear Layout
        (ii) Relative Layout
        (iii) Absolute Layout
    4.2 Create the Application to play the Audio and Video clips.

5. Create Application by Using Building Menus and Storing Data
    5.1 Design the Application for Menus and Action Bar
    5.2 Design the application to display the Drop-Down List Action Bar

Course Outcomes:

- Create data sharing with different applications and sending and interceptingSMS.
- Develop applications using services and publishing android applications.
- To demonstrate their skills of using Android software development tools

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VI Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9906	0	0	3	1.5	CIA	30 M
Course Title	:	Advanced English Communication Skills Lab					SEE	70 M

Course Objectives

- Students will be exposed to a variety of self-instructional, learner friendly modes of language learning
- Students will cultivate the habit of reading passages from the computer monitor. Thus providing them with the required facility to face computer based competitive exams like gre, toefl, and gmat etc.
- Students will learn better pronunciation through stress, intonation and rhythm
- Students will be trained to use language effectively to face interviews, group discussions, public speaking
- Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

UNIT -I

1. Phonetics for listening comprehension of various accents - 2
2. Formal Presentations using PPT slides without Graphic Elements
3. Paraphrasing

Learning Outcomes

At the end of the module, the learners will be able to

- Understand different accents spoken by native speakers of English
- Make formal structured presentations on general topics using PPT slides without graphical elements
- Paraphrase short academic texts using suitable strategies and conventions

UNIT -II

1. Debate – 2 (Following Argument)
2. Listening to short speeches/ short stories for note-making and summarizing
3. E-mail Writing

Learning Outcomes

At the end of the module, the learners will be able to

- Participate in formal discussions and speak clearly on a specific topic using suitable discourse markers
- Make formal structured presentations on academic topics using ppt slides with relevant graphical elements
- Write formal emails in the standard format

UNIT -III

1. Listening for Discussions
2. Group Discussions
3. Writing Persuasive/argumentative essays on general topics

Learning Outcomes

At the end of the module, the learners will be able to

- Follow a discussion to identify the salient points
- Participate in group discussions using appropriate conventions and language strategies
- Produce logically coherent persuasive/argumentative essays

UNIT-IV

1. Reviewing film/ book
2. Group Discussions – reaching consensus in Group Work
3. Resume Writing – Cover Letter – Applying for Internship

Learning Outcomes

At the end of the module, the learners will be able to

- Judge a film or book
- Express thoughts and ideas with acceptable accuracy and fluency with a view to reach consensus in group discussions
- Prepare a cv and write a cover letter to seek internship/ job

UNIT –V

1. Writing Project Reports
2. Editing Short Texts
3. Answering FAQs in Interviews

Learning Outcomes

At the end of the module, the learners will be able to

- Collaborate with a partner to make effective presentations
- Understand the structure and produce an effective project report.
- Edit short texts according to different needs of the work place.

Course Outcomes

- Remember and understand the different aspects of the English language proficiency with emphasis on LSRW skills
- Apply communication skills through various language learning activities
- Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
- Evaluate and exhibit acceptable etiquette essential in social and professional settings
- Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

SUGGESTED SOFTWARE:

1. Walden Infotech English Language Communication Skills.
2. iTell- Orell Digital Language Lab
3. Digital Teacher
4. LES(Learn English Select) by British council
5. TOEFL & GRE (KAPLAN, AARCO & BARRONS, USA, Cracking GRE by CLIFFS)
6. DELTA's key to the Next Generation TOEFL Test: Advanced Skills Practice.

7. Lingua TOEFL CBT Insider, by Dreamtech
8. English Pronunciation in Use (Elementary, Intermediate, Advanced) CUP
9. Cambridge Advanced Learners' English Dictionary with CD.

REFERENCE BOOKS:

The software consisting of the prescribed topics elaborated above should be procured and used.

1. Meenakshi Raman &Sangeeta Sharma, "Technical Communication" O U Press 2009.
2. Barron's Books on TOEFL/GRE/GMAT/CAT/IELTS /DELTA/Cambridge University Press.2012.
3. Butterfield Jeff, "Soft Skills for Everyone", Cengage Publications, 2011.
4. "Practice Psychometric Tests": How to familiarize yourself with genuine recruitment tests, 2012.
5. David A McMurrey& Joanne Buckely "Handbook for Technical Writing" CENGAGE Learning 2008.
6. "A Textbook of English Phonetics for Indian Students", 2nd Edition, T.Balasubramanyam. (Macmillan), 2012.
7. "A Handbook for English Laboratories", E. Suresh Kumar, P. Sreehari, Foundation Books, 2011

Note: Links provided by APSHE on LSRW, grammar and vocabulary

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0518T	2	1	0	3	CIA	30 M
Course Title	:	Internet of Things					SEE	70 M

Course Objectives:

- Introduce the fundamental concepts of IoT and physical computing
- Expose the student to a variety of embedded boards and IoT Platforms
- Create a basic understanding of the communication protocols in IoT communications.
- Familiarize the student with application program interfaces for IoT.
- Enable students to create simple IoT applications.

UNIT I

Overview of IoT:

The Internet of Things: An Overview, The Flavour of the Internet of Things, The “Internet” of “Things”, The Technology of the Internet of Things, Enchanted Objects, Who is Making the Internet of Things?

Design Principles for Connected Devices: Calm and Ambient Technology, Privacy, Web Thinking for Connected Devices, Affordances.

Prototyping: Sketching, Familiarity, Costs Vs Ease of Prototyping, Prototypes and Production, Open source Vs Close source, Tapping into the community.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain IoT architecture. [L2]
- Interpret the design principles that govern connected devices [L2]
- Summarize the roles of various organizations for IoT [L2]
- Interpret the significance of Prototyping [L2]

UNIT II

Embedded Devices:

Electronics, Embedded Computing Basics, Arduino, Raspberry Pi, Mobile phones and tablets, Plug Computing: Always-on Internet of Things

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the basics of microcontrollers [L2]
- Outline the architecture of Arduino [L2]
- Develop simple applications using Arduino [L3]
- Outline the architecture of Raspberry Pi [L2]
- Develop simple applications using Raspberry Pi [L3]
- Select a platform for a particular embedded computing application [L3]

UNIT III

Communication in the IoT:

Internet Communications: An Overview, IP Addresses, MAC Addresses, TCP and UDP Ports, Application Layer Protocols

Prototyping Online Components:
Getting Started with an API, Writing a New API, Real-Time Reactions, Other Protocols Protocol
Learning Outcomes:
After completing this Unit, students will be able to
- Interpret different protocols and compare them [L2]
- Select which protocol can be used for a specific application [L3]
- Utilize the Internet communication protocols for IoT applications [L3]
- Select IoT APIs for an application [L3]
- Design and develop a solution for a given application using APIs [L6]
- Test for errors in the application [L4]

UNIT IV
Business Models: A short history of business models, The business model canvas, Who is the business model for, Models, Funding an Internet of Things startup, Lean Startups.
Manufacturing: What are you producing, Designing kits, Designing printed circuit boards.
Learning Outcomes:
After completing this Unit, students will be able to
- Plan the business model [L6]
- Predict the market value [L6]
- Build the product [L6]

UNIT V
Manufacturing continued: Manufacturing printed circuit boards, Mass-producing the case and other fixtures, Certification, Costs, Scaling up software.
Ethics: Characterizing the Internet of Things, Privacy, Control, Environment, Solutions.
Learning Outcomes:
After completing this Unit, students will be able to
- Outline the manufacturing techniques [L2]
- Adapt the Ethics of the IoT[L6]

Course outcomes:
Upon completion of the course, the students should be able to:
- Choose the sensors and actuators for an IoT application (L1)
- Select protocols for a specific IoT application (L2)
- Utilize the cloud platform and APIs for IoT applications (L3)
- Experiment with embedded boards for creating IoT prototypes (L3)
- Design a solution for a given IoT application (L6)

Text Book:
1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things, Wiley Publications, 2012
Reference Books:
1. Arshdeep Bahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
2. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.
Reference sites:
1. https://www.arduino.cc/
2. https://www.raspberrypi.org/

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(VII Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0519T	3	0	0	3	CIA	30 M
Course Title	:	Cryptography & Network Security					SEE	70 M

Course Objectives:

This course is designed to:

To make the student learn different encryption techniques along with hash functions, MAC, digital signatures and their use in various protocols fornetwork security and system security.

UNIT I:

Classical Encryption Techniques Objectives:

The Objectives of this unit is to present an overview of the main concepts of cryptography, understand the threats & attacks, understand ethical hacking.

Introduction: Security attacks, services & mechanisms, Symmetric Cipher Model, Substitution Techniques, Transportation Techniques, Cyber threats and their defense(Phishing Defensive measures,

web based attacks, SQL injection & Defense techniques)(TEXT BOOK 2), Buffer overflow & format string

vulnerabilities, TCP session hijacking(ARP attacks, route table modification) UDP hijacking (man-in-the middle attacks)(TEXT BOOK 3).

UNIT II:

Block Ciphers & Symmetric Key Cryptography Objectives:

The Objectives of this unit is to understand the difference between stream ciphers & block ciphers, present an overview of the Feistel Cipher and explain the encryption and decryption, present an overview of DES, Triple DES, Blowfish, IDEA.

Traditional Block Cipher Structure, DES, Block Cipher Design Principles, AES-Structure, Transformation functions, Key Expansion, Blowfish, CAST-128, IDEA, Block Cipher Modes of Operations.

UNIT III:

Number Theory & Asymmetric Key Cryptography Objectives: Presents the basic principles of public key cryptography, Distinct uses of public key cryptosystems.

Number Theory: Prime and Relatively Prime Numbers, Modular Arithmetic, Fermat's and Euler's Theorems, The Chinese Remainder theorem, Discrete logarithms.

Public Key Cryptography: Principles, public key cryptography algorithms, RSA Algorithms, Diffie Hellman Key Exchange, Elgamal encryption & decryption, Elliptic Curve Cryptography.

UNIT IV:

Cryptographic Hash Functions & Digital Signatures Objectives:

Present overview of the basic structure of cryptographic functions, Message Authentication Codes, Understand the operation of SHA-512, HMAC, Digital Signature.

Application of Cryptographic hash Functions, Requirements & Security, Secure Hash Algorithm, Message Authentication Functions, Requirements & Security, HMAC& CMAC. Digital Signatures NIST Digital Signature Algorithm.

Key management & distribution.

UNIT V:

User Authentication, Transport Layer Security & Email Security Objectives:

Present an overview of techniques for remote user authentication, Kerberos, Summarize Web Security threats and Web traffic security approaches, overview of SSL & TLS. Present an overview of electronic mail security.

User Authentication: Remote user authentication principles, Kerberos Transport Level Security: Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Shell(SSH).

Electronic Mail Security: Pretty Good Privacy (PGP) and S/MIME.

Course outcomes:

Upon completion of the course, the students should be able to:

- Analyze and design classical encryption techniques and block ciphers.
- Understand and analyze data encryption standard.
- Understand and analyze public-key cryptography, RSA and other public-key cryptosystems such as Diffie-Hellman Key Exchange, ElGamal Cryptosystem, etc.
- Understand key management and distribution schemes and design UserAuthentication Protocols.
- Analyze and design hash and MAC algorithms, and digital signatures.

TEXT BOOKS:

1. Cryptography & Network Security: Principles and Practices, William Stallings, PEA, Sixth edition.
2. Introduction to Computer Networks & Cyber Security, Chwan Hwa Wu, J.David Irwin, CRC press
3. Hack Proofing your Network, Russell, Kaminsky, Forest Puppy, Wiley Dreamtech.

REFERENCE BOOKS:

1.Everyday Cryptography, Fundamental Principles & Applications, Keith Martin, Oxford

2.Network Security & Cryptography, Bernard Menezes, Cengage, 2010

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester CSE)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0507	3	0	0	3	CIA	30 M
Course Title	:	Cloud Computing					SEE	70 M

Course Objectives:

This course is designed to:

- Define cloud services and models
- Demonstrate design the architecture for new cloud application.
- Explain how to re-architect the existing application for the cloud.

Unit-I: Introduction to Cloud Computing, Characteristics of Cloud Computing, Cloud Models, Cloud Services Examples, Cloud based services and Applications, Cloud Concepts and Technologies, Virtualization, Load Balancing, Scalability and Elasticity, Deployment, Replication, Monitoring, Software defined networking, Network function virtualization, Map Reduce, Identity and Access Management, Service Level Agreements, Billing.

Learning Outcomes

At the end of the unit, students will be able to:

- Outline the Cloud characteristics and models.(L2)
- Classify different models, different technologies in cloud.(L2)

Unit-II: Cloud Services and Platforms: Compute Services, Storage Services, Database Services, Application Services, Content Delivery Services, Analytics Services, Deployment and Management Services, Identity and Access Management Services, Open Source Private Cloud Software, Apache Hadoop, Hadoop MapReduce Job Execution, Hadoop Schedulers, Hadoop Cluster Setup.

Learning Outcomes:

At the end of the unit, students will be able to:

- Summarize the Services and Platform of cloud.(L2)
- Demonstrate Hadoop Cluster Setup. (L2)

Unit-III:Cloud Application Design: Design Considerations, Reference Architectures, Cloud Application Design Methodologies, Data Storage Approaches,
Multimedia Cloud: Introduction, Case Study: Live Video Streaming App, Streaming Protocols, Case Study: Video Transcoding APP.

Learning Outcomes:

At the end of the unit, students will be able to:

- Design and build cloud applications.(L6)
- Describe the multimedia cloud. (L2)

Unit-IV: Python for Amazon Web Services, Python for Google Cloud Platform, Python for Windows Azure, Python for MapReduce, Python Packages of Interest, Python Web Application Framework – Django, Designing a RESTful Web API.

Learning Outcomes:

At the end of the unit, students will be able to:

- Select different cloud services from different vendors (L2)
- Utilize Python language to access cloud services (L3)

Unit-V: Cloud Application Development in Python, Design Approaches, Image Processing APP, Document Storage App, MapReduce App, Social Media Analytics App, Cloud Application Benchmarking and Tuning, Cloud Security, Cloud Computing for Education.

Learning Outcomes:

At the end of the unit, students will be able to:

- Investigate different Cloud applications. (L4)
- Design cloud applications using Python. (L6)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Outline the procedure for Cloud deployment (L2)
- Distinguish different cloud service models and deployment models (L4)
- Compare different cloud services. (L5)
- Design applications for an organization which use cloud environment. (L6)

Textbooks:

1. Arshadeep Bhaga, Vijay Madisetti, "Cloud Computing A Handson Approach", Universities Press, 2018.

References:

1. Chris Hay, Brian Prince, "Azure in Action" Manning Publications [ISBN: 9781935182481],2010.
2. Henry Li, "Introducing Windows Azure" Apress; 1 edition [ISBN: 978-14302-2469- 3],2009.
3. Eugenio Pace, Dominic Betts, Scott Densmore, Ryan Dunn, Masashi Narumoto, MatiasWoloski, "Developing Applications for the Cloud on the Microsoft Windows Azure Platform" Microsoft Press; 1 edition [ISBN: 9780735656062],2010.
4. Eugene Ciurana, "Developing with Google App Engine" Apress; 1 edition [ISBN: 978-1430218319],2009.
5. Charles Severance, "Using Google App Engine" O'Reilly Media; 1 edition, [ISBN: 978-0596800697], 2009.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester CSE)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0508	3	0	0	3	CIA	30 M
Course Title	:	Natural Language Processing					SEE	70 M

Course Objectives:

This course is designed to:

- Explain and apply fundamental algorithms and techniques in the area of natural language processing (NLP)
- Discuss approaches to syntax and semantics in NLP.
- Examine current methods for statistical approaches to machine translation.
- Explore machine learning techniques used in NLP.

UNIT I:

Introduction to Natural language

The Study of Language, Applications of NLP, Evaluating Language Understanding Systems, Different Levels of Language Analysis, Representations and Understanding, Organization of Natural language Understanding Systems, Linguistic Background: An outline of English Syntax.

Learning Outcomes:

At the end of the module, students will be able to:

- Classify various NLP Applications (L2)
- Apply the logic by using Python Programming (L3)
- List the AI Languages (L1)
- Outline the Linguistic Background (L2)

Unit II: Grammars and Parsing

Grammars and Parsing- Top- Down and Bottom-Up Parsers, Transition Network Grammars, Feature Systems and Augmented Grammars, Morphological Analysis and the Lexicon, Parsing with Features, Augmented Transition Networks, Bayees Rule, Shannon game, Entropy and Cross Entropy.

Learning Outcomes:

At the end of the module, students will be able to:

- Demonstrate the Top- Down and Bottom-Up Parsing techniques (L2)
- Apply Bayes Rule, Shannon game, Entropy and Cross Entropy. (L3).
- Develop game playing strategies using Shannon game. (L3)

UNIT III: Grammars for Natural Language

Grammars for Natural Language, Movement Phenomenon in Language, Handling questions in Context Free Grammars, Hold Mechanisms in ATNs, Gap Threading, Human Preferences in Parsing, Shift Reduce Parsers, Deterministic Parsers.

Learning Outcomes:

At the end of the module, students will be able to:

- Classify Grammars for Natural Language (L2)
- Explain Hold Mechanisms in ATNs. (L2)

- Explain Human Preferences in Parsing. (L2)

UNIT IV:

Semantic Interpretation

Semantic & Logical form, Word senses & ambiguity,The basic logical form language, Encoding ambiguity in the logical Form, Verbs & States in logical form, Thematic roles, Speech acts & embedded sentences, Defining semantics structure model theory.

Language Modeling

Introduction, n-Gram Models, Language model Evaluation, Parameter Estimation, Language Model Adaption, Types of Language Models, Language-Specific Modeling Problems, Multilingual and Crosslingual Language Modeling.

Learning Outcomes:

At the end of the module, students will be able to:

- Distinguish Language model Evaluation (L4)
- List the types of Language Models (L1)

UNIT V:

Machine Translation

Survey: Introduction, Problems of Machine Translation, Is Machine Translation Possible, Brief History, Possible Approaches, Current Status. Anusaraka or Language Accessor: Background, Cutting the Gordian Knot, The Problem, Structure of Anusaraka System, User Interface, Linguistic Area, Giving up Agreement in Anusarsaka Output, Language Bridges.

Multilingual Information Retrieval

Introduction, Document Preprocessing, Monolingual Information Retrieval, CLIR, MLIR, Evaluation in Information Retrieval, Tools, Software and Resources.

Multilingual Automatic Summarization

Introduction, Approaches to Summarization, Evaluation, How to Build a Summarizer, Competitions and Datasets.

Learning Outcomes:

At the end of the module, students will be able to:

- Apply Machine Translation techniques. (L3)
- Elaborate Multilingual Information Retrieval and Multilingual Automatic Summarization. (L6)

Course Outcomes:

Upon completion of the course, the students should be able to:

- Build NLP applications using Python. (L6)
- Apply various Parsing techniques, Bayes Rule, Shannon game, Entropy and Cross Entropy. (L3)
- Explain the fundamentals of CFG and parsers and mechanisms in ATN's. (L2)
- Apply Semantic Interpretation and Language Modeling..(L3)
- Interpret Machine Translation and multilingual Information Retrieval systems and Automatic Summarization.(L2)

TEXT BOOKS:

1. James Allen, Natural Language Understanding, 2nd Edition, 2003, Pearson Education.
2. Multilingual Natural Language Processing Applications : From Theory To Practice- Daniel M.Bikel and Imed Zitouni, Pearson Publications.
3. Natural Language Processing, A paninian perspective, Akshar Bharathi,Vineet chaitanya,Prentice –Hall of India.

REFERENCES BOOKS:

1. Charniack, Eugene, Statistical Language Learning, MIT Press, 1993.
2. Jurafsky, Dan and Martin, James, Speech and Language Processing, 2nd Edition, Prentice Hall, 2008.
3. Manning, Christopher and Henrich, Schutze, Foundations of Statistical Natural Language Processing, MIT Press, 1999.

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(VII Semester CSE)

Course Category	:	Professional Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0509	3	0	0	3	CIA	30 M
Course Title	:	Agile Methodologies					SEE	70 M

Course Objectives:

This course is designed to:

- Master the art of agile development.
- Understand how an iterative, incremental development process leads to faster delivery of more useful software.
- Elucidate the essence of agile development methods
- Explain the principles and practices of extreme programming

UNIT I:

Why Agile? , How to be Agile, Understanding XP, Values and Principles, Improve the Process, Eliminate Waste, Deliver Value.

Learning Outcomes:

After completing this Unit, students will be able to

- Appraise the importance of Agile and the philosophy behind being Agile (L5)
- Interpret the questions that helps to eliminate waste from the process and increase one's agility (L2)

UNIT II:

Practicing XP-Thinking, Pair Programming, Energized Work, Informative Workspace, RootCause Analysis, Retrospectives, Collaborating, Sit Together, Real Customer Involvement, Ubiquitous Language, Stand-Up Meetings, Coding Standards, Iteration Demo, Reporting.

Learning Outcomes:

After completing this Unit, students will be able to

- Apply practices to excel as mindful developers (L3)
- Illustrate the eight practices to help a team and its stakeholders collaborate efficiently and effectively (L2)

UNIT III:

Releasing-Done Done, No Bugs, Version Control, Ten-Minute Build, Continuous Integration, Collective Code Ownership, Documentation.

Learning Outcomes:

After completing this Unit, students will be able to

- Examine pushing software into production (L4)
- Explain the importance of documentation in ensuring the long-term maintainability of the product at appropriate times. (L2)

UNIT IV:

Planning-Vision, Release Planning, Risk Management, Iteration Planning, Stories, Estimating.

Learning Outcomes:

After completing this Unit, students will be able to

- List the eight practices that allows to control the chaos of endless possibility (L1)

UNIT V:

Developing-Incremental Requirements, Customer Tests, Test- Driven Development, Refactoring, Incremental Design and Architecture, Spike Solutions, Performance Optimization.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the practices that keep the code clean and allow the entire team to contribute to development. (L2)

Course outcomes:

Upon completion of the course, the students should be able to:

- Adopt Extreme Programming (L1)
- Create own agile method by customizing XP to a particular situation(L6)

Text Books:

1. James Shore and Shane Warden, “ The Art of Agile Development”, O’REILLY, 2007.

References:

1. Robert C. Martin, “Agile Software Development, Principles, Patterns, and Practices” , PHI, 2002.
2. Angel Medinilla, “Agile Management: Leadership in an Agile Environment”, Springer, 2012.
3. Bhuvan Unhelkar, “The Art of Agile Practice: A Composite Approach for Projects and Organizations”, CRC Press.
4. Jim Highsmith, “Agile Project Management”, Pearson education, 2004.

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(VII Semester CSE)

Course Category	:	Open Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0105	3	0	0	3	CIA	30 M
Course Title	:	Air Pollution and Control					SEE	70 M

Course Objectives:

- To identify the sources of air pollution
- To know the composition and structure of atmosphere
- To know the pollutants dispersion models
- To understand the working of air pollution control equipments
- To identify the sources of noise pollution and their controlling methods

UNIT I

Introduction: sources, effects on – ecosystems, characterization of atmospheric pollutants, air pollution episodes of environmental importance. Indoor Air Pollution– sources, effects.

Learning Outcomes:

After completing this Unit, students will be able to

- To understand the character of atmospheric pollutants and their effects

UNIT II

Meteorology - composition and structure of the atmosphere, wind circulation, solar radiation, lapse rates, atmospheric stability conditions, wind velocity profile, Maximum Mixing Depth (MMD), Temperature Inversions, Wind rose diagram.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the composition and structure and structure of atmosphere
- To understand the maximum mixing depth and windrose diagram

UNIT III

General characteristics of stack emissions, plume behaviour, heat island effect. Pollutants dispersion models – description and application of point, line and areal sources. Monitoring of particulate matter and gaseous pollutants –respirable, non-respirable and nano - particulate matter. CO, CO2, Hydrocarbons (HC), SOX and NOX, photochemical oxidants.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the general characteristics of stack emissions and their behavior
- To understand the monitoring of particulate matter and gaseous pollutants

UNIT IV

Air Pollution Control equipment for particulate matter & gaseous pollutants– gravity settling chambers, centrifugal collectors, wet collectors, fabric filters, electrostatic precipitator (ESP). – Adsorption, Absorption, Scrubbers, Condensation and Combustion.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the various air pollution control equipments

UNIT V

Noise - sources, measurements, effects and occupational hazards. Standards, Noise mapping, Noise attenuation equations and methods, prediction equations, control measures, Legal aspects of noise.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the noise sources, mapping, prediction equations etc.,

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Identify the sources of air pollution
- Understand the composition and structure and structure of atmosphere.
- Know about the general characteristics of stack emissions and their behavior
- Know about the general characteristics of stake emission and their behavior
- Know about the noise sources, mapping, prediction equations etc.,

REFERENCES:

1. WarkK ., Warner C.F., and Davis W.T., “Air Pollution - Its Origin and Control”, Harper & Row Publishers, New York.
2. Lee C.C., and Lin S.D., “Handbook of Environmental Engineering Calculations”, McGraw Hill, New York.
3. Perkins H.C., “Air Pollution”, McGraw Hill.
4. Crawford M., “Air Pollution Control Theory”, TATA McGraw Hill.
5. Stern A.C., “Air Pollution”, Vol I, II, III.
6. Seinfeld N.J.,, “Air Pollution”, McGraw Hill.
7. Stern A.C. Vol. V, “Air Quality Management”.
8. M N Rao and HVN Rao, Air Pollution” Tata McGraw Hill publication

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester CSE)

Course Category	:	Open Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0106	3	0	0	3	CIA	30 M
Course Title	:	Basics of Civil Engineering					SEE	70 M

Course Objectives:

- To identify the traditional materials that are used for building constructions
- To know the principles of building planning
- To know the causes of dampness in structures and its preventive measures
- To know about the low cost housing techniques
- To know the basic principles of surveying

UNIT I

Traditional materials: Stones- Types of stone masonry -Brick-types of brick masonry- lime Cement – Timber – Seasoning of timber - their uses in building works

Learning Outcomes:

After completing this Unit, students will be able to

- To understand the characteristics of different building materials.

UNIT II

Elements of building planning- basic requirements-orientation-planning for energy efficiency- planning based on utility-other requirements.

Learning Outcomes:

After completing this Unit, students will be able to

- To understand the principles of planning in buildings

UNIT III

Dampness and its prevention: Causes of dampness- ill effects of dampness-requirements of an ideal material for damp proofing-materials for damp proofing –methods of damp proofing.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the causes of dampness in buildings and its ill effects
- To know about the general characteristics of ideal material for damp proofing

UNIT IV

Cost effective construction techniques in mass housing schemes: Minimum standards –Approach to cost effective mass housing schemes- cost effective construction techniques.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the various cost effective techniques in mass housing schemes.

UNIT V

Introduction to Surveying: Object and uses of surveying- Primary divisions in surveying- Fundamental principles of surveying- Classification of surveying-plans and maps-scales-types of graphical scales-units and measurements

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the objects of surveying and its classification.

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Identify the traditional building materials that are used in building construction.
- Plan the buildings based on principles of planning.
- Identify the sources of dampness and its ill effects on buildings and its prevention.
- Know the cost effective construction in mass housing schemes.
- Know the importance of surveying in planning of the buildings.

Text books:

1. S.S.Bhavikatti, “Basic civil engineering”, New age international publishers.
2. S.S.Bhavikatti, “Building Construction:, Vikas Publishing house, New Delhi.
3. G.C.Sahu and Joygopal jena, “Building materials and Construction”, McGraw Hill Education.

Reference books:

1. N.Subramanian, “Building Materials testing and sustainability”, Oxford university press.

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(VII Semester CSE)

Course Category	:	Open Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0204	3	0	0	3	CIA	30 M
Course Title	:	Renewable Energy Systems					SEE	70 M

Course Objectives:

At the end of the course the student will be able to

- Identify various sources of Energy and the need of Renewable Energy Systems.
- Understand the concepts of Solar Radiation, Wind energy and its applications.
- Distinguish between solar thermal and solar PV systems
- Interpret the concept of geo thermal energy and its applications.
- Understand the use of biomass energy and the concept of Ocean energy and fuel cells.

UNIT -I

Solar Energy

Solar radiation - beam and diffuse radiation, solar constant, earth sun angles, attenuation and measurement of solar radiation, local solar time, derived solar angles, sunrise, sunset and day length. flat plate collectors, concentrating collectors, storage of solar energy-thermal storage.

Learning Outcomes:

At the end of the course the student will be able to

- To understand about solar thermal parameters
- To distinguish between flat plate and concentrated solar collectors
- To know about thermal storage requirements
- To know about measurement of solar radiation

UNIT – II

PV Energy Systems

Introduction, The PV effect in crystalline silicon basic principles, the film PV, Other PV technologies, Electrical characteristics of silicon PV cells and modules, PV systems for remote power, Grid connected PV systems.

Learning Outcomes:

After completing this Unit, students will be able to

- Understand the concept of PV effect in crystalline silicon and their characteristics
- Understand other PV technologies
- To know about electrical characteristics of PV cells & modules
- To know about grid connected PV systems

UNIT - III

Wind Energy

Principle of wind energy conversion; Basic components of wind energy conversion systems; wind mill components, various types and their constructional features; design considerations of horizontal and vertical axis wind machines: analysis of aerodynamic forces acting on wind mill blades and estimation of power output; wind data and site selection considerations.

Learning Outcomes:
After completing this Unit, students will be able to
- To understand basics of wind energy conversion and system
- To distinguish between VAWT and HAWT systems
- To understand about design considerations
- To know about site selection considerations of WECS

UNIT - IV
Geothermal Energy
Estimation and nature of geothermal energy, geothermal sources and resources like hydrothermal, geo-pressured hot dry rock, magma. Advantages, disadvantages and application of geothermal energy, prospects of geothermal energy in India.

Learning Outcomes:
After completing this Unit, students will be able to
- Understand the Geothermal energy and its mechanism of production and its applications
- Analyze the concept of producing Geothermal energies
- To learn about disadvantages and advantages of Geo Thermal Energy Systems
- To know about various applications of GTES

UNIT -V
Miscellaneous Energy Technologies
Ocean Energy: Tidal Energy-Principle of working, performance and limitations. Wave Energy- Principle of working, performance and limitations.
Bio mass Energy: Biomass conversion technologies, Biogas generation plants, Classification, advantages and disadvantages, constructional details, site selection, digester design consideration Fuel cell: Principle of working of various types of fuel cells and their working, performance and limitations.

Learning Outcomes:
After completing this Unit, students will be able to
- Analyze the operation of tidal energy
- Analyze the operation of wave energy
- Analyze the operation of bio mass energy
- Understand the principle, working and performance of fuel cell technology
- Apply these technologies to generate power for usage at remote centres

Course Outcomes:
Upon the successful completion of this course, the students will be able to:
- To distinguish between various alternate sources of energy for different suitable application requirements
- To differentiate between solar thermal and PV system energy generation strategies
- To understand about wind energy system
- To get exposed to the basics of Geo Thermal Energy Systems
- To know about various diversified energy scenarios of ocean, biomass and fuel cells

Text Books:

1. Stephen Peake, "Renewable Energy Power for a Sustainable Future", Oxford International Edition, 2018.
2. G. D. Rai, "Non-Conventional Energy Sources", 4th Edition, Khanna Publishers, 2000.

References:

1. S. P. Sukhatme, "Solar Energy",3rd Edition, Tata Mc Graw Hill Education Pvt. Ltd, 2008.
2. B H Khan , " Non-Conventional Energy Resources", 2nd Edition, Tata Mc Graw Hill Education Pvt Ltd, 2011.
3. S. Hasan Saeed and D.K.Sharma,"Non-Conventional Energy Resources",3rd Edition, S.K.Kataria & Sons, 2012.
4. G. N. Tiwari and M.K.Ghosal, "Renewable Energy Resource: Basic Principles and Applications", Narosa Publishing House, 2004.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester CSE)

Course Category	:	Open Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0203	3	0	0	3	CIA	30 M
Course Title	:	Electric Vehicle Engineering					SEE	70 M

Course Objectives:
After completing this Unit, students will be able to
- To get exposed to new technologies of battery electric vehicles, fuel cell electric vehicles
- To get exposed to EV system configuration and parameters
- To know about electro mobility and environmental issues of EVs
- To understand about basic EV propulsion and dynamics
- To understand about fuel cell technologies for EV and HVEs
- To know about basic battery charging and control strategies used in electric vehicles

UNIT-I
Introduction to EV Systems and Parameters
Past, Present and Future EV, EV Concept, EV Technology, State-of-the Art EVs, EV configuration, EV system, Fixed and Variable gearing, single and multiple motor drive, in-wheel drives, EV parameters: Weight, size, force and energy, performance parameters.

Learning Outcomes:
After completing this Unit, students will be able to
- To know about past, present and latest technologies of EV
- To understand about configurations of EV systems
- To distinguish between EV parameters and performance parameters of EV systems
- To distinguish between single and multiple motor drive EVs
- To understand about in-wheel EV

UNIT-II
EV and Energy Sources
Electro mobility and the environment, history of Electric power trains, carbon emissions from fuels, green houses and pollutants, comparison of conventional, battery, hybrid and fuel cell electric systems

Learning Outcomes:
After completing this Unit, students will be able to
- To know about various types of EV sources
- To understand about e-mobility
- To know about environmental aspects of EV
- To distinguish between conventional and recent technology developments in EV systems

UNIT-III
EV Propulsion and Dynamics
Choice of electric propulsion system, block diagram, concept of EV Motors, single and multi motor configurations, fixed and variable geared transmission, In-wheel motor configuration, classification,

Electric motors used in current vehicle applications, Recent EV Motors, Vehicle load factors, vehicle acceleration.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about what is meant by propulsion system
- To understand about single and multi motor EV configurations
- To get exposed to current and recent applications of EV
- To understand about load factors in vehicle dynamics
- To know what is meant acceleration in EV

UNIT-IV

Fuel Cells

Introduction of fuel cells, basic operation, model, voltage, power and efficiency, power plant system – characteristics, sizing, Example of fuel cell electric vehicle.

Introduction to HEV, brake specific fuel consumption, comparison of series, series-parallel hybrid systems, examples

Learning Outcomes:

After completing this Unit, students will be able to

- To know about fuel cell technology of EV
- To know about basic operation of FCEV
- To know about characteristics and sizing of EV with suitable example
- To get exposed to concept of Hybrid Electric Vehicle using fuel cells
- To know about the comparison of various hybrid EV systems

UNIT-V

Battery Charging and Control

Battery charging: Basic requirements, charger architecture, charger functions, wireless charging, power factor correction.

Control: Introduction, modelling of electro mechanical system, feedback controller design approach, PI controllers designing, torque-loop, speed control loop compensation, acceleration of battery electric vehicle

Learning Outcomes:

After completing this Unit, students will be able to

- To understand about basic requirements of battery charging and its architecture
- To know about charger functions
- To get exposed to wireless charging principle
- To understand about block diagram, modelling of electro mechanical systems of EV
- To be able to design various compensation requirements

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- To understand and differentiate between conventional and latest trends in Electric Vehicles
- To know about various configurations in parameters of EV system
- To know about propulsion and dynamic aspects of EV

- To understand about fuel cell technologies in EV and HEV systems
- To understand about battery charging and controls required of EVs

TEXT BOOKS:

1. C.C Chan, K.T Chau: "Modern Electric Vehicle Technology", Oxford University Press Inc., New York 2001.
2. James Larminie, John Lowry, "Electric Vehicle Technology Explained", Wiley, 2003.

REFERENCE BOOKS:

1. Iqbal Husain,, "Electric and Hybrid Vehicles Design Fundamentals", CRC Press 2005.
2. Ali Emadi, "Advanced Electric Drive Vehicles", CRC Press, 2015.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester CSE)

Course Category	:	Open Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0306	3	0	0	3	CIA	30 M
Course Title	:	Finite Element Methods					SEE	70 M

Course Objectives:

- Familiarize basic principles of finite element analysis procedure.
- Explain theory and characteristics of finite elements that represent engineering structures.
- Apply finite element solutions to structural, thermal, dynamic problem.
- Learn to model complex geometry problems and solution techniques.

UNIT – I

Introduction to finite element methods for solving field problems, Stress and equilibrium, Boundary conditions, Strain-Displacement relations, Stress- strain relations for 2D and 3D Elastic problems. Potential energy and equilibrium, The Rayleigh-Ritz method, Formulation of Finite Element Equations.

One dimensional problems: Finite element modeling coordinates and shape functions. Assembly of global stiffness matrix and load vector. Finite element equations, Treatment of boundary conditions, Quadratic shape functions.

Learning Outcomes:

At the end of the unit, the student will be able to

- Understand the concept of nodes and elements.(l2)
- Understand the general steps of finite element methods.(l2)
- Understand the role and significance of shape functions in finite element formulations (l2)
- Formulate and solve axially loaded bar problems. (l6)

UNIT - II

Analysis of trusses: Stiffness Matrix for plane truss element. Stress Calculations and Problems. Analysis of beams: Element Stiffness Matrix for two noded, two degrees of freedom per node beam element and simple problems.

Learning Outcomes:

At the end of the unit, the student will be able to

- Explain the use of the basic finite elements for structural applications using truss and beam. (l2)
- Formulate and analyze truss and beam problems. (l6)

UNIT - III

Finite element modeling of two dimensional stress analysis - constant strain triangles- quadrilateral element-treatment of boundary conditions. Estimation of load Vector, Stresses.Finite element modeling of Axi-symmetric solids subjected to axi-symmetric loading with triangular elements.Two dimensional four nodedIsoparametric elements and problems.

Learning Outcomes:
At the end of the unit, the student will be able to
- Explain the formulation of two – dimensional elements (Triangular and Quadrilateral Elements). (L2)
- Apply the formulation techniques to solve two – dimensional problems using triangle and quadrilateral elements. (L3)
- Formulate and solve axisymmetric problems.(L6)

UNIT - IV
Steady state heat transfer analysis: One dimensional analysis of slab and fin, two dimensional analysis of thin plate.
Analysis of a uniform shaft subjected to torsion loading.

Learning Outcomes:
At the end of the unit, the student will be able to
- Explain the application and use of the Finite Element Methods for heat transfer problems. (L2)
- Formulate and solve heat transfer problems. (L6)
- Analyse the

UNIT V
Dynamic analysis: Formulation of finite element model,element –mass matrices,evaluation of Eigen values and Eigen vectors for a stepped bar truss.
3D Problems:Finite Element formulation- Tetrahedron element-Stiffness matrix.

Learning Outcomes:
At the end of the unit, the student will be able to
- Understand problems involving dynamics using Finite Element Methods.
- Evaluate the Eigen values and Eigen Vectors for steeped bar.
- Develop the stiffness matrix for tetrahedron element.

Course Outcomes:
Upon successful completion of this course you should be able to
- Understand the concepts behind variational methods and weighted residual methods in FEM.
- Identify the application and characteristics of FEA elements such as bars, beams, and isoparametric elements, and 3-D element.
- Develop element characteristic equation procedure and generation of global stiffness equation will be applied.
- Able to apply Suitable boundary conditions to a global structural equation, and reduce it to a solvable form.
- Able to identify how the finite element method expands beyond the structural domain, for problems involving dynamics, heat transfer and fluid flow.

TEXT BOOKS

1. Chandraputla, Ashok &Belegundu, “Introduction to Finite Element in Engineering”, Prentice Hall.
2. S.S.Rao, “The Finite Element Methods in Engineering”, 2nd Edition, Elsevier Butterworth - Heinemann 2011.

REFERENCE BOOKS

1. J N Reddy, “An introduction to the Finite Element Method”, McGraw – Hill, New York, 1993.
2. R D Cook, D S Malkus and M E Plesha, “Concepts and Applications of Finite Element Analysis”, 3rd Edition, John Wiley, New York, 1989.
3. K J Bathe, “Finite Element Procedures in Engineering Analysis”, Prentice-Hall, Englewood Cliffs,1982.
4. T J R Hughes, “the Finite Element Method, Prentice”, Hall, Englewood Cliffs, NJ, 1986.
5. C Zienkiewicz and R L Taylor, “the Finite Element Method”, 3rd Edition. McGraw-Hill, 1989.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester CSE)

Course Category	:	Open Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0307	3	0	0	3	CIA	30 M
Course Title	:	Product Marketing					SEE	70 M

Course Objectives:

- Introduce the basic concepts of Product marketing.
- Familiarize with market information systems and research
- Understand the nature and importance of industrial market
- Discuss the major stages in new product development
- Identify the factors affecting pricing decisions

UNIT I:

Introduction **(7 Hours)**

Historical development of marketing management, Definition of Marketing, Core marketing concepts, Marketing Management philosophies, Micro and Macro Environment, Characteristics affecting Consumer behaviour, Types of buying decisions, buying decision process, Classification of consumer products, Market Segmentation Concept of Marketing Myopia. Importance of marketing in the Indian Socio economic system.

Learning Outcomes:

At the end of this student, the student will be able to

- Define Marketing. (L1)
- Discuss marketing philosophies. (L2)
- Sketch the buying decision process. (L3)
- Understand the importance of marketing in the Indian socio economic system. (L2)

UNIT II:

Marketing of Industrial Products **(6 Hours)**

Components of marketing information system–benefits & uses marketing research system, marketing research procedure, Demand Estimation research, Test marketing, Segmentation Research - Cluster analysis, Discriminate analysis. Sales forecasting: objective and subjective methods. Nature and importance of the Industrial market, classification of industrial products, participants in the industrial buying process, major factors influencing industrial buying behavior, characteristics of industrial market demand. Determinants of industrial market demand Buying power of Industrial users, buying motives of Industrials users, the industrial buying process, buying patterns of industrial users.

Learning Outcomes:

At the end of this student, the student will be able to

- Identify the components of marketing information system. (L2)
- List the advantages and uses of marketing research system. (L1)
- Demonstrate sales forecasting. (L3)
- Explain the major factors influencing industrial buying behaviour. (L2)

UNIT III:

Product Management And Branding **(7 Hours)**

The concept of a product, features of a product, classification of products, product policies – product planning and development, product line, product mix – factors influencing change in product mix, product mix strategies, meaning of "New – product; major stages in new – product development product life cycle. Branding: Reasons for branding, functions of branding features of types of brands, kinds of brand name.

Learning Outcomes:

At the end of this student, the student will be able to

- Indentify the factors influencing change in product mix. (L2)
- Sketch various stages in product life cycle. (L2)
- Recall the features of a product and product policies. (L1)
- Demonstrate on features, functions and reasons of branding. (L3)

UNIT IV:

Pricing And Pacakaging (7Hours)

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions Labeling: Types, functions advantages and disadvantages, Packaging: Meaning, growth of packaging, function of packaging, kinds of packaging.

Learning Outcomes:

At the end of this student, the student will be able to

- List the factors affecting pricing decisions. (L1)
- Explain the procedure for price determination. (L2)
- Employ Pricing strategies and decisions. (L3)
- Understand the functions of labelling and packaging. (L2)

UNIT V:

Product Promotion **(6Hours)**

Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for price determination, kinds of pricing, pricing strategies and decisions. Advertising and sales promotion: Objectives of advertisement function of advertising, classification of advertisement copy, advertisement media – kinds of media, advantages of advertising. Objectives of sales promotion, advantages sales promotion. Personal Selling : Objectives of personal selling, qualities of good salesman, types of salesman, major steps in effective selling

Learning Outcomes:

At the end of this student, the student will be able to

- Discuss the procedures for price determination. (L2)
- Explain the objectives of advertisement function of advertising. (L2)
- List the advantages and disadvantages of advertising. (L1)
- Describe the major steps in effecting selling. (L2)

Course Outcomes:

At the end of the course, the student will be able to

- Understand basic marketing management concepts and their relevance to business development. (L2)
- Prepare a questionnaire for market research. (L5)
- Design marketing research plan for business organizations. (L5)
- Optimize marketing mix to get competitive advantage. (L4)

Text Books:

1. Philip Kotler, "Principles of Marketing", Prentice – Hall.
2. Philip Kotler, "Marketing Management", Prentice – Hall.

Reference Books:

1. Wiliam J Stanton, "Fundamentals of Marketing", McGraw Hill
2. R.S.N. Pillai and Mrs.Bagavathi, "Marketing", S. Chand & Co. Ltd
3. Rajagopal, "Marketing Management Text & Cases", Vikas Publishing House

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester CSE)

Course Category	:	Open Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0408	3	0	0	3	CIA	30 M
Course Title	:	Introduction To Microcontrollers & Applications					SEE	70 M

Course Objectives:

This course will enable students to:

- Describe theArchitecture of 8051 Microcontroller and Interfacing of 8051 to external memory.
- Write 8051 Assembly level programs using 8051 instruction set.
- Describe the Interrupt system, operation of Timers/Counters and Serial port of 8051.
- Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to 8051.

UNIT – I

8051 Microcontroller:

Microprocessor Vs Microcontroller, Embedded Systems, Embedded Microcontrollers, 8051 Architecture- Registers, Pin diagram, I/O ports functions, Internal Memory organization. External Memory (ROM & RAM) interfacing.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the importance of Microcontroller and acquire the knowledge of Architecture of 8051 Microcontroller. (L1)
- Analyze interface required memory of RAM & ROM. (L3)

UNIT – II

Addressing Modes, Data Transfer instructions, Arithmetic instructions, Logical instructions, Branch instructions, Bit manipulation instructions. Simple Assembly language program examples to usethese instructions.

Learning Outcomes:

At the end of this student, the student will be able to

- Explain different types instruction set of 8051. (L1)
- Develop the 8051 Assembly level programs using 8051 instruction set. (L3)

UNIT – III

8051 Stack, Stack and Subroutine instructions. Simple Assembly language program examples to use subroutine instructions.8051 Timers and Counters – Operation and Assembly language programming to generate a pulse using Mode-1 and a square wave using Mode- 2 on a port pin.

Learning Outcomes:

At the end of this student, the student will be able to

- Describe Stack and Subroutine of 8051. (L1)
- Design Timer /counters using of 8051. (L4)

UNIT –IV

8051 Serial Communication- Basics of Serial Data Communication, RS- 232 standard, 9 pin RS232 signals, Simple Serial Port programming in Assembly and C to transmit a message and to receive data serially.8051 Interrupts. 8051 Assembly language programming to generate an external interrupt using a switch.

Learning Outcomes:

At the end of this student, the student will be able to

- Acquire knowledge of Serial Communication and develop serial port programming. (L1)
- Develop an ALP to generate an external interrupt using a switch. (L3)

UNIT – V

8051 C programming to generate a square waveform on a port pin using a Timer interrupt. Interfacing 8051 to ADC-0804, DAC, LCD and Interfacing with relays and opto isolators, Stepper Motor Interfacing, DC motor interfacing, PWM generation using 8051.

Learning Outcomes:

At the end of this student, the student will be able to

- Apply and Interface simple switches, simple LEDs, ADC 0804 and LCD to using 8051 I/O ports. (L2)
- Design Stepper Motor and f motor interfacing of 8051. (L4)

Course outcomes:

- Understand the importance of Microcontroller and Acquire the knowledge of Architecture of 8051 Microcontroller.
- Apply and Interface simple switches, simple LEDs, ADC 0804, LCD and Stepper Motor to using 8051 I/O ports.
- Develop the 8051 Assembly level programs using 8051 instruction set.
- Design the Interrupt system, operation of Timers/Counters and Serial port of 8051.

TEXT BOOKS:

1. Muhammad Ali Mazidi and Janice Gillespie Mazidi and Rollin D. McKinlay; “The 8051 Microcontroller and Embedded Systems – using assembly and C”, PHI, 2006 / Pearson, 2006.
2. Kenneth J. Ayala, “The 8051 Microcontroller”, 3rd Edition, Thomson/Cengage Learning.

REFERENCE BOOKS:

1. Manish K Patel, “The 8051 Microcontroller Based Embedded Systems”, McGraw Hill, 2014, ISBN: 978-93-329-0125-4.
2. Raj Kamal, “Microcontrollers: Architecture, Programming, Interfacing and System Design”, Pearson Education, 2005.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester CSE)

Course Category	:	Open Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0410	3	0	0	3	CIA	30 M
Course Title	:	Principles of Digital Signal Processing					SEE	70 M

Course Objectives:

- To explain about signals and perform various operations on it.
- To understand discrete time signals and systems.
- To solve Laplace transforms and z-transforms for various signals.
- To find Discrete Fourier Transform of a sequence by using Fast Fourier Transform.
- To design and realize IIR and FIR filters.

UNIT- I:

INTRODUCTION TO SIGNALS

Classification of Signals: Analog, Discrete, Digital, Deterministic & Random, Periodic & Aperiodic, Even & Odd, Energy & Power signals. Basic operations on signals: Time shifting, Time scaling, Time reversal, Amplitude scaling and Signal addition. Elementary Signals: Unit step, Unit ramp, Unit parabolic, Impulse, Sinusoidal function, Exponential function, Gate function, Triangular function, Sinc function and Signum function.

Learning Outcomes:

At the end of this student, the student will be able to

- Define basic signals and its operations, Classify discrete time signals and systems. (L1)
- Understand various basic operations on signals (L1)

UNIT – II:

DISCRETE TIME SIGNALS AND SYSTEMS

Discrete Time Signals: Elementary discrete time signals, Classification of discrete time signals: power and energy signals, even and odd signals. Simple manipulations of discrete time signals: Shifting and scaling of discrete-time signals.

Discrete Time Systems: Input-Output description of systems, Block diagram representation of discrete time systems, Linear Constant Coefficient Difference Equations, Classification of discrete time systems: linear and nonlinear, time-invariant and variant systems, causal and non causal, stable and unstable systems.

Learning Outcomes:

At the end of this student, the student will be able to

- Define basic signals and its operations, Classify discrete time signals and systems. (L1)
- Understand various basic operations on signals (L1)

UNIT- III:

LAPLACE TRANSFORMS AND Z- TRANSFORMS

Laplace Transforms: Laplace transforms, Partial fraction expansion, Inverse Laplace transform, Concept of Region of Convergence (ROC), Constraints on ROC for various classes of signals, Properties of Laplace transforms.

Z-Transforms: Concept of Z-transform of a discrete sequence, Region of convergence in Z- Transform, constraints on ROC for various classes of signals, inverse Z-transform, properties of Z-Transforms.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the basic concepts of Laplace and Z transforms (L1)
- Apply the transform techniques to solve the problems (L2)

UNIT – IV:

FAST FOURIER TRANSFORMS

Discrete Time Fourier Transform (DTFT), Discrete Fourier Transform (DFT), Radix-2 Fast Fourier Transforms (FFT), Decimation in Time and Decimation in Frequency FFT Algorithms: radix-2 DIT-FFT, DIF-FFT, and Inverse FFT: IDFT-FFT.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the importance of DTFT, DFT, FFT and their inverse transforms with respect to signals and systems (L1)
- Analyze the Decimation in time and frequency algorithms (L3)

UNIT – V:

IIR AND FIR DIGITAL FILTERS

IIR DIGITAL FILTERS: Analog filters approximations: Butterworth and Chebyshev, Design of IIR digital filters from analog filters. Realization of IIR filters: Direct form-I, Direct form-II, cascade form and parallel form.

FIR DIGITAL FILTERS: Characteristics of FIR digital filters, frequency response. Design of FIR digital filters using window techniques: Rectangular window, Triangular or Bartlett window, Hamming window, Hanning window, Blackman window. Realization of FIR filters: Linear phase and Lattice structures.

Learning Outcomes:

At the end of this student, the student will be able to

- Understand the importance of IIR and FIR digital Filters (L1)
- Realize IIR filters and analyze various windowing techniques in FIR filters (L2)
- Design IIR and FIR filters (L4)

Course outcomes:

- Define basic signals and its operations, Classify discrete time signals and systems.
- Solve Laplace Transform and z-Transform for various signals, Calculate DFT of a given sequence by using Fast Fourier Transform.
- Analyze the continuous and discrete signals and systems
- Design and realize IIR and FIR filters from the given specifications.

TEXT BOOKS:

1. B. P. Lathi, “Signals, Systems and Communications”, BS Publications, 2008.

2. John G. Proakis, Dimitris G. Manolakis, “Digital signal processing, principles, Algorithms and applications” , 4th edition , Pearson Education/PHI, 2007.

3. A.V. Oppenheim and R.W. Schaffer, “Discrete Time Signal Processing”, 2nd edition., PHI.

REFERENCES:

1. A.V. Oppenheim, A.S. Will sky and S.H. Nawab, “Signals and Systems”, PHI, 2nd Edition, 2013.
2. A. Anand Kumar, “Signals and Systems”, PHI Publications, Third Edition, 2013
3. P. Ramesh Babu. “Digital Signal Processing”.
4. Andreas Antoniou, “Digital signal processing”, Tata McGraw Hill, 2006.
5. R S Kaler, M Kulkarni,, Umesh Gupta, “A Text book on Digital Signal processing” –I K International Publishing House Pvt. Ltd.
6. M H Hayes, Schaum’s Outlines, “Digital Signal Processing”, Tata Mc-Graw Hill, 2007.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester CSE)

Course Category	:	Open Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0509	3	0	0	3	CIA	30 M
Course Title	:	Fundamentals of Game Development					SEE	70 M

Course Objectives:

This course is designed to:

- Get familiarized with the various components in a game and game engine.
- Explore the leading open source game engine components.
- Elaborate on game physics.
- Introduce to the game animation.
- Expose to network-based gaming issues.

Unit – 1: Introduction to Game

What is a Game? The Birth of Games, The Rise of Arcade Games, The Crash and Recovery, The Console Wars, Online Games and Beyond.

The Game Industry: Game Industry Overview, Game Concept Basics, Pitch Documentation, pitching a Game to a Publisher, Managing the developer-Publisher Relationship, Legal Agreements, Licenses, Console Manufacturers Approval.

Roles on the Team: Production, Art, Engineering, Design, Quality Assurance Testing, Team Organization, Corporate.

Learning Outcomes:

After completing this Unit, students will be able to

- Demonstrate online games and beyond. [L2]
- Outline the process carried out in the Game Industry [L2]
- Inspect the roles on the Team[L4]

Unit – 2: Teams

Project Leadership, Picking Leads, Team Building, Team Buy-in and Motivation.

Effective Communication: Written Communication, Oral Communication, Nonverbal Communication, Establishing Communication Norms, Communication Challenges.

Game Production Overview: Production Cycle, Preproduction, Production, Testing, Postproduction.

Learning Outcomes:

After completing this Unit, students will be able to

- Build a team and pick a leader. [L6]
- Develop Effective communication. [L3]
- Outline the Game Production cycle [L2]

Unit – 3: Game Concept

Introduction, Beginning the Process, Defining the Concept, Game Programming Basics, Prototyping, Risk Analysis, Pitch Idea, Project Kickoff.

Characters, setting, and Story: Story Development, Gameplay, Characters, Setting, Dialogue, Cinematics, Story Documentation.

Game Requirements: Define Game Features, Define Milestones and Deliverables, Evaluate Technology, Define Tools and Pipeline, Documentation, Approval, Game Requirements Outline

Learning Outcomes:

After completing this Unit, students will be able to

- Design a game. [L6]
- Demonstrate the game play. [L2]
- Identify the Game requirements [L3]

Unit – 4 : Game Plan

Dependencies, Schedules, Budgets, Staffing, Outsourcing, Middleware, Game Plan Outline. Production Cycle: Design Production Cycle, Art Production Cycle, Engineering Production Cycle, Working Together.

Voiceover and Music: Planning for Voiceover, choosing a Sound Studio, Casting Actors, Recording Voiceover, Voiceover Checklist, Planning for Music, Working with a Composer, Licensing Music.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the Game plan. [L2]
- Define the production cycle. [L1]
- Make use of voiceover and music in game development. [L3]

Unit – 5 :Localization

Creating International Content, Localization-Friendly Code, Level of Localization, Localization Plan, Testing, Localization Checklist.

Testing and Code Releasing: Testing Schedule, Test Plans, Testing Pipeline, Testing Cycle, External Testing, Determining Code Release, Code Release Checklist, Gold Masters, Postmortems.

Marketing and Public Relations: Software Age Ratings, Working with Marketing, Packaging, Demos, Marketing Assets, Game Builds, Working with Public Relations, Asset Deliverable Checklist.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the importance of localization. [L2]
- Summarize Testing and code releasing [L2]
- Illustrate Marketing and public relations. [L2]

Course Outcomes:

Upon completion of the course, the students should be able to:

- Design games for commercialization (L6)
- Predict the trends in game development (L5)
- Design Game Plan and production cycle (L6)
- Dramatize the game playing environment (L4)

Text Book:

1. Heather MaxwellChandler, and Rafael Chandler, "Fundamentals ofGame Development", Jones& Bartlett Learning, 2011.

References:

1. Flint Dille and John Zuur Platten, The Ultimate guide to Video Game Writing, Loan Eagle publisher, 2008.
2. Adams, Fundamentals of Game Design, 3rd edition, Pearson Education India, 2015.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester CSE)

Course Category	:	Open Elective-III	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0508	3	0	0	3	CIA	30 M
Course Title	:	Cyber Security					SEE	70 M

Course Objectives:

This course is designed to:

- Understand essential building blocks and basic concepts of cyber security
- Explore Web security and Network security
- Explain the measures for securing the networks and cloud
- Understand privacy principles and policies
- Describe the legal issues and ethics in computer security

UNIT I

Introduction: Introduction to Computer Security, Threats, Harm, Vulnerabilities, Controls, Authentication, Access Control, and Cryptography, Authentication, Access Control, Cryptography.

Programs and Programming: Unintentional (Non-malicious) Programming Oversights, Malicious Code—Malware, Countermeasures.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain Vulnerabilities, threats and. Counter measures for computer security[L2]
- Interpret the design of the malicious code [L2]

UNIT II

Web Security: User Side, Browser Attacks, Web Attacks Targeting Users, Obtaining User or Website Data, Email Attacks.

Operating Systems Security: Security in Operating Systems, Security in the Design of Operating Systems, Rootkit.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the attacks on browser, Web and email. [L2]
- Explain the security aspects of Operating Systems. [L3]

UNIT III

Network Security: Network Concepts, Threats to Network Communications, Wireless Network Security, Denial of Service, Distributed Denial-of-Service Strategic Defenses: Security Countermeasures, Cryptography in Network Security, Firewalls, Intrusion Detectionand Prevention Systems, Network Management.

Cloud Computing and Security: Cloud Computing Concepts, Moving to the Cloud, Cloud Security Tools and Techniques, Cloud Identity Management, Securing IaaS.

Learning Outcomes:

After completing this Unit, students will be able to

- Identify the network security threats and attacks. [L3]
- Design the Counter measures to defend the network security attacks. [L6]
- Analyze the security tools and techniques for Cloud computing [L4]

UNIT IV

Privacy: Privacy Concepts, Privacy Principles and Policies, Authentication and Privacy, Data Mining, Privacy on the Web, Email Security, Privacy Impacts of Emerging Technologies, Where the Field Is Headed.

Management and Incidents: Security Planning, Business Continuity Planning, Handling Incidents, Risk Analysis, Dealing with Disaster.

Learning Outcomes:

After completing this Unit, students will be able to

- Interpret the need for Privacy and its impacts of Emerging Technologies. [L2]
- Explain how to handle incidents and deal with Disaster. [L2]

UNIT V

Legal Issues and Ethics: Protecting Programs and Data, Information and the Law, Rights of Employees and Employers, Redress for Software Failures, Computer Crime, Ethical Issues in Computer Security, Incident Analysis with Ethics, Emerging Topics: The Internet of Things, Economics, Computerized Elections, Cyber Warfare.

Learning Outcomes:

After completing this Unit, students will be able to

- Adapt legal issues and ethics in computer security. [L6]
- Elaborate on the Emerging topics. [L6]

Course Outcomes:

Upon completion of the course, the students should be able to:

- Illustrate the broad set of technical, social & political aspects of Cyber Securityand security management methods to maintain security protection (L2)
- Assess the vulnerabilities and threats posed by criminals, terrorist and nation states tonational infrastructure (L5)
- Identify the nature of secure software development and operating systems (L3)
- Demonstrate the role security management in cyber security defense (l2)
- Adapt the legal and social issues at play in developing solutions.(L6)

Text Books:

1) Pfleeger, C.P., Security in Computing, Prentice Hall, 2010, 5th edition.
2) Schneier, Bruce. Applied Cryptography, Second Edition, John Wiley & Sons, 1996

Reference Books:

1) Rhodes-Ousley, Mark. Information Security: The Complete Reference, Second Edition, Information Security Management: Concepts and Practice, McGraw-Hill, 2013.
2) Whitman, Michael E. and Herbert J. Mattord. Roadmap to Information Security for IT and Infosec Managers. Boston, MA: Course Technology, 2011.

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(VII Semester CSE)

Course Category	:	Humanities Science	L	T	P	C	Exam	3 Hrs
Course Code	:	19AHS9907	3	0	0	3	CIA	30 M
Course Title	:	Entrepreneurship & Incubation					SEE	70 M

COURSE OBJECTIVES:

The objective of this course is

- To make the student understand about Entrepreneurship
- To enable the student in knowing various sources of generating new ideas in setting up of New enterprise
- To facilitate the student in knowing various sources of finance in starting up of a business
- To impart knowledge about various government sources which provide financial assistance to entrepreneurs/ women entrepreneurs
- To encourage the student in creating and designing business plans

UNIT-I

Entrepreneurship - Concept, knowledge and skills requirement - Characteristics of successful entrepreneurs - Entrepreneurship process - Factors impacting emergence of entrepreneurship - Differences between Entrepreneur and Intrapreneur - Understanding individual entrepreneurial mindset and personality - Recent trends in Entrepreneurship.

Learning Outcomes:

At the end if the Unit, the learners will be able to

- Understand the concept of Entrepreneur and Entrepreneurship in India
- Know Entrepreneurship process and emergence of Entrepreneurship
- Analyze the differences between Entrepreneur and Intrapreneur
- Develop a creative mind set and personality
- Understand recent trends in Entrepreneurship across the globe

UNIT-II

Starting the New Venture - Generating business idea – Sources of new ideas & methods of generating ideas - Opportunity recognition - Feasibility study - Market feasibility, technical/operational feasibility - Financial feasibility - Drawing business plan - Preparing project report - Presenting business plan to investors.

Learning Outcomes:

At the end if the Unit, the learners will be able to

- Know the process of starting a new venture
- Analyze the sources of new methods in generating business idea
- Evaluate market feasibility, financial feasibility and technical feasibility
- Design and draw business plans in project preparation and prepare project reports

UNIT-III

Sources of finance - Various sources of Finance available - Long term sources - Short term sources - Institutional Finance – Commercial Banks, SFC's in India - NBFC's in India - their way of financing in

India for small and medium business - Entrepreneurship development programs in India - The entrepreneurial journey- Institutions in aid of entrepreneurship development

Learning Outcomes:
At the end of the Unit, the learners will be able to
- Know the various sources of finance to start a new venture
- Contrast & compare between Long term & Short term finance sources
- Analyze the role of banks and other financial institutions in promoting entrepreneurship in India
- Evaluate the need and importance of MSMEs in the growth of country

UNIT-IV
Women Entrepreneurship - Entrepreneurship Development and Government - Role of Central Government and State Government in promoting women Entrepreneurship - Introduction to various incentives, subsidies and grants – Export- oriented Units - Fiscal and Tax concessions available - Women entrepreneurship - Role and importance - Growth of women entrepreneurship in India - Issues & Challenges - Entrepreneurial motivations.

Learning Outcomes:
At the end of the Unit, the learners will be able to
- Understand the role of government in promoting women entrepreneurship
- Know various incentives, subsidies and grants available to women entrepreneurs
- Analyze the role of export-oriented units
- Know about the tax concessions available for Women entrepreneurs
- Prepare to face the issues and challenges.

UNIT-V
Fundamentals of Business Incubation - Principles and good practices of business incubation- Process of business incubation and the business incubator and how they operate and influence the Type/benefits of incubators - Corporate/educational / institutional incubators - Broader business incubation environment - Pre-Incubation and Post - Incubation process - Idea lab, Business plan structure - Value proposition

Learning Outcomes:
At the end of the Unit, the learners will be able to:
- Understand the importance of business incubation
- Apply brilliant ideas in the process of business incubation
- Analyze the process of business incubation/incubators.
- Contrast & Compare between business incubation and business incubators.
- Design their own business incubation/incubators as viable-business unit.

Course Outcomes:
At the end of the course, students will be able to
- Understand the concept of Entrepreneurship and challenges in the world ofcompetition.
- Apply the Knowledge in generating ideas for New Ventures.
- Analyze various sources of finance and subsidies to entrepreneur/womenEntrepreneurs.

- Evaluate the role of central government and state government in promotingEntrepreneurship.
- Create and design business plan structure through incubations.

TEXT BOOKS

1. D F Kuratko and T V Rao, “Entrepreneurship” - A South-Asian Perspective – Cengage Learning,2012. (For PPT, Case Solutions Faculty may visit : login.cengage.com)

2 . Nandan H, “ Fundamentals of Entrepreneurship”, PHI, 2013

REFERENCES

1. Vasant Desai, “Small Scale Industries and Entrepreneurship”, Himalaya Publishing 2012.
2. Rajeev Roy “Entrepreneurship”, 2nd Edition, Oxford, 2012.
3. B.Janakiramand M.Rizwanall“Entrepreneurship Development: Text & Cases”, Excel Books, 2011.
4. Stuart Read, Effectual “Entrepreneurship”, Routledge, 2013.

E-RESOURCES

1. Entrepreneurship-Through-the-Lens-of-enture Capital
2. http://www.onlinevideolecture.com/?course=mba-programs&subject=entrepreneurship
3. http://nptel.ac.in/courses/122106032/Pdf/7_4.pd
4. http://freevideolectures.com/Course/3514/Economics-/-Management-/-Entrepreneurhip/50

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VII Semester CSE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	19AMC9904	3	0	0	3	CIA	30 M
Course Title	:	Indian Constitution and Society					SEE	70 M

COURSE OBJECTIVES:

The objective of this course is

- To enable the student to understand the importance of constitution.
- To understand the structure of executive, legislature and judiciary.
- To understand philosophy of fundamental rights and duties.
- To understand the autonomous nature of constitutional bodies like Supreme Court and high court controller and auditor general of India and Election Commission of India.
- To understand the central-state relation in financial and administrative control.

UNIT I:

Introduction to Indian Constitution – Constitution -Meaning of the term - Indian Constitution-Sources and constitutional history – Features– Citizenship – Preamble - Fundamental Rights and Duties - Directive Principles of State Policy.

Learning Outcomes:

After completion of this unit student will

- Understand the concept of Indian constitution.
- Apply the knowledge on directive principle of state policy.
- Analyze the History and features of Indian constitution.
- Learn about Preamble, Fundamental Rights and Duties.

UNIT II:

Union Government and its Administration Structure of the Indian Union - Federalism - Centre-State relationship – President's Role, power and position - PM and Council of ministers - Cabinet and Central Secretariat –Lok Sabha - Rajya Sabha - The Supreme Court and High Court - Powers and Functions.

Learning Outcomes:

After completion of this unit student will

- Understand the structure of Indian government.
- Differentiate between the state and central government.
- Explain the role of President and Prime Minister.
- Know the Structure of Supreme Court and High court.

UNIT III:

State Government and its Administration - Governor - Role and Position -CM and Council of ministers - State Secretariat-Organization Structure and Functions.

Learning Outcomes:

After completion of this unit student will

- Understand the structure of state government.
- Analyze the role of Governor and Chief Minister.
- Explain the role of State Secretariat.
- Differentiate between structure and functions of state secretariat.

UNIT IV:

Local Administration - District's Administration Head - Role and Importance - Municipalities - Mayor and role of Elected Representatives -CEO of Municipal Corporation Pachayati Raj – Functions– PRI –Zilla Parishath - Elected officials and their roles – CEO,ZillaParishath - Block level Organizational Hierarchy - (Different departments) - Village level - Role of Elected and Appointed officials - Importance of grass root democracy.

Learning Outcomes:

After completion of this unit student will

- Understand the local Administration.
- Compare and contrast district administration's role and importance.
- Analyze the role of Mayor and elected representatives of Municipalities.
- Learn about the role of Zilla Parishath block level organization.

UNIT V:

Election Commission - Election Commission- Role of Chief Election Commissioner and Election Commissionerate - State Election Commission -Functions of Commissions for the welfare of SC/ST/OBC and Women.

Learning Outcomes:

After completion of this unit student will

- Know the role of Election Commission.
- Contrast and compare the role of Chief Election commissioner and Commissionerate.
- Analyze the role of state election commission.
- Evaluate various commissions viz SC/ST/OBC and women.

TEXT BOOKS:

1. Durga Das Basu, "Introduction to the Constitution of India", Prentice – Hall of India Pvt. Ltd... New Delhi.

2. Subash Kashyap, “Indian Constitution”, National Book Trust.

REFERENCES:

1. J.A. Siwach, “Dynamics of Indian Government & Politics”.

1. H.M.Sreevai, “Constitutional Law of India”, 4th edition in 3 volumes (Universal Law Publication).
2. J.C. Johari, “Indian Government and Politics”, Hans India.
3. M.V. Pylee, “Indian Constitution Durga Das Basu, Human Rights in Constitutional Law, Prentice”Hall of India Pvt. Ltd... New Delhi.

COURSE OUTCOMES:

At the end of the course, students will be able to

- Understand historical background of the constitution making and its importance for building a democratic India.
- Understand the functioning of three wings of the government i.e., executive, legislative and judiciary.
- Understand the value of the fundamental rights and duties for becoming good citizen of India.
- Analyze the decentralization of power between central, state and local self-government.
- Apply the knowledge in strengthening of the constitutional institutions like CAG, Election Commission and UPSC for sustaining democracy.

E-RESOURCES:

1. nptel.ac.in/courses/109104074/8
2. nptel.ac.in/courses/109104045/
3. nptel.ac.in/courses/101104065/
4. www.hss.iitb.ac.in/en/lecture-details.
5. www.iitb.ac.in/en/event/2nd-lecture-institute-lecture-series-indian-constitution.

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(VII Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0518P	0	0	3	1	CIA	30 M
Course Title	:	Cryptography & Network Security Lab					SEE	70 M

COURSE OBJECTIVES:

- To learn different cipher techniques
- Learn to implement the algorithms DES, RSA,MD5,SHA-1
- To use network security tools and vulnerability assessment tools

1. Write a C program that contains a string (char pointer) with a value ‘Hello world’.
The program should XOR each character in this string with 0 and displays the result.
2. Write a C program that contains a string (char pointer) with a value ‘Hello world’.
The program should AND or and XOR each character in this string with 127 anddisplay the result.
3. Write a Java program to perform encryption and decryption using the followingalgorithms
a. Ceaser cipher b. Substitution cipher c. Hill Cipher
4. Write a C/JAVA program to implement the DES algorithm logic.
5. Write a C/JAVA program to implement the Blowfish algorithm logic.
6. Write a C/JAVA program to implement the Rijndael algorithm logic.
7. Write the RC4 logic in Java Using Java cryptography; encrypt the text “Hello world”using Blowfish. Create your own key using Java key tool.
8. Write a Java program to implement RSA algorithm.
9. Implement the Diffie-Hellman Key Exchange mechanism using HTML andJavaScript.
10. Calculate the message digest of a text using the SHA-1 algorithm in JAVA.
11. Calculate the message digest of a text using the MD5 algorithm in JAVA.

Course Outcomes:
At the end of the course, the student should be able to:

- Implement the cipher techniques
- Develop the various security algorithms
- Use different open source tools for network security and analysis

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(VII Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	19APC0519P	0	0	3	1.5	CIA	30 M
Course Title	:	Internet of Things Laboratory					SEE	70 M

Practical's:

1. Select any one development board (Eg., Arduino or Raspberry Pi) and control LED using the board.
2. Using the same board as in (1), read data from a sensor. Experiment with both analog and digital sensors.
3. Control any two actuators connected to the development board using Bluetooth.
4. Read data from sensor and send it to a requesting client. (using socket communication) Note: The client and server should be connected to same local area network.
5. Create any cloud platform account, explore IoT services and register a thing on the platform.
6. Push sensor data to cloud.
7. Control an actuator through cloud.
8. Access the data pushed from sensor to cloud and apply any data analytics or visualization services.
9. Create a mobile app to control an actuator.
10. Design an IoT based air pollution control system which monitors the air pollution by measuring carbon monoxide, ammonia, etc and gives alarm or sends message when the pollution level is more than permitted range.
11. Design an IoT based system which measures the physical and chemical properties of the water and displays the measured values.
12. Identify a problem in your local area or college which can be solved by integrating the things you learned and create a prototype to solve it (Mini Project).
13. Design a business model canvas for a digital display

Course outcomes:

At the end of the course, students will be able to

- Choose the sensors and actuators for an IoT application (L1)
- Select protocols for a specific IoT application (L2)
- Utilize the cloud platform and APIs for IoT application (L3)
- Experiment with embedded boards for creating IoT prototypes (L3)
- Design a solution for a given IoT application (L6)

Text Book:

1. Adrian McEwen, Hakim Cassimally - Designing the Internet of Things,Wiley Publications, 2012.
2. Alexander Osterwalder, and Yves Pigneur – Business Model Generation – Wiley, 2011

Reference Books:

1. Arshdeep Bahga, Vijay Madisetti - Internet of Things: A Hands-On Approach, Universities Press, 2014.
2. The Internet of Things, Enabling technologies and use cases – Pethuru Raj, Anupama C. Raman, CRC Press.

Reference sites: https://www.arduino.cc/
https://www.raspberrypi.org/

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(VIII Semester CSE)

Course Category	:	Professional Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0510	3	0	0	3	CIA	30 M
Course Title	:	Software Development and IT Operations					SEE	70 M

Course Objectives:

This course is designed to:

- Adapt the software Engineering practices that combine Software Development and IT operations for Quality Software
- Enumerate the principles of continuous development and deployment, automation of configuration management, inter-team collaboration, and IT service agility

UNIT I

Phases of Software Development life cycle. Values and principles of agile software development.

Learning Outcomes:

After completing this Unit, students will be able to:

1. Illustrate the Phases of Software Development life cycle (L2)
2. Appraise theValues and principles of agile software development (L5)

UNIT II

Fundamentals of DevOps: Architecture, Deployments, Orchestration, Need, Instance of applications, DevOps delivery pipeline, DevOps eco system.

Learning Outcomes:

After completing this Unit, students will be able to:

- Explain the Fundamentals of Software development and operations (L2)
- Create the Instance of applications (L6)

UNIT III

DevOps adoption in projects: Technology aspects, Agiling capabilities, Tool stack implementation, People aspect, processes

Learning Outcomes:

After completing this Unit, students will be able to:

- Understand the Technology aspects and Agile capabilities (L2)
- Interpret the aspects in user's context (L5)

UNIT IV

CI/CD: Introduction to Continuous Integration, Continuous Delivery and Deployment , Benefits of CI/CD, Metrics to track CICD practices

Learning Outcomes:

After completing this Unit, students will be able to:

- Explain CI/CD and its benefits (L2)
- Demonstrate the Continuous Integration, Delivery and Deployment (L2)

UNIT V

Devops Maturity Model: Key factors of DevOps maturity model, stages of Devops maturity model, DevOps maturity Assessment

Learning Outcomes:

After completing this Unit, students will be able to:

- Identify the Key factors of maturity model (L3)
- Estimate the DevOps maturity Assessment (L6)

Course Outcomes:

At the end of the course, student will be able to

- Explain how DevOps will balance the needs throughout the SDLC(L2)
- Demonstrate how DevOps improves the collaboration and productivity by automation.(L2)
- Adapt DevOps in real time projects. (L6)
- Illustrate the continuous integration tools and monitoring tools (L2)

Text Books:

1) The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations, Gene Kim , John Willis , Patrick Debois , Jez Humb,1st Edition, O'Reilly publications, 2016.
2) What is Devops? Infrastructure as code, 1st Edition, Mike Loukides ,O'Reilly publications, 2012.

Reference Books:

1) Building a DevOps Culture, 1st Edition, Mandi Walls, O'Reilly publications, 2013.
2) The DevOps 2.0 Toolkit: Automating the Continuous Deployment Pipeline With Containerized Microservices, 1st Edition, Viktor Farcic, CreateSpace Independent Publishing Platform publications, 2016
3) Continuous Delivery: Reliable Software Releases Through Build, Test, and Deployment Automation, 1st Edition, Jez Humble and David Farley, 2010.
4) Achieving DevOps: A Novel About Delivering the Best of Agile, DevOps, and microservices, 1st Edition, Dave Harrison, Knox Lively, Apress publications, 2019

e-Resources:

1) https://www.javatpoint.com/devops
2) https://github.com/nkatre/Free-DevOps-Books-1/blob

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(VIII Semester CSE)

Course Category	:	Professional Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0511	3	0	0	3	CIA	30 M
Course Title	:	Deep Learning					SEE	70 M

Course Objectives:

This course is designed to:

- Demonstrate the major technology trends driving Deep Learning
- Build, train and apply fully connected deep neural networks
- Implement efficient (vectorized) neural networks
- Analyze the key parameters and hyper parameters in a neural network's architecture

UNIT I

Linear Algebra: Scalars, Vectors, Matrices and Tensors, Matrix operations, types of matrices, Norms, Eigen decomposition, Singular Value Decomposition, Principal Components Analysis.

Probability and Information Theory: Random Variables, Probability Distributions, Marginal Probability, Conditional Probability, Expectation, Variance and Covariance, Bayes' Rule, Information Theory. Numerical Computation: Overflow and Underflow, Gradient-Based Optimization, Constrained Optimization, Linear Least Squares.

Learning Outcomes:

After completing this Unit, students will be able to:

- Understand linear algebra in the deep learning context (L2)
- Utilize probability and information theory in machine/deep learning applications (L3)

UNIT II

Machine Learning: Basics and Underfitting, Hyper parameters and Validation Sets, Estimators, Bias and Variance, Maximum Likelihood, Bayesian Statistics, Supervised and Unsupervised Learning, Stochastic Gradient Descent, Challenges Motivating Deep Learning. Deep Feedforward Networks: Learning XOR, Gradient-Based Learning, Hidden Units, Architecture Design, Back-Propagation and other Differentiation Algorithms.

Learning Outcomes:

After completing this Unit, students will be able to:

- Illustrate machine learning basics leads to deep learning(L2)
- Contrast super and unsupervised learning(L2)

UNIT III

Regularization for Deep Learning: Parameter Norm Penalties, Norm Penalties as Constrained Optimization, Regularization and Under-Constrained Problems, Dataset Augmentation, Noise Robustness, Semi-Supervised Learning, Multi-Task Learning, Early Stopping, Parameter Tying and Parameter Sharing, Sparse Representations, Bagging and Other Ensemble Methods, Dropout, Adversarial Training, Tangent Distance, Tangent Prop and Manifold Tangent Classifier. Optimization for Training Deep Models: Pure Optimization, Challenges in Neural Network Optimization, Basic Algorithms, Parameter Initialization Strategies, Algorithms with Adaptive Learning Rates, Approximate Second-Order Methods, Optimization Strategies and Meta- Algorithms.

Learning Outcomes:

After completing this Unit, students will be able to:

- Evaluate Regularization Problems for Deep learning (L5)
- Apply optimization for Training Deep Learning models (L3)

UNIT IV

Convolutional Networks: The Convolution Operation, Pooling, Convolution, Basic Convolution Functions, Structured Outputs, Data Types, Efficient Convolution Algorithms, Random or Unsupervised Features, Basis for Convolutional Networks.

Learning Outcomes:

After completing this Unit, students will be able to:

- Appraise Basic Convolution Functions (L5)
- Develop Efficient Convolution Algorithms (L3)

UNIT V

Sequence Modeling: Recurrent and Recursive Nets: Unfolding Computational Graphs, Recurrent Neural Networks, Bidirectional RNNs, Encoder-Decoder Sequence-to-Sequence Architectures, Deep Recurrent Networks, Recursive Neural Networks, Echo State Networks, LSTM, Gated RNNs, Optimization for Long-Term Dependencies, Auto encoders, Deep Generative Models.

Learning Outcomes:

After completing this Unit, students will be able to:

- Illustrate Recurrent and Recursive Neural Networks (L2)
- Apply Auto encoders and Deep Generative Models (L3)

Course Outcomes:

After completing this course, students will be able to:

- Apply linear algebra and probability theory in the deep learning applications(L3)
- Elaborate the challenges and motivations to Deep learning (L6)
- Differentiate the architectures of deep neural network (L4)
- Build a convolutional neural network (L6)
- Build and train RNN and LSTMs(L6)

Text Books:

1) Ian Goodfellow, Yoshua Bengio, Aaron Courville, “Deep Learning”, MIT Press,2016.
2) Josh Patterson and Adam Gibson, “Deep learning: A practitioner's approach”, O'Reilly Media, First Edition, 2017.

Reference Books:

1) Fundamentals of Deep Learning, Designing next-generation machine intelligence algorithms, Nikhil Buduma, O’Reilly, Shroff Publishers, 2019.
2) Deep learning Cook Book, Practical recipes to get started Quickly, Douwe Osinga, O’Reilly, Shroff Publishers, 2019.

e-Resources:

1) https://keras.io/datasets/
2) http://deeplearning.net/tutorial/deeplearning.pdf
3) https://arxiv.org/pdf/1404.7828v4.pdf

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(VIII Semester CSE)

Course Category	:	Professional Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19APE0512	3	0	0	3	CIA	30 M
Course Title	:	Ad Hoc and Sensor Networks					SEE	70 M

Course Objectives:
This course is designed to:
- Introduce the concepts of Adhoc and Sensor Networks.
- Explain Routing algorithms suitable for Adhoc Networks.
- Understand the transport protocols for Adhoc networks
- Familiarize with the security issues of adhoc and sensor networks

Unit I: IEEE 802 Networking Standard. Fundamentals of WLANs, IEEE 802.11 standard. What is Wireless Internet?, Mobile IP, Cellular and Adhoc Wireless Networks, Applications of Adhoc Networks, Issues in Ad Hoc Wireless Networks, Ad Hoc Wireless Internet.

Learning Outcomes:
After completing this Unit, students will be able to
- Explain different wireless networks. (L2)
- Examine wireless LAN Standard IEEE 802.11.(L4)

Unit II: Issues in Designing a MAC Protocol for Ad Hoc Wireless Networks, Design Goals of a MAC Protocol for Ad Hoc Wireless Networks, Classification of MAC Protocols, Contention- Based Protocols, Contention-Based Protocols with Reservation Mechanisms, Contention-Based MAC Protocols with Scheduling Mechanisms, MAC Protocols that used Directional Antennas, Other MAC Protocols.

Learning Outcomes:
After completing this Unit, students will be able to
- Identify the limitations of existing MAC protocols when applied to adhoc networks. (L3)
- Analyze the existing MAC Protocols for Adhoc networks.(L3)

Unit III: Issues in Designing a Routing Protocol for Ad Hoc Wireless Networks, Classification of Routing Protocols, Table-Driven Routing Protocols, On-Demand Routing Protocols, Hybrid Routing Protocols, Hierarchical Routing Protocols, Power-Aware Routing Protocols.

Learning Outcomes:
After completing this Unit, students will be able to
- Compare different routing protocols.(L2)
- Choose the routing protocol based on network characteristics.(L5)

Unit – IV Multicast Routing in Ad hoc Wireless Networks- Issues in Designing a Multicast Routing Protocol, Operation of Multicast Routing Protocols, An architecture reference model for multicast routing protocols, Classifications of Multicast Routing Protocols, Tree-Based Multicast Routing Protocols, Mesh-Based Multicast Routing Protocols, Summary of Tree and Mesh-Based Protocols. Issues in Designing a Transport Layer Protocol for Ad Hoc Wireless Networks, Design Goals of a Transport Layer Protocol for Ad Hoc Wireless Networks, Classification of Transport Layer Solutions.

TCP over Ad Hoc Wireless Networks, Other Transport Layer Protocols for Ad Hoc Wireless Networks.

Learning Outcomes:

After completing this Unit, students will be able to

- Interpret the issues in designing a multicast Routing Algorithmd(L2)
- Propose new Transport protocols for adhoc networks(L6)

Unit V: Security in Ad Hoc Wireless Networks, Network Security Requirements, Issues and Challenges in Security Provisioning, Network Security Attacks, Key Management, Secure Routing in Ad Hoc Wireless Networks.

Wireless Sensor Networks- Introduction, Sensor Network Architecture, Data Dissemination, Data Gathering, MAC Protocols for Sensor Networks, Location Discovery, Quality of a Sensor Network, Evolving Standards, Other issues.

Learning Outcomes:

After completing this Unit, students will be able to

- Define the sensor networks.(L1)
- Identify the need for security in Adhoc and Sensor networks.(L3)

Course outcomes:

Upon completion of the course, the students should be able to:

- List the design issues for Adhoc and sensor networks(L1)
- Analyze the use of TCP in Wireless networks.(L4)
- Justify the need for new MAC Protocols for Adhoc networks.(L5)
- Extend the existing protocols to make them suitable for Adhoc Networks.(L2)
- Evaluate the performance of Protocols in Adhoc and sensor networks.(L5)
- Design new Protocols for Adhoc and Sensor networks.(L6)

Text Book:

1. Murthy, C. Siva Ram, and B. S. Manoj. Ad hoc wireless networks: Architectures and protocols. Pearson Education India, 2004.

References:

1. Carlos De Morais Cordeiro, Dharma Prakash Agrawal “Ad Hoc & Sensor Networks: Theory and Applications”, World Scientific Publishing Company, 2006.
2. Feng Zhao and Leonides Guibas, "Wireless Sensor Networks", Elsevier Publication - 2002.
3. Holger Karl and Andreas Willig “Protocols and Architectures for Wireless Sensor Networks”,Wiley, 2005

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester CSE)

Course Category	:	Open Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0107	3	0	0	3	CIA	30 M
Course Title	:	Disaster Management					SEE	70 M

Course Objectives:

The objective of this course is to:

- Develop an understanding of why and how the modern disaster manager is involved with pre-disaster and post-disaster activities.
- Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
- Understand the 'relief system' and the 'disaster victim.'
- Describe the three planning strategies useful in mitigation.
- Identify the regulatory controls used in hazard management.
- Describe public awareness and economic incentive possibilities.
- Understand the tools of post-disaster management.

UNIT-I:

Natural Hazards And Disaster Management: Introduction of DM – Inter disciplinary -nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: floods, draughts – Earthquakes – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast – landslides.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the natural hazards and its management
- To understand about the global warming, cyclones and tsunamis

UNIT-II:

Man Made Disaster And Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrotirism -threat in mega cities, rail and air craft's accidents, and Emerging infectious diseases & Aids and their management.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the fire hazards and solid waste management
- To understand about the emerging infectious diseases and aids their management.

UNIT-III:

Risk and Vulnerability: Building codes and land use planning – social vulnerability – environmental vulnerability – Macroeconomic management and sustainable development, climate change risk rendition – financial management of disaster – related losses.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the regulations of building codes and land use planning related to risk and vulnerability.
- To understand about the financial management of disaster and related losses

UNIT-IV:

Role Of Technology In Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges-mitigation programme for earth quakes –flowchart, geospatial information in agriculture drought assessment-multimedia technology in disaster risk management and training- transformable indigenous knowledge in disaster reduction.

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the technological aspects of disaster management
- To understand about the factors for disaster reduction

UNIT-V:

Education and Community Preparedness: Education in disaster risk reduction-Essentials of school disaster education-Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

Learning Outcomes:

After completing this Unit, students will be able to

- To impart the education related to risk reduction in schools and communities

Course Outcomes:

Upon the successful completion of this course, the students will be able to:

- Affirm the usefulness of integrating management principles in disaster mitigation work
- Distinguish between the different approaches needed to manage pre- during and post- disaster periods
- Explain the process of risk management
- Relate to risk transfer

TEXT BOOKS

1. Rajib shah & R R Krishnamurthy "Disaster Management" – Global Challenges and Local Solutions' Universities press. (2009),
2. Tushar Bhattacharya, "Disaster Science & Management" Tata McGraw Hill Education Pvt. Ltd., New Delhi.
3. Jagbir Singh "Disaster Management" – Future Challenges and Opportunities' I K International Publishing House Pvt. Ltd. (2007),

REFERENCE BOOKS

1. Harsh. K . Gupta "Disaster Management edited", Universities press, 2003.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester CSE)

Course Category	:	Open Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0108	3	0	0	3	CIA	30 M
Course Title	:	Global Warming and Climate Changes					SEE	70 M

Course Objectives:
The objective of this course is to:
- To know the basics, importance of global warming.
- To know the concepts of mitigation measures against global warming
- To know the impacts of climate changes

UNIT I
EARTH'S CLIMATE SYSTEM:
Introduction to environment, Ozone, ozone layer and its functions, Ozone depletion and ozone hole, Vienna convention and Montreal protocol, Green house gases and green house effect, Hydrological cycle and Carbon cycle, Global warming and its impacts

Learning Outcomes:
After completing this Unit, students will be able to
- To identity the importance of Ozone and effect of green house gases
- To know the effect of global warming

UNIT II
ATMOSPHERE & ITS COMPONENTS: Atmosphere and its layers-Characteristics of Atmosphere - Structure of Atmosphere - Composition of Atmosphere - Atmospheric stability - Temperature profile of the atmosphere - Temperature inversion and effects of inversion on pollution dispersion.

Learning Outcomes:
After completing this Unit, students will be able to
- To know about the layers of atmosphere and their characteristics

UNIT III
IMPACTS OF CLIMATE CHANGE: Causes of Climate change - Change of Temperature in the environment - Melting of ice and sea level rise - Impacts of Climate Change on various sectors - Projected impacts for different regions, uncertainties in the projected impacts and risk of irreversible changes.

Learning Outcomes:
After completing this Unit, students will be able to
- To know about the causes of climate change and its effects on various sectors.

UNIT IV
OBSERVED CHANGES AND ITS CAUSES: Climate change and Carbon credits-Clean Development Mechanism (CDM), CDM in India - Kyoto Protocol - Intergovernmental Panel on Climate Change (IPCC) - Climate Sensitivity - Montreal Protocol - United Nations Framework Convention on Climate Change (UNFCCC) - Global change in temperature and climate and changes within India

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the causes of climate change and carbon credits, effect of change in temperature and climate on india.

UNIT V

CLIMATE CHANGE AND MITIGATION MEASURES: CDM and Carbon Trading - Clean Technology, biodiesel, compost, biodegradable plastics - Renewable energy usage as an alternative - Mitigation Technologies and Practices within India and around the world - Non- renewable energy supply to all sectors - Carbon sequestration - International and regional cooperation for waste disposalbiomedical wastes, hazardous wastes, e-wastes, industrial wastes, etc.,

Learning Outcomes:

After completing this Unit, students will be able to

- To know about the clean technology, use of renewable energy, mitigation technologies and their practices.

Course Outcomes

Upon the successful completion of this course, the students will be able to:

- An ability to apply knowledge of mathematics, science, and engineering
- Design a system, component or process to meet desired needs with in realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability
- An ability to identify, formulate, and solve engineering problems

REFERENCE BOOKS

1. Dash Sushil Kumar, “Climate Change – An Indian Perspective”, Cambridge University Press India Private limited 2007.
2. Adaptation and mitigation of climate change-Scientific Technical Analysis. Cambridge University Press ,Cambridge,2006.
3. Atmospheric Science, J.M. Wallace and P.V. Hobbs, Elsevier / Academic Press 2006.
4. Jan C. van Dam, Impacts of “Climate Change and Climate Variability on ydrological Regimes”, Cambridge university press ,2003.
5. David Archer, Global Warming: Understanding the Forecast, 2 nd ed. (Wiley, 2011
6. John Houghton, Global Warming: The Complete Briefing, 5th Edition, 2015, Cambridge Univ. Press. Useful

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester CSE)

Course Category	:	Open Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0308	3	0	0	3	CIA	30 M
Course Title	:	Energy Conservation and Management					SEE	70 M

Course Objective:

- Familiarize present energy scenario, and energy auditing methods.
- Explain components of electrical systems, lighting systems and improvements in performance.
- Demonstrate different thermal systems, efficiency analysis, and energy conservation methods.
- Train on energy conservation in major utilities.
- Instruct principles of energy management and energy pricing.

UNIT I

Introduction: Energy – Power – Past & Present Scenario Of World; National Energy Consumption Data – Environmental Aspects Associated With Energy Utilization –Energy Auditing: Need, Types, Methodology And Barriers. Role Of Energy Managers. Instruments For Energy Auditing.

Learning Outcomes

At the end of this unit, the student will be able to

- Infer energy consumption patterns and environmental aspects of energy utilization. (l2)
- Outline energy auditing requirements, tools and methods. (l2)
- Identify the function of energy manager. (l3)

UNIT II

Electrical Systems: Components Of EB Billing – HT And LT Supply, Transformers, Cable Sizing, Concept Of Capacitors, Power Factor Improvement, Harmonics, Electric Motors – Motor Efficiency Computation, Energy Efficient Motors, Illumination – Lux, Lumens, Types Of Lighting, Efficacy, LED Lighting And Scope Of Economy In Illumination.

Learning Outcomes

At the end of this unit, the student will be able to

- Outline components of electricity billing, transmission and distribution. (l2)
- Analyze performance characteristics of transformers, capacitors, and electric motors. (l4)
- Examine power factor improvements, and electric motor efficiency. (l4)
- Evaluate lighting systems. (L4)

UNIT III

Thermal Systems: Stoichiometry, Boilers, Furnaces and Thermic Fluid Heaters – Efficiency Computation and Encon Measures. Steam: Distribution & Usage: Steam Traps, Condensate Recovery, Flash Steam Utilization, Insulators & Refractories.

Learning Outcomes

At the end of this unit, the student will be able to

- Determine efficiency of boilers, furnaces and other thermal systems. (l5)
- Recommend energy conservation measures in thermal systems. (l5)

- Justify steam systems in energy conservation. (l4)

UNIT IV

Energy Conservation In Major Utilities: Pumps, Fans, Blowers, Compressed Air Systems, Refrigeration And Air Conditioning Systems – Cooling Towers – D.G. Sets.

Learning Outcomes

At the end of this unit, the student will be able to

- Explain energy conservation measures in major utilities. (l2)
- Apply performance test criteria for fans, pumps, compressors, hvac systems. (l3)
- Assess energy conservation in cooling towers and d.g. sets. (l5)

UNIT V

Energy Management: Principles of Energy Management, Energy demand estimation, Organising and Managing Energy Management Programs, Energy pricing.

Learning Outcomes

At the end of this unit, the student will be able to

- Describe principles of energy management. (l2)
- Assess energy demand and forecast. (l5)
- Organize energy management programs. (l6)
- Design elements of energy pricing. (l6)

Course Outcomes:

At the end of this course, the student will be able to:

- Explain energy utilization and energy auditing methods.(l2)
- Analyze electrical systems performance of electric motors and lighting systems.(l4)
- Examine energy conservation methods in thermal systems.(l4)
- Estimate efficiency of major utilities such as fans, pumps, compressed air systems, hvac and d.g. Sets. (l4)
- Elaborate principles of energy management, programs, energy demand and energy pricing. (l6)

TEXT BOOKS:

1. Energy Manager Training Manual (4 Volumes) Available At www.energymanagertraining.com, A Website Administered By Bureau Of Energy Efficiency (BEE), A Statutory Body Under Ministry Of Power, Government Of India, 2004.

REFERENCES:

1. Witte. L.C., P.S. Schmidt, D.R. Brown, “Industrial Energy Management and Utilisation” Hemisphere Publ, Washington, 1988.
2. Callaghn, P.W. “Design And Management For Energy Conservation”, Pergamon Press, Oxford, 1981.
3. Dryden. I.G.C., “The Efficient Use Of Energy” Butterworths, London, 1982
4. Murphy. W.R. And G. Mc KAY, “Energy Management”, Butterworths, London 1987.
5. Turner, W. C., Doty, S. and Truner, W. C., “Energy Management Hand book”, 7th edition, Fairmont Press, 2009.
6. De, B. K., “Energy Management audit & Conservation”, 2nd Edition, Vrinda Publication, 2010.
7. Smith, C. B., “Energy Management Principles”, Pergamon Press, 2007.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester CSE)

Course Category	:	Open Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0309	3	0	0	3	CIA	30 M
Course Title	:	Non-Destructive Testing					SEE	70 M

Course Objectives

- Introduce basic concepts of non destructive testing.
- Familiarize with characteristics of ultrasonic test, transducers, rejection and effectiveness.
- Describe concept of liquid Penetrant, eddy current and magnetic particle tests, its applications and limitations.
- Explain the principles of infrared and thermal testing, applications and honey comb and sandwich structures case studies.
- Impart NDE and its applications in pressure vessels, casting and welded constructions.

UNIT I

Introduction to non-destructive testing: Radiographic test, Sources of X and Gamma Rays and their interaction with Matter, Radiographic equipment, Radiographic Techniques, Safety Aspects of Industrial Radiography.

Learning outcomes:

At the end of this unit, the student will be able to

- Explain non destructive testing techniques (L2)
- Summarize the basic concepts of Radiographic test (L2)
- Outline the concepts of sources of X and Gamma Rays (L2)
- Explain the radiographic techniques (L2)
- Discuss the safety aspects of industrial radiography. (L4)

UNIT II

Ultrasonic test: Principle of Wave Propagation, Reflection, Refraction, Diffraction, Mode Conversion and Attenuation, Sound Field, Piezo-electric Effect , Ultrasonic Transducers and their Characteristics, Ultrasonic Equipment and Variables Affecting Ultrasonic Test, Ultrasonic Testing, Interpretations and Guidelines for Acceptance, Rejection - Effectiveness and Limitations of Ultrasonic Testing.

Learning outcomes:

At the end of this unit, the student will be able to

- Explain the principle of ultrasonic test. (l2)
- Analyze the performance of wave propagation, reflection, refraction, diffraction and sound field in ultrasonic test. (l4)
- Discuss the characteristics of ultrasonic transducers. (l4)
- Outline the limitations of ultrasonic testing. (l2)

UNIT III

Liquid Penetrant Test: Liquid Penetrant Test, Basic Concepts, Liquid Penetrant System, Test Procedure, Effectiveness and Limitations of Liquid Penetrant Testing.

Eddy Current Test: Principle of Eddy Current, Eddy Current Test System, Applications of Eddy Current-Testing Effectiveness of Eddy Current Testing.

Magnetic Particle Test: Magnetic Materials, Magnetization of Materials, Demagnetization of Materials, Principle of Magnetic Particle Test, Magnetic Particle Test Equipment, Magnetic Particle Test Procedure, Standardization and Calibration, Interpretation and Evaluation, Effective Applications and Limitations of the Magnetic Particle Test.

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate the procedure of Liquid Penetrant, eddy current and magnetic particle tests.(L2)
- Outline the limitations of Penetrant, eddy current and magnetic particle tests. (L2)
- Explain the effectiveness of Penetrant, eddy current and magnetic particle tests. (L2)
- Apply the applications of Magnetic particle test. (L3)

UNIT IV

Infrared And Thermal Testing: Introduction and fundamentals to infrared and thermal testing– Heat transfer –Active and passive techniques –Lock in and pulse thermography–Contact and non contact thermal inspection methods–Heat sensitive paints –Heat sensitive papers —thermally quenched phosphors liquid crystals –techniques for applying liquid crystals –other temperature sensitive coatings –Inspection methods –Infrared radiation and infrared detectors–thermo mechanical behavior of materials–IR imaging in aerospace applications, electronic components, Honey comb and sandwich structures–Case studies.

Learning Outcomes:

At the end of this unit, the student will be able to

- Discuss the fundamentals of thermal testing. (l6)
- Explain the techniques of liquid crystals, active and passive. (l2)
- Illustrate thermal inspection methods. (l2)
- Outline the limitations of thermal testing. (l2)
- Explain the applications of honey comb and sandwich structures. (l2)

UNIT V

Industrial Applications of NDE: Span of NDE Activities Railways, Nuclear, Non-nuclear and Chemical Industries, Aircraft and Aerospace Industries, Automotive Industries, Offshore Gas and Petroleum Projects, Coal Mining Industry, NDE of pressure vessels, castings, welded constructions

Learning Outcomes:

At the end of this unit, the student will be able to

- Illustrate applications of NDE. (L2)
- Explain the applications of Railways, Nuclear and chemical industries. (L2)
- Outline the limitations and disadvantages of NDE. (L2)
- Explain the applications of NDA of pressure vessels, casting and welding constructions (L2)

Course Outcomes

At the end of the course, student will be able to

- Explain various methods of non-destructive testing. (l3)
- Apply relevant non-destructive testing method different applications. (l3)
- Explain the applications of railways, nuclear and chemical industries. (l2)
- Outline the limitations and disadvantages of nde. (l2)

- Explain the applications of nda of pressure vessels, casting and welding constructions (l2)

TEXT BOOKS:

1. J Prasad, GCK Nair , “Non destructive test and evaluation of Materials”, Tata mcgraw- Hill Education Publishers, 2008.
2. Josef Krautkrämer, Herbert Krautkrämer, “Ultrasonic testing of materials”, 3rd edition, Springer-Verlag, 1983.
3. X. P. V. Maldague, “Non destructive evaluation of materials by infrared thermography”, 1st edition, Springer-Verlag, 1993.

REFERENCES:

1. Gary L. Workman, Patrick O. Moore, Doron Kishoni, “Non-destructive, Hand Book, Ultrasonic Testing”, 3rd edition, Amer Society for Nondestructive, 2007.
2. ASTM Standards, Vol 3.01, Metals and alloys

Social Relevant Projects

1. Solid waste conversion into energy (Gasification)
2. Plastic waste into fuel.
3. Bio-gas digester.
4. Development of mechanisms for farmers.
5. Smart irrigation for saving water.
6. Mechanized water segregation.
7. Applications of solar technologies for rural purpose.
8. Power generation from wind turbine.
9. Applications of drones for agriculture.
10. Solar drying.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester CSE)

Course Category	:	Open Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0413	3	0	0	3	CIA	30 M
Course Title	:	Introduction to Image Processing					SEE	70 M

Course Objectives:

- To interpret fundamental concepts of digital image processing.
- To exemplify image enhancement.
- To interpret fundamental concepts of color image processing.
- To assess image compression techniques for digital images.
- To summarize segmentation for digital images.

UNIT-I:

INTRODUCTION TO DIGITAL IMAGE PROCESSING

Introduction: Digital image representation, Fundamental steps in image processing, Elements of digital image processing, Elements of visual perception, Simple image model, Sampling and Quantization, Basic relationships between pixels, Image transformations.

Applications: Medical imaging, Robot vision, Character recognition, Remote sensing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the fundamental concepts of image processing, Sampling process and basis relationships between pixels (L1)
- Explain the elements of Digital Image Processing (L2)

UNIT–II:

IMAGE ENHANCEMENT

Need for image enhancement, Point processing, Histogram processing, Spatial filtering- Smoothing and Sharpening.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for enhancement process (L1)
- Explain the terminology involved in enhancement process (L2)

UNIT-III:

COLOR IMAGE PROCESSING

Colour fundamentals, Colour models, Color transformations, Pseudo colour image processing, Full colour image processing.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for enhancement process (L1)
- Explain the terminology involved in enhancement process (L2)

UNIT–IV:

IMAGE COMPRESSION

Redundancies, Fidelity criteria, Image compression model, Lossless compression: Huffman coding, Arithmetic coding. Lossy compression: Lossy Predictive Coding, JPEG Compression Standard.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the need for image compression (L1)
- Explain the image compression and various types of compression techniques (L2)

UNIT–V:

IMAGE SEGMENTATION

Detection of discontinuities: point, line and edge detection, Edge linking and Boundary detections: Local Processing, Global processing via Hough transform, Thresholding, Region oriented segmentation: Region growing, Region splitting and merging.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the principle of image segmentation and its importance (L1)
- Explain the image compression and various types of compression techniques (L2)
- Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. (L3)

Course Outcomes:

- Interpret fundamental concepts of digital and color image processing.
- Exemplify image enhancement.
- Analyze the various terminologies involved in image segmentation like edge, boundary detection etc. Assess image compression techniques for digital images.
- Summarize segmentation techniques for digital images.

TEXT BOOKS:

1. Rafael C. Gonzalez and Richard E. Woods, “Digital Image Processing”, 3rd Edition, Pearson Education, 2011.

REFERENCE BOOKS:

1. S Jayaraman, S Esakkirajan and T Veerakumar, “Digital Image Processing”, TMH, 2011.
2. S. Sridhar, “Digital Image Processing”, 2nd Edition, Oxford Publishers, 2016.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester CSE)

Course Category	:	Open Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0415	3	0	0	3	CIA	30 M
Course Title	:	Principles of Cellular and Mobile Communications					SEE	70 M

Course Objectives:

- To understand the concepts and operation of cellular systems.
- To apply the concepts of cellular systems to solve engineering problems.
- To analyse cellular systems for meaningful conclusions.
- To evaluate suitability of a cellular system in real time applications.
- To design cellular patterns based on frequency reuse factor.

UNIT-I:

Introduction to Cellular Mobile Systems

Why cellular mobile communication systems? A basic cellular system, Evolution of mobile radio communications, Performance criteria, Characteristics of mobile radio environment, Operation of cellular systems. Examples for analog and digital cellular systems.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the conceptsand operation of cellular systems (L1).
- Analyze the characteristics of mobile radio environment (L3).

UNIT-II:

Cellular Radio System Design

General description of the problem, Concept of frequency reuse channels, Cochannel interference reduction, Desired C/I ratio, Cell splitting and sectoring.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand the concept of frequency reuse and cochannel interference in cellular systems (L1).
- Apply the concept of cellular systems to solve engineering problems (L2).
- Analyze the design problems of cellular systems (L3).
- Design of cellular patterns based frequency reuse factor (L5).

UNIT-III:

Handoffs and Dropped Calls

Why handoffs and types of handoffs, Initiation of handoff, Delaying a handoff, Forced handoffs, Queuing of handoffs, Power-difference handoffs, Mobile assisted handoff and soft handoff, Cell- site handoff, Intersystem handoff. Introduction to dropped call rate.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand why handoff is required (L1).

- Apply handoff techniques to solve engineering problems (L2).
- Compare various types of handoffs (L3).

UNIT-IV:

Multiple Access Techniques for Wireless Communications

Introduction, Frequency Division Multiple Access, Time Division Multiple Access, Code Division Multiple Accessand Space Division Multiple Access.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand various types of multiple access techniques (L1).
- Apply the concept of multiple access to solve engineering problems (L2).
- Compare various types of multiple access techniques (L3).

UNIT-V:

Digital Cellular Systems

Global System for Mobile Systems, Time Division Multiple Access Systems, Code Division Multiple Access Systems. Examples for 2G, 3G and 4G systems. Introduction to 5G system.

Learning Outcomes:

At the end of the unit, the student should be able to

- Understand operation of various types of digital cellular systems (L1).
- Compare various types of digital cellular systems (L3).
- Evaluate suitability of a cellular system in real time applications (L4).

Note: The main emphasis is on qualitative treatment. Complex mathematical treatment may be avoided.

Course Outcomes:

At the end of the course, the student should be able to

- Understand the concepts and operation of cellular systems (L1)
- Apply the concepts of cellular systems to solve engineering problems (L2).
- Analyse cellular systems for meaningful conclusions, Evaluate suitability of a cellular system in real time applications (L3).
- Design cellular patterns based on frequency reuse factor (L4).

TEXT BOOKS:

1. William C. Y. Lee, “Mobile Cellular Telecommunications”, 2ndEdition, McGraw-Hill International, 1995.
2. Theodore S. Rappaport, “Wireless Communications – Principles and Practice”, 2ndEdition, PHI, 2004.

REFERENCES:

3. Aditya K. Jagannatham “Principles of Modern Wireless Communications Systems – Theory and Practice”, McGraw-Hill International, 2015.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester CSE)

Course Category	:	Open Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0411	3	0	0	3	CIA	30 M
Course Title	:	Electronic Instrumentation					SEE	70 M

Course Objectives:

This course will enable students to:

- To introduce various measuring instruments and their functionality
- To teach various measurement metrics for performance analysis
- To explain principles of operation and working of different electronic instruments
- To familiarize the characteristics, operations, calibrations and applications of the different oscilloscopes and signal generators.
- To provide exposure to different types of transducers

UNIT – I

Measurement and Error: Definitions, Accuracy, Precision, Resolution and Significant Figures, Types of Errors, Measurement error combinations. (Text 2)

Ammeters: DC Ammeter, Multi-range Ammeter, The Ayrton Shunt or Universal Shunt, Requirements of Shunt, Extending of Ammeter Ranges, RF Ammeter (Thermocouple), Limitations of Thermocouple. (Text 1)

Voltmeters and Multi-meters: Introduction, Basic Meter as a DC Voltmeter, DC Voltmeter, Multi range Voltmeter, Extending Voltmeter Ranges, Loading, AC Voltmeter using Rectifiers. True RMS Voltmeter, Multi-meter. (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the importance of measurement system (L1)
- Examine the characteristics of different Instruments (L2)
- Illustrate different types of errors that may occur in instruments during measurements (L2)

UNIT – II

Digital Voltmeters: Introduction, RAMP technique, Dual Slope Integrating Type DVM, Integrating Type DVM, Most Commonly used principles of ADC, Successive Approximations, - Digit, Resolution and Sensitivity of Digital Meters, General Specifications of DVM, (Text 1) Digital Instruments: Introduction, Digital Multi-meters, Digital Frequency Meter, Digital Measurement of Time, Universal Counter, Digital Tachometer, Digital pH Meter, Digital Phase Meter, Digital Capacitance Meter, (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain working of digital measuring Instruments (L2)
- Compare the various measuring techniques for measuring voltage (L4)

UNIT – III

Oscilloscopes: Introduction, Basic principles, CRT features, Block diagram of Oscilloscope, Simple CRO, Vertical Amplifier, Horizontal Deflecting System, Sweep or Time Base Generator, Measurement of Frequency by Lissajous Method, Digital Storage Oscilloscope. (Text 1)

Signal Generators: Introduction, Fixed and Variable AF Oscillator, Standard Signal Generator, Laboratory Type Signal Generator, AF sine and Square Wave Generator, Function Generator, (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe functions of basic building of CRO (L1)
- Measure parameters viz. Amplitude, frequency and time period using CRO (L2)
- Classify signal generators and describe its characteristics (L2)

UNIT – 4

Measuring Instruments: Field Strength Meter,Stroboscope, Phase Meter, Q Meter, Megger. (Text 1)
Bridges: Introduction, Wheatstone‘s bridge, Kelvin‘s Bridge; AC bridges, Capacitance Comparison Bridge, Inductance Comparison Bridge, Maxwell‘s bridge, Wien‘s bridge. (Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe function of various measuring Instruments. (L1)
- Describe how unknown capacitance and inductance can be measured using bridges (L1)
- Select appropriate bridge for measuring R, L and C parameters (L2)

UNIT – 5

Transducers: Introduction, Electrical transducers, Selecting a transducer, Resistive transducer, Resistive position transducer, Strain gauges, Resistance thermometer, Thermistor, Inductive transducer, LVDT, Piezoelectric transducer, Photo cell, Photo voltaic cell, Semiconductor photo diode and transistor.(Text 1)

Learning Outcomes:

At the end of this unit, the student will be able to

- Explain the importance of transducer (L1)
- Illustrate differentmeasuring techniques in transducers to measure physical quantities.(L2)
- Select the appropriate transducer for the measurement of physical parameters (L2)

Course outcomes:

- Learn different types of errors in measurement, calibration process and standards, various methods for measurement of non-electrical quantities, Understand the different methods for measurement of various electrical quantities.
- Familiarize the dynamics of instrument systems, various passive and active transducers
- Compare the various measuring techniques for measuring voltage (L4)

TEXT BOOKS:

- H. S. Kalsi, “Electronic Instrumentation”, McGraw Hill, 3rd Edition, 2012, ISBN:9780070702066.
- A. D. Helfrick and W.D. Cooper, “Modern Electronic Instrumentation and Measuring Techniques”, Pearson, 1st Edition, 2015, ISBN: 9789332556065.

REFERENCE BOOKS:

- David A. Bell, “Electronic Instrumentation & Measurements”, Oxford University Press PHI 2nd Edition, 2006 ISBN 81-203-2360-2.
- A. K. Sawhney, “Electronics and Electrical Measurements”, Dhanpat Rai &Sons. ISBN - 81-7700-016-0

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester CSE)

Course Category	:	Open Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0512	3	0	0	3	CIA	30 M
Course Title	:	Blockchain Technology					SEE	70 M

Course Objectives:

This course is designed to:

- Understand the philosophy of Blockchain and the cutting edge technology behind its functions
- Illustrate how to setup Ethereum tools
- Explain the key vocabulary and concepts used in Blockchain for Business

UNIT-I

Blockchain concepts: Blockchain, Blockchain application example: Escrow, Blockchain stack, from web 2.0 to the next generation decentralized web, domain specific Blockchain application, Blockchain benefits and challenges.

Blockchain application templates: Blockchain application components, design methodology for Blockchain applications, Blockchain applications templates

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the benefits and challenges of Block chain(L2)
- Design the Blockchain applications(L6)

UNIT-II

Setting up Ethereum development tools: Ethereum clients,Ethereum languages, TestRPC, Mist Ethereumwalle, meta mask, web3 JavaScript API, truffle.

Ethereum Accounts: Ethereum Accounts, keypairs, working with EOA Accounts, working with contract accounts.

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the use of Ethereum development tools(L2)
- Create Ethereum accounts and work with them (L6)

UNIT-III

Smart contracts: Smart contract, structure of a contract, setting up and interacting with a contract using Geth client, setting up and interacting with a contract using Mist Wallet

Learning Outcomes:

After completing this Unit, students will be able to

- Make use of of smart contracts(L3)
- Distinguish setting up and interacting with a contract using Geth client and Mist Wallet.(L4)

UNIT-IV

Smart contracts (continued): Smart contract examples, Smart contract patterns.

Decentralized Applications: implementing Dapps, case studies,

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the Smart contract examples and patterns(L2)
- Develop Decentralized applications.(L6)

UNIT-V

Mining: Concensus on Blockchain network, mining, Block validation, state storage in Ethereum.

Learning Outcomes:

After completing this Unit, students will be able to

- Define Concensus on Blockchain network(L1)
- Demonstrate State Storage in Ethereum(L2)

Course outcomes:

Upon completion of the course, the students should be able to:

- Create customized blockchain solutions (L6)
- Make use of the specific mechanics of Ethereum(L3)
- Experiment with Smart contracts (L3)
- Develop Enterprise applications using Blockchain(L6)

Text book:

1. Arshadeepbahga, Vijay madisetti, “Blockchain Applications A hands-on approach”, VPT 2017.
2. Chandramouli Subramanian, Asha A George, Abhilash K A and MeenaKarthikeyan, “Blockchain Technology”, Universty Press, 2021

References:

1. Imran Bashir, “Mastering Blockchain” Packt Publishing Ltd, March 2017.
2. Melanie swan, “Blokchain blueprint for a new economy”, O’REILLY

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester CSE)

Course Category	:	Open Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0514	3	0	0	3	CIA	30 M
Course Title	:	Mean Stack Technologies					SEE	70 M

Course Objectives:

This course is designed to:

- Translate user requirements into the overall architecture
- Implement new systems and manage the projects
- Write optimized front end code using HTML and JavaScript
- Monitor the performance of web applications & its infrastructure
- Design and implement Robust and Scalable Front End Applications

UNIT I

Introduction to Web: Internet and World Wide Web, Domain name service, Protocols: HTTP, FTP, SMTP. Html5 concepts, CSS3, Anatomy of a web page. XML: Document type Definition, XML schemas, Document object model, XSLT, DOM and SAX Approaches.

Learning Outcomes:

After completing this Unit, students will be able to

- Summarize the protocols related to Internet &WWW(L2)
- Compare and contrast XML and HTML(L5)

UNIT II

JavaScript: The Basic of JavaScript: Objects, Primitives Operations and Expressions, Control Statements, Arrays, Functions, Constructors, Pattern Matching using Regular Expressions. Angular Java Script Angular JS Expressions: ARRAY, Objects, $eval, Strings, Angular JS Form Validation & Form Submission, Single Page Application development using Angular JS.

Learning Outcomes:

After completing this Unit, students will be able to

- Illustrate the importance of JavaScript(L2)
- Develop applications using Angular JS(L6)

UNIT III

Node.js: Introduction, Advantages, Node.js Process Model, Node JS Modules. Express.js: Introduction to Express Framework, Introduction to Nodejs , What isNodejs, Getting Started with Express, Your first Express App, Express Routing, Implementing MVC in Express, Middleware, Using Template Engines, Error Handling , API Handling , Debugging, Developing Template Engines, Using Process Managers, Security & Deployment.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the Node JS modules(L2)
- Make use of MVC in Express(L3)

UNIT IV

RESTful Web Services: Using the Uniform Interface, Designing URIs,
Web Linking, Conditional Requests. React Js: Welcome to React, Obstacles and Roadblocks, React's Future, Keeping Up with the Changes, Working with the Files, Pure React, Page Setup, The Virtual DOM, React Elements, ReactDOM, Children, Constructing Elements with Data, React Components, DOM Rendering, Factories.

Learning Outcomes:

After completing this Unit, students will be able to

- Outline the RESTful Web Services(L2)
- Assess the future of React Js(L5)

UNIT V

Mongo DB: Introduction, Architecture, Features, Examples, Database Creation & Collection in Mongo DB. Deploying Applications: Web hosting & Domains, Deployment Using Cloud Platforms.

Learning Outcomes:

After completing this Unit, students will be able to

- Explain the features and architecture of Mongo DB (L2)
- Create and collect Database in MongDB(L6)

Course Outcomes

After the completion of the course, student will be able to

- List the Basic Concepts of Web & Markup Languages(L1)
- Develop web Applications using Scripting Languages &Frameworks(L6)
- Make use of Express JS and Node JS frameworks(L3)
- Illustrate the uses of web services concepts like restful, react js (L2)
- Deploying applications using Cloud Platforms (L6)

Text Books:

1) Programming the World Wide Web, Robet W Sebesta, 7ed, Pearson.
2) Web Technologies, Uttam K Roy, Oxford
3) Pro Mean Stack Development, ELadElrom, Apress
4) Restful Web Services Cookbook, Subbu Allamraju, O'Reilly
5) JavaScript & jQuery the missing manual, David sawyer mcfarland, O'Reilly
6) Web Hosting for Dummies, Peter Pollock, John Wiley Brand

Reference Books:

1) Ruby on Rails up and Running, Lightning fast Web development, Bruce Tate, Curt Hibbs, Oreilly (2006).
2) Programming Perl, 4ed, Tom Christiansen, Jonathan Orwant, Oreilly (2012).
3) Web Technologies, HTML, JavaScript, PHP, Java, JSP, XML and AJAX, Black book, Dream Tech.
4) An Introduction to Web Design, Programming, Paul S Wang, Sanda S Katila, Cengage Learning.
5) Express.JS Guide,The Comprehensive Book on Express.js, Azat Mardan, Lean Publishing.

e-Resources:

1) http://www.upriss.org.uk/perl/PerlCourse.html

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(VIII Semester CSE)

Course Category	:	Open Elective - IV	L	T	P	C	Exam	3 Hrs
Course Code	:	19AOE0515	3	0	0	3	CIA	30 M
Course Title	:	Mathematical Modeling & Simulation					SEE	70 M

Course Objective:
This course focuses on what is needed to build simulation software environments, and not just building simulations using preexisting packages.

UNIT-I:
Simulation Basics-Handling Stepped and Event-based Time in Simulations-Discrete versus Continuous Modeling-Numerical Techniques-Sources and Propagation of Error

Learning Outcomes:
Students will be able to
- Understand computer simulation technologies and techniques.

UNIT-II
Dynamical, Finite State, and Complex Model Simulations-Graph or Network Transitions Based Simulations-Actor Based Simulations-Mesh Based Simulations-Hybrid Simulations
Learning Outcomes:
Students will be able to
- implement and test a variety of simulation and data analysis.

UNIT-III
Converting to Parallel and Distributed Simulations-Partitioning the Data-Partitioning the Algorithms-Handling Inter-partition Dependencies

Learning Outcomes:
Students will be able to
- Understand concepts of modeling layers of society's critical infrastructure networks.
- Understand partitioning the data.

UNIT-IV
Probability and Statistics for Simulations and Analysis-Introduction to Queues and Random Noise-Random Variates Generation-Sensitivity Analysis

Learning Outcomes:
Students will be able to
- Understand Queues and Random noise.
- Understand sensitivity analysis.

UNIT-V
Simulations Results Analysis and Viewing Tools-Display Forms: Tables, Graphs, and Multidimensional Visualization-Terminals, X and MS Windows, and Web Interfaces-Validation of Model Results

Learning Outcomes:
Students will be able to

- Build tools to view and control simulations and their results.

Course Outcomes:
After the completion of course, student will be able to

- Understand basic Model Forms.
- Understand basic Simulation Approaches.
- Evaluate handling Stepped and Event-based Time in Simulations.
- Distinguish Discrete versus Continuous Modeling.
- Apply Numerical Techniques.
- Calculate Sources and Propagation of Error.

TEXT BOOKS:

1. JN Kapur, "Mathematical modelling", Newage publishers
2. Kai Velten, "Mathematical Modeling and Simulation: Introduction for Scientists and Engineers" Wiley Publishers.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
Course Structure & Syllabus for B.Tech. Degree Program
(Effective for the batches admitted from 2020-21 onwards)
COMPUTER SCIENCE & ENGINEERING

INDUCTION PROGRAM (3 weeks duration)

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

B. Tech – I Semester (Theory – 4, Lab – 5)

S.No	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5401	Linear Algebra and Calculus	3	0	0	3	30	70	100
2	BS	20ABS5101T	Chemistry	3	0	0	3	30	70	100
3	ES	20AES0201T	Basic Electrical & Electronics Engg.	3	0	0	3	30	70	100
4	ES	20AES0501T	C Programming & Data Structures	3	0	0	3	30	70	100
PRACTICAL										
5	BS	20ABS5101P	Chemistry Lab	0	0	3	1.5	30	70	100
6	ES	20AES0201P	Basic Electrical & Electronics Engineering Lab	0	0	3	1.5	30	70	100
7	ES	20AES0501P	C Programming & Data Structures Lab	0	0	3	1.5	30	70	100
8	ES	20AES0302	Engineering Workshop	0	0	3	1.5	30	70	100
9	ES	20AES0502	IT Workshop	0	0	3	1.5	30	70	100
			TOTAL:	**12**	**0**	**15**	**19.5**	**270**	**630**	**900**

B. Tech – II Semester (Theory – 6, Lab – 4)

S.No	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5402	Differential Equations and Vector Calculus	3	0	0	3	30	70	100
2	BS	20ABS5601T	Applied Physics	3	0	0	3	30	70	100
3	HS	20AHS5201T	Communicative English	3	0	0	3	30	70	100
4	ES	20AES0503T	Python Programming	3	0	0	3	30	70	100
5	ES	20AES0301T	Engineering Drawing	1	0	2	2	30	70	100
6	MC	20AMC9902	Universal Human Values	3	0	0	0	30	--	30
PRACTICAL										
7	BS	20ABS5601P	Applied Physics Lab	0	0	3	1.5	30	70	100
8	HS	20AHS5201P	Communicative English Lab	0	0	3	1.5	30	70	100
9	ES	20AES0503P	Python Programming Lab	0	0	3	1.5	30	70	100
10	ES	20AES0301P	Engineering Graphics Lab	0	0	2	1	30	70	100
			TOTAL:	**16**	**00**	**13**	**19.5**	**300**	**630**	**930**

B. Tech – III Semester (Theory – 6, Lab – 4)

S.No	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5405	Discrete Mathematics	3	0	0	3	30	70	100
2	ES	20AES0403	Digital Electronics	3	0	0	3	30	70	100
3	PC	20APC0501T	Advanced Data Structures & Algorithms	3	0	0	3	30	70	100
4	PC	20APC0502T	Object Oriented Programming ThroughJava	3	0	0	3	30	70	100
5	PC	20APC0503T	Software Engineering	3	0	0	3	30	70	100
6	MC	20AMC9901	Environmental Sciences	3	0	0	0	50	-	50
PRACTICAL										
7	ES	20APC0501P	Advanced Data Structures and Algorithms Lab	0	0	3	1.5	30	70	100
8	PC	20APC0502P	Object Oriented Programming ThroughJava Lab	0	0	3	1.5	30	70	100
9	PC	20APC0503P	Software Engineering Lab	0	0	3	1.5	30	70	100
10	SC	20ASC0502	Web application Development	1	0	2	2	30	70	100
			TOTAL:	**19**	**0**	**11**	**21.5**	**320**	**630**	**950**

B. Tech – IV Semester (Theory – 6, Lab – 4)

S.No	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5409	Probability & Statistics	3	0	0	3	30	70	100
2	PC	20APC0504T	Database Management Systems	3	0	0	3	30	70	100
3	PC	20APC0505T	Computer Organization and Architecture	3	0	0	3	30	70	100
4	PC	20APC0506T	Operating Systems	3	0	0	3	30	70	100
5	PC	20APC0507T	Computer Networks	3	0	0	3	30	70	100
6	MC	20AMC9903	Biology for Engineers	3	0	0	0	50	-	50
PRACTICAL										
7	PC	20APC0504P	Database Management SystemsLab	0	0	3	1.5	30	70	100
8	PC	20APC0506P	Operating Systems Lab	0	0	3	1.5	30	70	100
9	PC	20APC0507P	Computer Networks Lab	0	0	3	1.5	30	70	100
10	SC	20ASC0503	Exploratory Data Analysis with R	1	0	2	2	30	70	100
11	--	--	NSS/NCC/NSO Activities	0	0	2	--	--	--	--
			TOTAL:	**19**	**0**	**13**	**21.5**	**320**	**630**	**950**
Mandatory Community Service Internship for 6 weeks duration during Summer Vacation										

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, CSE, ECE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5401	3	0	0	3	CIE	30 M
Course Title	:	LINEAR ALGEBRA AND CALCULUS					SEE	70 M

COURSE OBJECTIVES:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

Bridge Course: Limits, continuity, Types of matrices

Unit I: Matrices (10 hrs)

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous equations linear equations. Eigenvalues and Eigenvectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors (L3).
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

Unit II: Mean Value Theorems (06 hrs)

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), related problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)
- Analyze the behaviour of functions by using mean value theorems (L3)

Unit III: Multivariable calculus (10 hrs)

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

Unit IV: Multiple Integrals **(10 hrs)**

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates. Finding areas and volumes using double and triple integrals.

Learning Outcomes:

- At the end of this unit, the student will be able to
- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

Unit V: Beta and Gamma functions **(06 hrs)**

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand beta and gamma functions and its relations (L2)
- Conclude the use of special function in evaluating definite integrals (L4)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education

Course Outcomes:

At the end of the course, the student will be able to

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- Familiarize with functions of several variables which is useful in optimization (L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ECE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5101T	3	0	0	3	CIE	30 M
Course Title	:	CHEMISTRY					SEE	70 M

COURSE OBJECTIVES:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry, Spectroscopy and polymers
- To introduce instrumental methods and modern engineering materials.

Unit I: Structure and Bonding Models **(10 hrs)**

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and Ψ^2, applications to hydrogen, molecular orbital theory – bonding in homo- and hetero-nuclear diatomic molecules – energy level diagrams of N_2, O_2, CO and NO, π-molecular orbitals of butadiene and benzene, calculation of bond order.

Learning outcomes:

At the end of this unit, the students will be able to

- **Apply** Schrodinger wave equation to hydrogen atom (L3)
- **Recall** molecular orbital theory and energy level diagrams of atoms (L1)
- **Illustrate** the molecular orbital energy level diagram of different molecular species (L2)
- **Explain** the calculation of bond order of O_2 and CO molecules (L2)
- **Discuss** the basic concept of molecular orbital theory (L3)

Unit II: Modern Engineering Materials **(12 hrs)**

i) **Understanding of materials:** Crystal field theory – salient features – splitting in octahedral, tetrahedral and square planar geometry. Properties of coordination compounds- oxidation state, coordination number, magnetic properties and colour.

ii) **Semiconductor materials, superconductors:** Basic concept, band diagrams for conductors, semiconductors and insulators, effect of doping on band structures.

iii) **Super capacitors:** Introduction, basic concept-classification – applications.

iv) **Nano chemistry:** Introduction, classification of nano materials, properties and applications of fullerenes, carbon nano tubes and graphenenano particles.

Learning Outcomes:

At the end of this unit, the students will be able to

- **Explain** splitting of in octahedral and tetrahedral geometry of complexes (L2).
- **Recall** applications of semiconductors, super conductors, nano materials (L1)
- **Discuss** the magnetic behaviour and colour of coordination compounds (L3).
- **Explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **Demonstrate** the application of fullerenes, carbon nano tubes and graphene nanoparticles (L2).

Unit III: Electrochemistry and Applications **(12hrs)**

Introduction to electrochemistry, electrodes – concepts of reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode); Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, pH metry, potentiometry- potentiometric titrations (redox titrations), concept of conductivity- Specific, equivalent & molar conductance and cell constant, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors (glucose potentiometric sensor), amperometric sensors (Estimation of Uric Acid (UA))

Primary cells – Zinc-air, Na-Air batteries, secondary cells – Nickel-Cadmium (NiCd),and lithium ion batteries- working of the batteries including cell reactions; fuel cells: hydrogen-oxygen, methanol fuel cells – working of the cells and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- **Apply** Nernst equation for calculating electrode and cell potentials (L3)
- **Recall** applications of various batteries (L1).
- **Explain** the theory of construction of battery and fuel cells (L2)
- **Solve** problems based on cell potential (L3)

Unit IV: Polymer Chemistry **(10 hrs)**

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation (addition and condensation).

Plastics: Thermoplastics and Thermosettings, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres. Calculation of molecular Weight of polymer by weight average and number average methods, polydispersity index

Elastomers: Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers: Polyacetylene, Polyaniline, Polypyrroles – mechanism of conduction and applications.

Learning Outcomes:

At the end of this unit, the students will be able to

- **Explain** the different types of polymers and their applications (L2)
- **Find** number average and weight average of polymer (L1)
- **Explain** the preparation, properties and applications of Bakelite, Nylon-6,6, and carbon fibres (L2)
- **Describe** the mechanism of conduction in conducting polymers (L2)
- **Discuss** Buna-S and Buna-N elastomers and their applications (L2)

Unit V: Instrumental Methods and Applications **(08 hrs)**

Regions of electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible**,** IR Spectroscopies- Principle, selection rules and applications. Solid-Liquid Chromatography–TLC, retardation factor.

Learning outcomes:

At the end of this unit, the students will be able to:

- **Explain** the different types of spectral series in electromagnetic spectrum (L2)
- **Understand** the principles of UV-Vis, IR Spectroscopy (L2)
- **Find** retention time and volumes of samples (L1**)**
- **Explain** the various applications of analytical instruments (L2)

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. ArunBahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S.Chand Publication, New Delhi 2012.

Reference Books:

1. J.D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Course Outcomes:

At the end of the course, the students will be able to:

- **Compare** the materials for construction of battery and electrochemical sensors (L2)
- **Recall** properties and applications of polymers and engineering materials (L1)
- **Explain** the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers. (L2)
- **Explain** the principles of spectrometry, TLC in separation of solid and liquid mixtures (L2)
- **Apply** the principle of Band diagrams in application of conductors and semiconductors (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, CSE and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0201T	3	0	0	3	CIA	30 M
Course Title	:	BASIC ELECTRICAL & ELECTRONICS ENGG.					SEE	70 M

PART-A: <u>BASIC ELECTRICAL ENGINEERING</u>

COURSE OBJECTIVES:-

- To introduce basics of electric circuits.
- To teach DC and AC electrical circuit analysis.
- To explain working principles of transformers and electrical machines.
- To impart knowledge on Power system generation, transmission and distribution

UNIT I: DC & AC Circuits

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power – power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits, Resonance.

Learning Outcomes

At the end of this unit, the student will be able to

- Recall Kirchoff laws
- Analyze simple electric circuits with DC excitation
- Apply network theorems to simple circuits
- Analyze single phase AC circuits consisting of series RL - RC - RLC combinations

UNIT II: DC & AC Machines:

Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC tests on transformer - Principle and operation of 3-phase AC machines [Elementary treatment only]

Learning Outcomes

At the end of this unit, the student will be able to

- Explain principle and operation of DC Generator & Motor.
- Perform speed control of DC Motor
- Explain operation of transformer and induction motor.
- Explain construction & working of induction motor - DC motor

UNIT III: Basics of Power Systems

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

Learning Outcomes

At the end of this unit, the student will be able to

- Understand working operation of various generating stations
- Explain the types of Transmission and Distribution systems

Text Books:

1. D. P. Kothari and I. J. Nagrath - “Basic Electrical Engineering” - Tata McGraw Hill - 2010.
2. V.K. Mehta &Rohit Mehta, “Principles of Power System” – S.Chand – 2018.

References:

1. L. S. Bobrow - “Fundamentals of Electrical Engineering” - Oxford University Press - 2011.
2. E. Hughes - “Electrical and Electronics Technology” - Pearson - 2010.
3. C.L. Wadhwa – “Generation Distribution and Utilization of Electrical Energy”, 3rd Edition, New Age International Publications.

Course Outcomes:

The student should be able to

- Apply concepts of KVL/KCL in solving DC circuits
- Understand and choose correct rating of a transformer for a specific application
- Illustrate working principles of DC Motor
- Identify t ype of electrical machine based on their operation
- Understand the basics of Power generation, Transmission and Distribution

PART-B: <u>ELECTRONICS ENGINEERING</u>

COURSE OBJECTIVES:-

- **Understand principles and terminology of electronics.**
- **Familiar with the theory, construction, and operation of electronic devices.**
- **Learn about biasing of BJTs and FETs.**
- **Design and construct amplifiers.**
- **Understand the concept & principles of logic devices.**

Unit I:

Diodes and Applications: Semiconductor Diode, Diode as a Switch& Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Operation and Applications of Zener Diode, LED, Photo Diode.

Transistor Characteristics: Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Biasing of Transistor Configuration; Field Effect Transistor (FET) – Construction, Characteristics of Junction FET, Concepts of Small Signal Amplifiers –CE & CC Amplifiers.

Learning outcomes:

1. Remember and understand the basic characteristics of semiconductor diode. (L1)
2. Understand principle of operation of Zener diode and other special semiconductor diodes. (L1)
3. Analyze BJT based biasing circuits. (L3)
4. Design an amplifier using BJT based on the given specifications. (L4)

Unit II:

Operational Amplifiers and Applications: Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; Op-Amp Applications - Inverting, Non-Inverting, Summing and Difference Amplifiers, Voltage Follower, Comparator, Differentiator, Integrator.

Learning outcomes:

1. Describe operation of Op-Amp based linear application circuits, converters, amplifiers and non-linear circuits. (L2)
2. Analyze Op-Amp based comparator, differentiator and integrator circuits. (L3)

Unit III:

Digital Electronics: Logic Gates, Simple combinational circuits–Half and Full Adders, BCD Adder. Latches and Flip-Flops (S-R, JK and D), Shift Registers and Counters. Introduction to Microcontrollers and their applications (Block diagram approach only).

Learning outcomes:

1. Explain the functionality of logic gates. (L2)
2. Apply basic laws and De Morgan's theorems to simplify Boolean expressions. (L3)
3. Analyze standard combinational and sequential circuits. (L4)
4. Distinguish between 8085 & 8086 microprocessors also summarize features of a microprocessor. (L5)

Text Books:

1. R. L. Boylestad& Louis Nashlesky, Electronic Devices &Circuit Theory, Pearson Education,2007.
2. Ramakanth A. Gayakwad, Op-Amps & Linear ICs, 4thEdition, Pearson, 2017.
3. R. P. Jain, Modern Digital Electronics,3rd Edition, Tata Mcgraw Hill,2003.
4. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, 2nd Edition, Pearson, 2012.

Reference Books:

1. SantiramKal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India,2002.
2. R. S. Sedha, A Text Book of Electronic Devices and Circuits, S.Chand& Co,2010.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Explain the theory, construction, and operation of electronic devices.

CO2: Apply the concept of science and mathematics to explain the working of diodes and its applications, working of transistor and its characteristics.

CO3: Design and analyze small signal amplifier circuits applying the biasing techniques.

CO4: Solve problems of various digital logic gates and circuits.

CO5: Correlate the fundamental concepts to various Real life applications of today.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0501T	3	0	0	3	CIE	30 M
Course Title	:	C PROGRAMMING & DATA STRUCTURES					SEE	70 M

COURSE OBJECTIVES:

- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures of C Programming Language.
- To discuss the syntax and semantics of C Programming language
- To familiarize with Stack, Queue, Linked lists, Tree and graph data structures.
- To demonstrate programming by choosing appropriate Data Structures and Features of the C language.

Unit I:

Getting Started: What is C, The C Character Set, Constants, Variables and Keywords, Types of C Constants, Rules for Constructing Integer Constants, Rules for Constructing Real Constants, Rules for Constructing Character Constants, Types of C Variables, Rules for Constructing Variable Names, C Keywords, Form of a C Program, Comments in a C Program, What is main, Variables and their Usage, printf( ) and its Purpose, Compilation and Execution, Receiving Input.

Data Types Revisited: Integers, long and short, Integers, signed and unsigned, Chars, signed and unsigned, Floats and Doubles, A Few More Issues, Storage Classes in C-Automatic Storage Class, Register Storage Class, Static Storage Class, and External Storage Class.

C Instructions: Types of Instructions, Type Declaration Instruction, Arithmetic Instructions, Integer and Float Conversions, Type Conversion in Assignments, Hierarchy of Operations, Associativity of Operators, Control Instructions.

Decision Control Instruction: Decisions! Decisions, The if Statement, The Real Thing, Multiple Statements within if, The if-else Statement, Nested if-elses, Forms of if.

Learning Outcomes:

1. Understand the basic concepts of C language (L2)
2. Learn the functionality of operators and Control Statements of C (L2)
3. Use the if control structure of the C language (L3)

Unit II:

More Complex Decision Making: Use of Logical Operators, The else if Clause, The ! Operator, Hierarchy of Operators Revisited, a Word of Caution, the Conditional Operators.

Loop Control Instruction: Loops, the while Loop, Tips and Traps, More Operators.

More Complex Repetitions: The for Loop, Nesting of Loops, Multiple Initializations in the for Loop, The break Statement, The continue Statement, The do-while Loop, The Odd Loop.

Case Control Instruction: Decisions using switch, The Tips and Traps, switch versus if-else Ladder, The goto Keyword.

Functions: What is a Function?, Why use Functions?, Passing Values between Functions, Scope Rule of Functions, Order of Passing Arguments, Using Library Functions, One Dicey Issue, Return Type of Function.

Learning Outcomes:

1. Apply the concept of Loops in various applications. (L3)
2. Design programs using modular approach (L6)

Unit III:

Recursion: Recursion, Recursion and Stack

Pointers: Call by Value and Call by Reference, an Introduction to Pointers, Pointer Notation, Back to Function Calls.

The C Preprocessor: Features of C Preprocessor, Macro Expansion, Macros with Arguments, Macros versus Functions, File Inclusion.

Arrays: What are Arrays?, A Simple Program using Array, More on Arrays, Array Initialization Array Elements in Memory, Bounds Checking, Passing Array Elements to a Function, Pointers and Arrays, Passing an Entire Array to a Function, The Real Thing.

Multidimensional Arrays: Two-Dimensional Arrays, Initializing a Two-Dimensional Array, Memory Map of a Two-Dimensional Array, Pointers and Two-Dimensional Arrays, Pointer to an Array, Passing 2-D Array to a Function, Array of Pointers, Three-Dimensional Array.

Learning Outcomes:

1. Solve problems by using Recursion (L3)
2. Understand the concept of Array (L2)
3. Use pointers to efficiently use memory (L3)

Unit IV:

Strings: What are Strings, More about Strings, Pointers and Strings

Standard Library String Functions-strlen ( ), strcpy ( ), strcat ( ), strcmp ( ).

Handling Multiple Strings: Two-Dimensional Array of Characters, Array of Pointers to Strings, Limitation of Array of Pointers to Strings.

Structures: Why use Structures? Declaring a Structure, Accessing Structure Elements, How Structure Elements are Stored? Array of Structures, Additional Features of Structures, Uses of Structures.

Console Input/output: Types of I/O, **Console I/O Functions**-Formatted Console I/O Functions, sprintf ( ) and sscanf ( ) Functions Unformatted Console I/O Functions

File Input/output: Data Organization, **File Operations**-Opening a File, Reading from a File, Trouble in Opening a File, Closing the File, Counting Characters, Tabs, Spaces, **A File-Copy Program**-Writing to a File, File Opening Modes, **String (Line) I/O in Files**-The Awkward Newline, Record I/O in Files, Text Files and Binary Files, Record I/O Revisited, Database Management, **Low-Level File I/O** -A Low-Level File-Copy Program, I/O under Windows.

Learning Outcomes:

1. Understand the concept of Strings (L2)
2. Learn Structures and Unions (L2)
3. Operate Files through C Programs (L4)
4. Manipulate strings (L3)

Unit V:

Data Structures: Linked List-Single Linked List, Double Linked List, Circular Linked List. Stacks-Using Arrays and Linked List, Stack Applications.

Queue- Arrays and Linked List, Circular Queue, Priority Queue.

Trees-Binary Trees, Binary Search Tree.

Graphs-Graphs Implementation using Arrays and Linked List, Traversal of Graphs.

Learning Outcomes:

1. Implements basic data structures such as stacks, queues and trees.(L3)
2. Apply algorithms and data structures in solving problems. (L3)
3. Design indexing structures (L6)

Text Books:

1. YashavantKanetkar, "Let Us C", Fourteenth Edition, BPB Publications.
2. K R Venugopal, Sudeep R Prasad, "Mastering C", McGrawHill publications
3. Jeri R. hanly, Elliot B. Koffman, Ashok Kamthane, A. Ananda Rao, "Programming in C and Data Structures", Pearson.

Reference Books:

1. Brian W Kernighan and Dennis M Ritchie, "The C Programming Language", Second Edition, Prentice Hall Publication.
2. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Computer Science Press.
3. PradipDey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition 2011.
4. Richard F. Gilberg&Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Course Outcomes:

1. Learn the concepts of C Programming language. (L2)
2. Design applications in C, using functions, arrays, pointers and structures. (L6)
3. Apply the concepts of Stacks and Queues in solving the problems. (L3)
4. Explore various operations on Linked lists. (L5)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CSE & ECE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5101P	0	0	3	1.5	CIE	30 M
Course Title	:	CHEMISTRY LAB					SEE	70 M

COURSE OBJECTIVES:

- Verify the fundamental concepts with experiments.

List of Experiments:

1. Conductometric titration of Strong acid vs Strong base.
2. Conductometric titration of weak acid vs Strong base.
3. Determination of cell constant and conductance of solutions.
4. Potentiometry - determination of redox potentials and EMF.
5. Acid-Base titration by pH metry.
6. Determination of Strength of an acid in Pb-Acid battery.
7. Preparation of polymer- Bakelite.
8. Verification Lambert-Beer's law.
9. Estimation of manganese by Colorimetry.
10. Separation of organic mixtures by Thin layer chromatography (TLC).
11. Identification of simple organic compounds by IR.
12. Preparation of nano materials by precipitation.
13. Estimation of Ferrous Iron by Potassium dichromate.
14. Measurement of 10Dq by spectrophotometric method.
15. Models of potential energy surfaces.

Course Outcomes:

At the end of the course, the students will be able to

- **Determine** the cell constant and conductance of solutions (L3)
- **Find** conductivity of acid and base (L1)
- **Prepare** polymer Bakelite materials (L2)
- **Measure** the strength of an acid present in secondary batteries (L3)
- **Analyse**the IR spectra of some organic compounds (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, CSE and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0201P	3	0	0	3	CIA	30 M
Course Title	:	BASIC ELECTRICAL & ELECTRONICS ENGG. LAB					SEE	70 M

PART-A: <u>BASIC ELECTRICAL ENGINEERING LAB</u>

COURSE OBJECTIVES:-

- To Verify Kirchoff's laws and Superposition theorem
- To learn performance characteristics of DC Machines.
- To perform various tests on 1- Phase Transformer.
- To Study the I – V Characteristics of Solar PV Cell

LIST OF EXPERIMENTS: -

1. Verification of Kirchhoff laws.
2. Verification of Superposition Theorem.
3. Magnetization characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Load test on 1-Phase Transformer.
7. I – V Characteristics of Solar PV cell
8. Brake test on DC Shunt Motor.

COURSE OUTCOMES:

After completing the course, the student will be able to

- Understand Kirchoff's Laws & Superposition theorem.
- Analyze the various characteristics on DC Machines by conducting various tests.
- Analyze I – V Characteristics of PV Cell
- Apply the knowledge to perform various tests on 1-phase transformer

PART-B: <u>ELECTRONICS ENGINEERING LAB</u>

COURSE OBJECTIVES:-

- To verify the theoretical concepts practically from all the experiments.
- To analyze the characteristics of Diodes, BJT, MOSFET, UJT.
- To design the amplifier circuits from the given specifications.
- Exposed to linear and digital integrated circuits.

LIST OF EXPERIMENTS: (**Execute Six experiments**).

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Full Wave Rectifier with & without filter.
4. Wave Shaping Circuits. (Clippers & Clampers)
5. Input & Output characteristics of Transistor in CB / CE configuration.
6. Frequency response of CE amplifier.
7. Inverting and Non-inverting amplifiers using Op-Amps.
8. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.

9. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

COURSE OUTCOMES:

CO1: Learn the characteristics of basic electronic devices like PN junction diode, Zener diode & BJT.
CO2: Analyze the application of diode as rectifiers, clippers and clampers.
CO3: Learn the fundamental principles of amplifier circuits and need of Bias in Amplifier circuits.
CO4: Learn the basics of linear integrated circuits and understand characteristics of operational amplifier.
CO5: Learn about available digital ICs and verify truth tables of Logic gates and Flipflops.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0501P	0	0	3	1.5	CIE	30 M
Course Title	:	C PROGRAMMING & DATA STRUCTURES LAB					SEE	70 M

COURSE OBJECTIVES:

- To illustrate the concepts of C programming language
- To discuss the syntax and semantics of C programming language.
- To demonstrate using arrays, strings, pointers and structures.
- To illustrate the use of Stacks and Queues
- To teach different operations on linked lists.
- To demonstrate Binary search tree traversal techniques.

Week 1

For the first few weeks students have to do some practice programs to understand the concepts of the C programming language

Week 2

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
(i) Addition of Two Matrices (ii) Multiplication of Two Matrices

Week 3

a) Write a C program that uses functions to perform the following operations:
(i) To insert a sub-string in to a given main string from a given position.
(ii) To delete n characters from a given position in a given string.

Week 4

a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn't contain T.
b) Write a C program to count the lines, words and characters in a given text.

Week 5

a) Write a C Program to perform various arithmetic operations on pointer variables.
b) Write a C Program to demonstrate the following parameter passing mechanisms:
(i) call-by-value (ii) call-by-reference

Week 6

Write a C program that uses functions to perform the following operations:

(i) Reading a complex number
(ii) Writing a complex number
(iii) Addition of two complex numbers
(iv) Multiplication of two complex numbers
(Note: represent complex number using a structure.)

Week 7

Write C programs that implement stack (its operations) using

(i) Arrays (ii) Pointers

Week 8

Write C programs that implement Queue (its operations) using

(i) Arrays (ii) Pointers

Week 9

Write a C program that uses Stack operations to perform the following:

(i) Converting infix expression into postfix expression

(ii) Evaluating the postfix expression

Week 10

Write a C program that uses functions to perform the following operations on singly linked list.

(i) Creation (ii) Insertion (iii) Deletion (iv) Traversal

Week 11

Write a C program that uses functions to perform the following operations on Doublylinkedlist.

(i) Creation (ii) Insertion (iii) Deletion (iv) Traversal

Week 12

Write a C program that uses functions to perform the following operations on circular linkedlist.

(i) Creation (ii) Insertion (iii) Deletion (iv) Traversal

Week 13

Write a C program that uses functions to perform the following:

(i) Creating a Binary Tree of integers

(ii) Traversing the above binary tree in preorder, inorder and postorder.

Week 14

Write C programs that use both recursive and non-recursive functions

(i) To find the factorial of a given integer.

(ii) To find the GCD (greatest common divisor) of two given integers.

(iii) To solve Towers of Hanoi problem.

Week 14

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers:

(i) Linear search (ii) Binary search

Week 15

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

(i) Bubble sort (ii) Selection sort (iii) Insertion sort

Week 16 Application development

College information system – The students in groups can collect the information about the college and design a project which automates the some of the tasks like Attendance calculation, Grade calculation, etc.

TEXT BOOKS:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg&Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

REFERENCE BOOKS:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, Tata McGraw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

COURSE OUTCOMES:

1. Demonstrate basic concepts of C programming language. (L2)
2. Develop C programs using functions, arrays, structures and pointers. (L6)
3. Illustrate the concepts Stacks and Queues. (L2)
4. Design operations on Linked lists. (L6)
5. Apply various Binary tree traversal techniques. (L3)
6. Develop searching and sorting methods. (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0302	0	0	3	1.5	CIE	30 M
Course Title	:	ENGINEERING WORKSHOP					SEE	70 M

COURSE OBJECTIVES:

- To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills.

LIST OF EXPERIMENTS

Trade I: Wood Working

Familiarity with different types of woods and tools used in wood working and make following joints

(a) Half – Lapjoint (b) Mortise and Tenonjoint (c) Corner Dovetail joint or Bridlejoint

Trade II: Sheet Metal Working

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

(a) Taperedtray (b)Conicalfunnel (c)Elbowpipe (d)Brazing

Trade III: Fitting

Familiarity with different types of tools used in fitting and do the following fitting exercises.

(a) V-fit (b)Dovetailfit (c) Semi-circularfit

(d) Bicycle tyre puncture and change of two wheeler tyre.

Trade IV: Electrical Wiring

Familiarities with different types of basic electrical circuits and make the following connections

(a) Parallelandseries (b) Twowayswitch (c)Godownlighting

(d) Tubelight (e) Threephasemotor (f) Soldering ofwires

COURSE OUTCOMES:

After completion of this lab the student will be able to

- Apply wood working skills in real world applications.(l3)
- Build different objects with metal sheets in real world applications.(l3)
- Apply fitting operations in various applications.(l3)
- Apply different types of basic electric circuit connections.(l3)
- Use soldering and brazing techniques.(l2)

Note: In each section a minimum of three exercises are to be carried out.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CSE & ME and II Semester CE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0502	0	0	3	1.5	CIE	30 M
Course Title	:	IT WORKSHOP					SEE	70 M

COURSE OBJECTIVES:

- To make the students know about the internal parts of a computer, assembling and dissembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, and Presentations
- To demonstrate Networking of computers and use Internet facility for Browsing and Searching
- To illustrate the need for security while using applications and devices.

Preparing your Computer

Task 1:

Learn about Computer: Identify the internal parts of a computer, and its peripherals, Represent the same in the form of diagrams including Block diagram of a computer, Write specifications for each part of a computer including peripherals and specification of a Desktop computer.

Task 2:

Assembling a Computer: Disassemble and assemble the PC back to working condition, Trouble shoot the computer and identify working and non-working parts, Identify the problem correctly by various methods like beeps.

Task 3:

Install Operating system and Applications: Install Linux on the computer, Install another operating system and make the system dual boot or multi boot, Install operating systems using Virtual machine.
Access the computing resources like CD/DVD drives, Pen drives, Printers, Speakers, Microphone, etc.
Install device drivers and install application programs.

Networking and Internet

Task 4:

Networking: Connect two computers directly using a cable or wireless connectivity and share information, Connect two or more computers using switch/hub and share information, Phuscally connect computers using crimpling activity, logical configuration, etc.

Task 5:

Browsing Internet: Access the Internet for Browsing, Search the Internet for required information, Create e-mail account, send and receive email, Get acquaintance with applications like Facebook, skype, etc.

Task 6:

Antivirus: Download freely available Antivirus software, install it and use it to check for threats to the computer being used, Submit information about the features of the antivirus used, installation process, virus definitions, virus engine, etc. Configure the computer for high security.

Productivity tools

Task 7:

Word Processor: Create documents using the word processor tool, Inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc.

Prepare project cover pages, content sheet, and chapter pages.

Task 8:

Presentations: Creating, opening, saving, and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show.

Task 9:

Spreadsheet: Create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells.

Applications

Task 10:

Database management system: Install a Database management system, configure users, do some administration tasks.

Task 11:

Language Translators

Install different Natural language translators in a Computer/Mobile. Use them to convert text between different languages.

Use Voice to access applications and make them perform different tasks like calling users, etc.

Task 12:

Sharing

Install applications github, dropbox, google forms, google docs and use them to share information and work on a common project. It is a Team task.

Task 13:

IDE

Install applications like Vscode, and Eclipse and use the integrated development environment of those applications and perform tasks like editing, compiling, executing, etc.

Task 14:

Cyber Security

Practice the following Cyber Security related tasks

- Cyber Hygiene Practices of Personal digital devices
- Cyber Hygiene Practices for Home
- Cyber Hygiene Practices for Remote working and Learning
  Websource: Cyber Hygiene Practices - ISEA (infosecawareness.in)

References:

1. Peter Norton , Introduction to Computers, McGraw Hill
2. Joan Lambert, Joyce Cox, MOS study guide for word, Excel, Powerpoint& Outlook Exams, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Rusen , Networking your computers and devices, PHI
5. Bigelows , Trouble shooting, Maintaining & Repairing PCs, TMH
6. Major reference is Websites like Google.com, dropbox.com, github.com and others.

Course Outcomes:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use. (L6)
- Prepare the Documents using Word processors and Prepare spread sheets for calculations using excel. (L3)
- Design Slide presentations using the presentation tool. (L6)
- Interconnect two or more computers for information sharing. (L4)
- Access the Internet and Browse it to obtain the required information. (L4)
- Analyze the vulnerabilities of the devices, and apply security features (L4)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, CSE, ECE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5402	3	0	0	3	CIE	30 M
Course Title	:	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS					SEE	70 M

COURSE OBJECTIVES:

1) To enlighten the learners in the concept of differential equations and multivariable calculus.
2) To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

UNIT I: Linear differential equations of higher order (Constant Coefficients) (10 hrs)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskean, method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Mass spring system.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L3)
- Formulate and solve the higher order differential equation by analyzing physical situations (L3)

UNIT II: Partial Differential Equations (08 hrs)

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order equations using Lagrange's method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply a range of techniques to find solutions of standard PDEs (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT III: Applications of Partial Differential Equations (10 hrs)

Classification of PDE, method of separation of variables for second order equations. Applications of Partial Differential Equations: One dimensional Wave equation, One dimensional Heat equation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Calcify the PDE (L3)
- Learn the applications of PDEs(L2)

UNIT IV: Vector differentiation (06 hrs)

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply del to Scalar and vector point functions (L3)

- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT 5: Vector integration **(08 hrs)**

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes:

At the end of this unit, the student will be able to

- find the work done in moving a particle along the path over a force field (L4)
- evaluate the rates of fluid flow along and across curves (L4)
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
2. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. S L Ross , Differential Equations ,Wiley India, year 2007 edition.

Course Outcomes:

At the end of the course, the student will be able to

- Solve the differential equations related to various engineering fields (L6)
- Identify solution methods for partial differential equations that model physical processes (L3)
- Interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- Estimate the work done against a field, circulation and flux using vector calculus (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CSE and ECE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5601T	3	0	0	3	CIA	30 M
Course Title	:	APPLIED PHYSICS					SEE	70 M

COURSE OBJECTIVES:

- To make a bridge between the physics in school and engineering courses.
- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications.
- To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
- To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de'Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and band theory of solids.
- Evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

UNIT I: Wave Optics (12 hrs)

Interference- Principle of superposition – Interference of light – Conditions for sustained interference - Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum.

Polarization-Introduction – Types of polarization – Polarization by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates with applications.

Learning Outcomes:

The students will be able to

1. **Explain** the need of coherent sources and the conditions for sustained interference (L2)
2. **Identify** engineering applications of interference (L3)
3. **Analyze** the differences between interference and diffraction with applications (L4)
4. **Illustrate** the concept of polarization of light and its applications (L2)
5. **Classify** ordinary polarized light and extraordinary polarized light (L2)

Unit II: Lasers and Fiber optics (08 hrs)

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers.

Fiber optics: Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Propagation Losses (qualitative) – Applications.

Learning Outcomes:

The students will be able to

1. **Understand** the basic concepts of LASER light Sources (L2)
2. **Apply** the concepts to learn the types of lasers (L3)
3. **Identifies** the Engineering applications of lasers (L2)
4. **Explain** the working principle of optical fibers (L2)
5. **Classify** optical fibers based on refractive index profile and mode of propagation (L2)
6. **Identify** the applications of optical fibers in various fields (L2)

Unit III: Dielectric and Magnetic Materials (08 hrs)

Dielectric Materials-Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic and Ionic, Orientation polarizations (Qualitative) – Lorentz internal field – Clausius-Mossotti equation-Dielectric loss.

Magnetic Materials-Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para & Ferro-Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Learning Outcomes:

The students will be able to

1. **Explain** the concept of dielectric constant and polarization in dielectric materials (L2)
2. **Summarize** various types of polarization of dielectrics (L2)
3. **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics(L2)
4. **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
5. **Explain** the applications of dielectric and magnetic materials (L2)
6. **Apply** the concept of magnetism to magnetic devices (L3)

Unit IV:Quantum Mechanics, Free Electron Theory and Band theory of Solids (10 hrs)

Quantum Mechanics- Dual nature of matter – Schrodinger's time independent and dependent wave equations – Significance of wave function – Particle in a one-dimensional infinite potential well.

Free Electron Theory-Classical free electron theory (Merits and demerits only) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Fermi-Dirac distribution – Density of states – Fermi energy.

Band theory of Solids- Bloch's Theorem (Qualitative) – Kronig-Penney model (Qualitative) – E vs k diagram – Classification of crystalline solids – Effective mass of electron – m^*vs k diagram – Concept of hole.

Learning Outcomes:

The students will be able to

1. **Explain** the concept of dual nature of matter (L2)
2. **Understand** the significance of wave function (L2)
3. **Interpret** the concepts of classical and quantum free electron theories (L2)
4. **Explain** the importance of K-P model
5. **Classify** the materials based on band theory (L2)
6. **Apply** the concept of effective mass of electron (L3)

Unit V: Semiconductors and Superconductors (10 hrs)

Semiconductors- Introduction – Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors – Density of charge carriers – Dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Direct and indirect band gap semiconductors – Hall effect – Hall coefficient – Applications of Hall effect.

Superconductors- Introduction – Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – Josephson effects (AC and DC) – High T_c superconductors – Applications of superconductors.

Learning Outcomes:
The students will be able to

1. **Classify** the energy bands of semiconductors (L2)
2. **Interpret** the direct and indirect band gap semiconductors (L2)
3. **Identify** the type of semiconductor using Hall effect (L2)
4. **Identify** applications of semiconductors in electronic devices (L2)
5. **Explain** how electrical resistivity of solids changes with temperature (L2)
6. **Classify** superconductors based on Meissner's effect (L2)
7. **Explain** Meissner's effect, BCS theory & Josephson effect in superconductors (L2)

Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu& Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering Physics – B.K. Pandey and S. Chaturvedi, Cengage Learning.

Reference Books:

1. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018
2. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
3. Semiconductor physics and devices- Basic principle – Donald A, Neamen, McGraw Hill
4. Introduction to solid state physics – Charles Kittel, Wiley Publishers

COURSE OUTCOMES:

1. **Explain** the need of coherent sources and the conditions for sustained interference (L2). **Identify** the applications of interference in engineering (L3). **Analyze** the differences between interference and diffraction with applications (L4). **Illustrate** the concept of polarization of light and its applications (L2). **Classify** ordinary polarized light and extraordinary polarized light (L2).
2. **Explain** various types of emission of radiation (L2). **Identify** the role of laser in engineering applications (L3). **Describe** the construction and working principles of various types of lasers (L1). **Explain** the working principle of optical fibers (L2). **Classify** optical fibers based on refractive index profile and mode of propagation (L2). **Identify** the applications of optical fibers in medical, communication and other fields (L2). **Apply** the fiber optic concepts in various fields (L3).
3. **Explain** the concept of dielectric constant and polarization in dielectric materials (L2). **Summarize** various types of polarization of dielectrics (L2). **Interpret** Lorentz field and Claussius-Mosotti relation in dielectrics (L2). **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2). **Explain** the applications of dielectric and magnetic materials (L2). **Apply** the concept of magnetism to magnetic devices (L3).
4. **Describes** the dual nature of matter (L1). **Explains** the significance of wave function (L2). **Identify** the role of Schrodinger's time independent wave equation in studying particle in one-dimensional infinite potential well (L3). **Identify** the role of classical and quantum free electron theory in the study of electrical conductivity (L3).
5. **Classify** the energy bands of semiconductors (L2). **Outline** the properties of charge carriers (L2). **Interpret** the direct and indirect band gap semiconductors (L2). **Identify** the type of semiconductor using Hall effect (L2). **Identify** applications of semiconductors in electronic devices (L2). **Explain** how electrical resistivity of solids changes with temperature (L2).

Classify superconductors based on Meissner's effect (L2).**Explain** Meissner's effect, BCS theory & Josephson effect in superconductors (L2).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE and ECE)
(Common to II Semester CSE and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AHS5201T	3	0	0	3	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH					SEE	70 M

INTRODUCTION:

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

COURSE OBJECTIVES:

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Unit I: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Parts of Speech, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

At the end of the module, the learners will be able to

1. understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
2. ask and answer general questions on familiar topics and introduce oneself/others
3. employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
4. recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs

5. form sentences using proper grammatical structures and correct word forms

Unit II: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

At the end of the module, the learners will be able to

1. comprehend short talks on general topics
2. participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
3. understand the use of cohesive devices for better reading comprehension
4. write well structured paragraphs on specific topics
5. identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit III: The Death Trap: Saki

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Paragraph Writing.

Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

At the end of the module, the learners will be able to

1. Comprehend short talks and summarize the content with clarity and precision
2. Participate in informal discussions and report what is discussed
3. Infer meanings of unfamiliar words using contextual clues
4. Write summaries based on global comprehension of reading/listening texts
5. Use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit IV: Innovation: Muhammad Yunus

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters/Report Writing.

Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice

Learning Outcomes

At the end of the module, the learners will be able to

1. Infer and predict about content of spoken discourse
2. Understand verbal and non-verbal features of communication and hold formal/informal conversations
3. Interpret graphic elements used in academic texts
4. Produce a coherent paragraph interpreting a figure/graph/chart/table
5. Use language appropriate for description and interpretation of graphical elements

Unit V: Politics and the English Language: George Orwell

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: Reading for comprehension.

Writing: Writing structured essays on specific topics using suitable claims and evidences.

Grammar and Vocabulary: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Learning Outcomes

At the end of the module, the learners will be able to

- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

Text Books:

1. **Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan.**

Reference Books:

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3. Raymond Murphy's *English Grammar in Use* Fourth Edition (2012) E-book
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
5. Oxford Learners Dictionary, 12th Edition, 2011
6. Norman Lewis *Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary* (2014)
7. *Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words* by David Butler.

Web links

- www.englishclub.com
- www.easyworldofenglish.com
- www.languageguide.org/english/
- www.bbc.co.uk/learningenglish
- www.eslpod.com/index.html
- www.myenglishpages.com

COURSE OUTCOMES

At the end of the course, the learners will be able to

1. **Understand** the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
2. **Apply** grammatical structures to formulate sentences and correct word forms
3. **Analyze** discourse markers to speak clearly on a specific topic in informal discussions
4. **Evaluate** reading/listening texts and to write summaries based on global comprehension of these texts.
5. **Create** a coherent paragraph interpreting a figure/graph/chart/table

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(II Semester CSE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0503T	3	0	0	3	CIE	30 M
Course Title	:	PYTHON PROGRAMMING					SEE	70 M

COURSE OBJECTIVES:

- To teach the fundamentals of Python
- To elucidate problem-solving using a Python programming language
- To introduce a function-oriented programming paradigm through python
- To develop the skill of designing Graphical user Interfaces in Python
- To learn how to use lists, tuples, and dictionaries in Python programs.

Unit I:

Introduction: What is a program, running python, Arithmetic operators, Value and Types?
Variables, Assignments and Statements: Assignment statements, Script mode, Order of operations, string operations, comments.
Functions: Function calls, Math functions, Composition, Adding new Functions, Definitions and Uses, Flow of Execution, Parameters and Arguments, Variables and Parameters are local, Stack diagrams, Fruitful Functions and Void Functions, Why Functions.
Case study: The turtle module, Simple Repetition, Encapsulation, Generalization, Interface design, Refactoring, docstring.

Learning Outcomes: Student should be able to

- List the basic constructs of Python (L1)
- Solve the problems by applying modularity principle (L3)

Unit II:

Conditionals and Recursion: Floor division and modulus, Boolean expressions, Logical operators, Conditional execution, Alternative execution, Chained conditionals, Nested conditionals, Recursion, Infinite Recursion, Keyboard input.
Fruitful Functions: Return values, Incremental development, Composition, Boolean functions, More recursion, Leap of Faith, Checking types
Iteration: Reassignment, Updating variables, The while statement, Break, Square roots, Algorithms.
Strings: A string is a sequence, len, Traversal with a for loop, String slices, Strings are immutable, Searching, Looping and Counting, String methods, The in operator, String comparison.
Learning Outcomes: Student should be able to

- Apply the conditional execution of the program (L3)
- Apply the principle of recursion to solve the problems (L3)

Unit III:

Case Study: Reading word lists, Search, Looping with indices.
Lists: List is a sequence, Lists are mutable, Traversing a list, List operations, List slices, List methods, Map filter and reduce, Deleting elements, Lists and Strings, Objects and values, Aliasing, List arguments.

Dictionaries: A dictionary is a mapping, Dictionary as a collection of counters, Looping and dictionaries, Reverse Lookup, Dictionaries and lists, Memos, Global Variables.
Tuples: Tuples are immutable, Tuple Assignment, Tuple as Return values, Variable-length argument tuples, Lists and tuples, Dictionaries and tuples, Sequences of sequences.

Learning Outcomes: Student should be able to
- Use the data structures Lists, Dictionaries, and Tuples (L3)
- Design programs for manipulating strings (L6)

Unit IV:
Files: Persistence, Reading and writing, Format operator, Filename and paths, Catching exceptions, Databases, Pickling, Pipes, Writing modules.
Classes and Objects: Programmer-defined types, Attributes, Instances as Return values, Objects are mutable, Copying.
Classes and Functions: Time, Pure functions, Modifiers, Prototyping versus Planning
Classes and Methods: Object oriented features, Printing objects, Theinit method, The __str__method, Operator overloading, Type-based Dispatch, Polymorphism, Interface and Implementation
Inheritance: Card objects, Class attributes, Comparing cards, decks, Printing the Deck, Add Remove shuffle and sort, Inheritance, Class diagrams, Data encapsulation.

Learning Outcomes: Student should be able to
- Apply object orientation concepts (L3)
- Organize data in the form of files (L6)

Unit V: Introduction to data science:
Functional Programming, JSON and XML in Python, Numpy with Python, Pandas.

Learning Outcomes: Student should be able to
- Apply python programming for solving Data science problems (L3)
- Design solutions to Data science problems using the API supported by Python (L6)

Text books:
1) Allen B. Downey, "Think Python", 2nd edition, SPD/O'Reilly, 2016.
2) GowriShankar S., Veena A, "Introduction to Python Programming", CRC Press.

Reference Books:
1) Martin C.Brown, "The Complete Reference: Python", McGraw-Hill, 2018.
2) Kenneth A. Lambert, B.L. Juneja, "Fundamentals of Python", CENGAGE, 2015.
3) R. Nageswara Rao, "Core Python Programming", 2nd edition, Dreamtech Press, 2019

Course Outcomes: Student should be able to
- Explain the features of Python language (L2)
- Select appropriate data structure of Python for solving a problem (L4)
- Design object oriented programs for solving real-world problems (L6)
- Design Data Science applications using Python (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE & ECE and II Semester CSE & ME)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0301T	3	0	0	3	CIE	30 M
Course Title	:	ENGINEERING DRAWING					SEE	70 M

COURSE OBJECTIVES:

- Bring awareness that Engineering Drawing is the Language ofEngineers.
- Familiarize how industry communicates technicalinformation.
- Teach the practices for accuracy and clarity in presenting the technicalinformation.
- Develop the engineering imagination essential for successfuldesign.

Unit I:

Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance - Conventions in drawing - lettering - BIS conventions.

(a) Conic sections including the rectangular hyperbola- general methodonly,
(b) Cycloid, epicycloids andhypocycloid c) Involutes

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the significance of engineering drawing
- Know the conventions used in the engineering drawing
- Identify the curves obtained in different conic sections
- Draw different curves such as cycloid, involute and hyperbola

Unit II:

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of projection
- Know how to draw the projections of points, lines
- Differentiate between projected length and true length
- Find the true length of the lines

Unit III:

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliaryviewsmethod.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the procedure to draw projection of solids
- Differentiate between rotational method and auxillary view method.
- Draw the projection of solid inclined to one plain

- Draw the projection of solids inclined to both the plains

Unit IV:

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand different sectional views of regular solids
- Obtain the true shapes of the sections of prism
- Draw the sectional views of prism, cylinder, pyramid and cone

Unit V:

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of development of surfaces
- Draw the development of regular solids such as prism, cylinder, pyramid and cone
- Obtain the development of sectional parts of regular shapes

Text Books:

1) K.L.Narayana&P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2) N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers,2016.

Reference Books:

1) Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right,2009
2) Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers,2000
3) Shah and Rana, Engineering Drawing, 2/e, Pearson Education,2009
4) K.C.John, Engineering Graphics, 2/e, PHI,2013
5) Basant Agarwal &C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

After completing the course, the student will be able to

- Draw various curves applied in engineering. (l2)
- Show projections of solids and sections graphically. (l2)
- Draw the development of surfaces of solids.(l3)

Additional Sources

Youtube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CSE and ME)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	20AMC9902	3	0	0	0	CIA	30 M
Course Title	:	UNIVERSAL HUMAN VALUES					SEE	--

INTRODUCTION

This course discusses the role of human values in one's family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course names as Universal Human Values is designed which, may be covered in their I-I or I-II Semester.

In the Induction Program, students would get an initial exposure to human values through Universal Human Values-I. This exposure is to be augmented by this compulsory full semester foundation course.

COURSE OBJECTIVES

1. Exposure to the value of life, society and harmony
2. Leading towards holistic perspective based on self-exploration about themselves (human being), family, and society and nature/existence.
3. Bringing transition from the present state to Universal Human Order
4. Instill commitment and courage to act.
5. Know about appropriate technologies and management patterns

UNIT I:Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Universal Human Values-I - Self-Exploration - content and process; 'Natural Acceptance' and Experiential Validation - self-exploration - Continuous Happiness and Prosperity - Human Aspirations - current scenario - Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT II: Understanding Harmony in the Human Being - Harmony in Myself!

Human being as a co-existence of the sentient 'I' and the material 'Body' - the needs - happiness and physical facility -the Body as an instrument of 'I' - the characteristics and activities of 'I' and harmony in 'I' - the harmony of I with the Body

UNIT III: Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

Values in human relationship; meaning of Justice; Trust and Respect; Difference between intention and competence; the other salient values in relationship - the harmony in the society: Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals - Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

UNIT IV: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

The harmony in the Nature - Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature - Understanding Existence as Co-existence of mutually interacting units in all- pervasive space - Holistic perception of harmony at all levels of existence.

UNIT V: Implications of the above Holistic Understanding of Harmony on Professional Ethics
Humanistic Education - Competence in professional ethics: professional competence - people friendly and eco-friendly production systems - appropriate technologies and management patterns for above production systems. Individuals as socially and ecologically responsible engineers, technologists and managers

TEXT BOOKS:

1. *A Foundation Course in Human Values and Professional Ethics*, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. Teachers' Manual for *A Foundation Course in Human Values and Professional Ethics*, R.R. Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

REFERENCE BOOKS:

1. JeevanVidya: EkParichaya, ANagaraj, JeevanVidyaPrakashan, Amarkantak, 1999
2. HumanValues, A.N.Tripathi, New Age Intl.Publishers, NewDelhi,2004.
3. The Story of Stuff (Book).
4. Economy of Permanence - J C Kumarappa 8. Bharat Mein Angreji Raj – PanditSunderlal 9. Rediscovering India – by Dharampal
5. Hind Swaraj or Indian Home Rule - by Mohandas K.Gandhi
6. India Wins Freedom - Maulana Abdul Kalam Azad 12. Vivekananda - Romain Rolland(English)

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story

COURSE OUTCOMES:

By the end of the course the student will be able to:

1. Define terms like Natural Acceptance, Happiness and Prosperity
2. Understand awareness of oneself, and ones surroundings (family, society, Nature)
3. Apply what they have learnt to their own self in different day-to-day Settings in real life
4. Relate human values with human relationship and human society.
5. Justify the need for universal human values and harmonious existence.
6. Develop as socially and ecologically responsible engineers.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CSE and ECE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5601P	0	0	3	1.5	CIA	30 M
Course Title	:	APPLIED PHYSICS LAB					SEE	70 M

COURSE OBJECTIVES:

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

Note: In the following list, out of 15 experiments, any 10 experiments must be performed in a semester

<u>List of Experiments:</u>

1. Determine the thickness of the wire using wedge shape method

   Experimental outcomes:

   Operates optical instrument like travelling microscope. (L2)
   Estimate the thickness of the wire using wedge shape method (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)

2. Determination of the radius of curvature of the lens by Newton's ring method

   Experimental outcomes:

   Operates optical instrument like travelling microscope. (L2)
   Estimate the radius of curvature of the lens (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
   Plots the square of the diameter of a ring with no. of rings (L3)

3. Determination of wavelength by plane diffraction grating method

   Experimental outcomes:

   Operates optical instrument like spectrometer. (L2)
   Estimate the wavelength of the given source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)

4. Determination of dispersive power of prism.

   Experimental outcomes:

   Operates optical instrument like spectrometer. (L2)
   Estimate the refractive index and dispersive power of the given prism (L2)
   Identifies the formation of spectrum due to dispersion. (L2)

5. Determination of wavelength of LASER light using diffraction grating.

   Experimental outcomes:

   Operates various instrument (L2)
   Estimate the wavelength of laser source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)

6. Determination of particle size using LASER.

Experimental outcomes:

Operates various instrument (L2)

Estimate the Particles size using laser (L2)

Identifies the application of laser (L2)

7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)

Identifies the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications. (L2)

8. Determination of dielectric constant by charging and discharging method.

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the dielectric constant of the given substance. (L2)

Identifies the significance of dielectric constant in various devices. (L2)

9. Determination of magnetic field along the axis of a circular coil carrying current by Stewart and Gee's method.

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the magnetic field along the axis of a circular coil carrying current. (L2)

Plots the intensity of the magnetic field of circular coil carrying current with distance (L3)

10. Measurement of magnetic susceptibility by Gouy's method

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the magnetic susceptibility of the given material. (L2)

Identifies the significance of magnetic susceptibility in various engineering applications. (L2)

11. To Study the variation of B versus H by magnetizing the magnetic material (B-H loop)

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2)

Classifies the soft and hard magnetic material based on B-H curve. (L2)

Plots the magnetic field H and flux density B (L3)

12. To determine the resistivity of semiconductor by Four probe method

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the resistivity of a semiconductor. (L2)

Identifies the importance of four probe method in finding the resistivity of semiconductor. (L3)

13. To determine the energy gap of a semiconductor

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the energy gap of a semiconductor. (L2)

Illustrates the engineering applications of energy gap. (L3)

Plots1/T with log R (L3)

14. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall Effect.

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)

Estimate the charge carrier concentration and mobility in a semiconductor. (L2)

Illustrates the applications of Hall Effect. (L3)
Plots the voltage with current and voltage with magnetic field (L3)

15. Measurement of resistance with varying temperature.

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)
Estimate the resistance with varying temperature. (L2)
Plots resistance R with temperature T (L3)

Course Outcomes:

The students will be able to

1. **Operate** optical instruments like microscope and spectrometer (L2)
2. **Determine** thickness of a hair/paper with the concept of interference (L2)
3. **Estimate** the wavelength of different colors using diffraction grating and resolving power (L2)
4. **Plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
5. **Evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
6. **Determine** the resistivity of the given semiconductor using four probe method (L3)
7. **Identify** the type of semiconductor i.e., n-type or p-type using hall effect (L3)
8. **Calculate** the band gap of a given semiconductor (L3)

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE and ECE)

(Common to II Semester CSE and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AHS5201P	0	0	3	1.5	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH LAB					SEE	70 M

COURSE OBJECTIVES:

- Students will be exposed to a variety of self instructional, learner friendly modes of language learning
- Students will learn better pronunciation through stress, intonation and rhythm
- Students will be trained to use language effectively to face interviews, group discussions, public speaking
- Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

LIST OF TOPICS

1. Phonetics
2. Reading comprehension
3. Describing objects/places/persons
4. Role Play or Conversational Practice
5. Just-A-Minute (JAM)
6. Etiquettes of Telephonic Communication
7. Information Transfer
8. Note Making and Note Taking
9. E-mail Writing
10. Group Discussions
11. Resume Writing
12. Debates
13. Oral Presentations
14. Poster Presentation
15. Interviews Skills

Suggested Software

- Orell
- Walden Infotech
- Young India Films

Reference Books

1. Bailey, Stephen. Academic writing: A handbook for international students. Routledge, 2014.
2. Chase, Becky Tarver. Pathways: Listening, Speaking and Critical Thinking. Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. Cambridge Academic English (B2). CUP, 2012.
5. A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Web Links

- **www.esl-lab.com**
- **www.englishmedialab.com**
- **www.englishinteractive.net**

Course Outcomes

1. Listening and repeating the sounds of English Language
2. Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
3. Apply communication skills through various language learning activities.
4. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
5. Evaluate and exhibit acceptable etiquette essential in social and professional settings
6. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(II Semester CSE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0503P	0	0	3	1.5	CIE	30 M
Course Title	:	PYTHON PROGRAMMING LAB					SEE	70 M

COURSE OBJECTIVES:

- To train the students in solving computational problems
- To elucidate solving mathematical problems using Python programming language
  To understand the fundamentals of Python programming concepts and its applications.

LIST OF TOPICS

1. Write a program to demonstrate:
   (a) Different numeric data types, and
   (b) To perform different Arithmetic Operations on numbers in Python.
2. Write a program to create, append, and remove lists in Python.
3. Write a program to demonstrate working with tuples in Python.
4. Write a program to demonstrate working with dictionaries in Python.
5. Write a program to demonstrate a) arrays b) array indexing such as slicing, integer array indexing and Boolean array indexing along with their basic operations in NumPy.
6. Write a program that accepts a string from the user and display the same string after removing vowels from it.
7. Write a program to strip a set of characters from a string.
8. Write a function that prompts the user for the average temperature for each day of the week and returns a dictionary containing the required information.
9. Write a program that has the dictionary of your friends names as keys and phone numbers as its values. Print the dictionary in a sorted order. Prompt the user to enter the name and check if it is present in the dictionary. If the name is not present, then enter the details in the dictionary.
10. Write a program to store the latitude and longitude of your house as a tuple and display it.
11. Write a program to do the following operations on files:
    (a) Count the occurrence of each letter
    (b) read the last n lines
    (c) remove new line characters from the file
    (d) read random line from a file
    (e) read and write the contents from one csv file to another.
12. Write a program to add two polynomials using classes.
13. Create a class called library with data attributes accno, publisher, title and author. The methods of the class should include
    (a) read() accno, title, author
    (b) compute() – to accept the number of days late, calculate an display the fine charged at the rate of Rs. 10 per day.
    (c) display the data.
14. Create a program to compute summary statistics such as mean, median, mode, standard deviation and variance of the given different types of data.

15. Write a program to create and display a Data Frame from a dictionary of data which has the index labels.
16. Write a program to create and display a one-dimensional array-like object containing an array of data using pandas library
17. Write a python program to add, subtract, multiply and divide two pandas series.

Optional

18. Develop a Python program to solve the n-queen problem with and without recursion.
    Problem Description
    The n-queen problem is the problem of placing n queens on an n x n chessboard such that no queen can attack another queen.
19. Design a python program to design a Calculator and Countdown timer.
20. Design a program in which the computer randomly chooses a number between 1 to 10, 1 to 100, or any range. Then give users a hint to guess the number. Every time the user guesses wrong, he gets another clue, and his score gets reduced. The clue can be multiples, divisible, greater or smaller, or a combination of all.
21. Design a simple youtube video downloader.
22. Develop a Python program which blocks the unnecessary website popups

Textbooks:

1. Francois Chollet, Deep Learning with Python, 1/e, Manning Publications Company, 2017
2. Peter Wentworth, Jeffrey Elkner, Allen B. Downey and Chris Meyers, “How to Think Like a Computer Scientist: Learning with Python 3”, 3rd edition, Available at http://www.ict.ru.ac.za/Resources/cspw/thinkcspy3/thinkcspy3.pdf
3. Paul Barry, “Head First Python a Brain Friendly Guide” 2nd Edition, O’Reilly, 2016
4. DainelY.Chen “Pandas for Everyone Python Data Analysis” Pearson Education, 2019

COURSE OUTCOMES:

At the end of the course, the student will be able to

- Illustrate the use of various data structures. (L3)
- Analyze and manipulate Data using Pandas (L4)
- Design solutions to real-world problems using Python (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to Semester CE & ECE and II Semester CSE & me)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0301P	3	0	0	3	CIE	30 M
Course Title	:	ENGINEERING GRAPHICS LAB					SEE	70 M

COURSE OBJECTIVES:

- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3Dmodeling.
- Instruct graphical representation of machinecomponents.

Computer Aided Drafting:

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets,arrays,dimensions.
Dimensioning principles and conventional representations.

Orthographic Projections: Systems of projections, conventions and application to orthographic projections - simple objects.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

TEXT BOOKS:

1) K. Venugopal, V.Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2) Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHI Learning, Eastern Economy editions.

REFERENCE BOOKS:

1) T. Jayapoovan, Engineering Graphics using Auto Cad, Vikas Publishing House
2) K.L.Narayana&P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
3) LinkanSagar, BPB Publications, Auto Cad 2018 Training Guide.
4) K.C.John, Engineering Graphics, 2/e, PHI,2013
5) Basant Agarwal &C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

COURSE OUTCOMES:

After completing the course, the student will be able to

- Use computers as a drafting tool. (L2)
- Draw isometric and orthographic drawings using CAD packages.(L3)

ADDITIONAL SOURCES

Youtube: http-sewor,Carleton.cag, kardos/88403/drawings.html conic sections-online, red woods.edu

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester CSE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5405	3	0	0	3	CIE	30 M
Course Title	:	Discrete Mathematics					SEE	70 M

COURSE OBJECTIVES:
Introduce the concepts of mathematical logic and gain knowledge in sets, relations andfunctions and Solve problems using counting techniques and combinatorics and to introducegenerating functions and recurrence relations. Use Graph Theory for solving real worldproblems.

UNIT-I:
Mathematical Logic: Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology,Duality law, Equivalence, Implication, Normal Forms, Functionally complete set ofconnectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theoryof Predicate Calculus.

UNIT-II:
Set theory : Basic Concepts of Set Theory, Relations and Ordering, The Principle of InclusionExclusion, Pigeon hole principle and its application,Functions composition of functions,Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures:Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, subgroups, homomorphism, Isomorphism.

UNIT-III:
Elementary Combinatorics: Basics of Counting, Combinations and Permutations, Enumeration of Combinations andPermutations, Enumerating Combinations and Permutations with Repetitions, EnumeratingPermutations with Constrained Repetitions, Binomial Coefficients, The Binomial andMultinomial Theorems.

UNIT-IV:
Recurrence Relations: Generating Functions of Sequences, Calculating Coefficients of Generating Functions,Recurrence relations, Solving Recurrence Relations by Substitution and Generatingfunctions, The Method of Characteristic roots, Solutions of Inhomogeneous RecurrenceRelations.

UNIT-V:
Graphs: Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees,Directed Trees, Binary Trees, Planar Graphs, Euler’s Formula, Multigraphs and EulerCircuits, Hamiltonian Graphs, Chromatic Numbers, The Four Color Problem.

TEXT BOOKS:

1. Joe L. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics forComputer Scientists & Mathematicians, 2nd Edition, Pearson Education.
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applicationsto Computer Science, Tata McGraw Hill, 2002.

REFERENCE BOOKS:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatoricsand Graph Theory, 7th Edition, McGraw Hill Education (India) Private Limited.
2. Graph Theory with Applications to Engineering and Computer SciencebyNarsinghDeo.

COURSE OUTCOMES:

After completion of the course, students will be able to

- Apply mathematical logic to solve problems.
- Understand the concepts and perform the operations related to sets, relations andfunctions.
- Gain the conceptual background needed and identify structures of algebraic nature.
- Apply basic counting techniques to solve combinatorial problems.
- Formulate problems and solve recurrence relations.
- Apply Graph Theory in solving computer science problems

Online Learning Resources:http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0403	3	0	0	3	CIE	30 M
Course Title	:	Digital Electronics					SEE	70 M

COURSE OBJECTIVES:

• To understand all the concepts of Logic Gates and Boolean Functions.
• To learn about Combinational Logic and Sequential Logic Circuits.
• To design logic circuits using Programmable Logic Devices.

UNIT-I:

Basic Structure of Computer: Computer Types, Functional Units, Basic operational Concepts, Bus Structure, Software, Performance, Multiprocessors and Multicomputer.
Machine Instructions and Programs: Numbers, Arithmetic Operations and Programs, Instructions and Instruction Sequencing, Addressing Modes, Basic Input/output Operations, Stacks and Queues, Subroutines, Additional Instructions.

UNIT-II:

Arithmetic: Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations.

UNIT-III:

Number Systems & Code Conversion: Number Systems & Code conversion, Boolean Algebra & Logic Gates, Truth Tables, Universal Gates,Simplification of Boolean functions, SOP and POS methods – Simplification of Boolean functionsusing K-maps,Signed and Unsigned Binary Numbers.

UNIT-IV:

Combinational Circuits: Combinational Logic Circuits: Adders &Subtractors, Multiplexers, Demultiplexers, Encoders,Decoders, Programmable Logic Devices.

UNIT-V:

Sequential Circuits: Sequential Logic Circuits: RS, Clocked RS, D, JK, Master Slave JK, T Flip-Flops, Shift Registers,Types of Shift Registers, Counters, Ripple Counter, Synchronous Counters, Asynchronous Counters,Up-Down Counter.

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TEXT BOOKS:

1.M. Morris Mano, Michael D. Ciletti, Digital Design, Pearson Education, 5th Edition, 2013
2. Anil K. Maini, Digital Electronics: Principles, Devices and Applications, John Wiley & Sons, Ltd.,2007.
3. S.S. Bhatti, Rahul Malhotra, Digital Electronics, Wiley Publications,

REFERENCE BOOKS:

1. Thomas L. Floyd, Digital Fundamentals – A Systems Approach, Pearson, 2013.
2. Charles H. Roth, Fundamentals of Logic Design, Cengage Learning, 5th Edition, 2004.
3. D.A.Godse, A.P.Godse, Digital Electronics, Technical Publications.
4. A.Anand Kumar, Fundamentals of Digital Circuits, 2nd Edition.
5. S.Salivahanan, S.Arivazhagan, Digital Circuits and Design, 5th Edition, Oxford University Press.

COURSE OUTCOMES:

After Completion of this course, the student will be able to:

- Design any Logic circuit using basic concepts of Boolean Algebra.
- Design any Logic circuit using basic concepts of PLDs.

Online Learning Resources:NPTEL, SWAYAM

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0501T	3	0	0	3	CIE	30 M
Course Title	:	Advanced Data Structures & Algorithms					SEE	70 M

COURSE OBJECTIVES:

Learn asymptotic notations, and analyze the performance of different algorithms.

• Understand and implement various data structures.

• Learn and implement greedy, divide and conquer, dynamic programming and backtracking algorithms using relevant data structures.

• Understand non-deterministic algorithms, polynomial and non-polynomial problems

UNIT-I:

Trees Part-I: Binary Search Trees: Definition, Insertion into a Binary Search Tree, Deletion from a Binary Search Tree, Drawbacks AVL Trees: Definition, Retrieval from an AVL Search Tree, Insertion into an AVL Search Tre LL rotation, LR rotation, RR rotation, RL rotation, Applications.

UNIT-II:

B Trees: Definition, Insertion into B Trees, Deletion from B Trees.

Hash Tables: Introduction, Hash Structure, Hash functions, Linear Open Addressing, Chaining and Applications.

UNIT-III:

Introduction to Algorithms: Algorithms, Pseudocode for expressing algorithms, Performance Analysis-Space complexity, Timecomplexity, Asymptotic Notation- Big oh, Omega, Theta notation and Little oh notation, Polynomial VsExponential Algorithms, Average, Best and Worst Case Complexities, Analysing Recursive Programs.

Divide and conquer: General method, applications-Binary search, Finding Maximum and minimum, Quick sort, Merge sort, Strassen's matrix multiplication.

UNIT-IV:

Greedy method: General method, applications-Job sequencing with deadlines, knapsack problem, Minimum cost spanning trees, Single source shortest path problem.

Dynamic Programming: General method, applications- 0/1 knapsack problem, All pairs shortest path problem, Travelling salesperson problem, Reliability design.

UNIT-V:

Backtracking: General method, applications-n-queen problem, sum of subsets problem, graph coloring, Hamiltonian cycles.

Branch and Bound: Assignment Problem, Knapsack Problem, Travelling Salesman Problem.

Introduction to NP-Hard and NP-Complete problems: Basic Concepts

TEXT BOOKS:

1. Data Structures and algorithms: Concepts, Techniques and Applications, G A V Pai.

2. Fundamentals of Computer Algorithms, Ellis Horowitz, SartajSahni and Rajasekharam, Galgotiapublications Pvt. Ltd.

REFERENCE BOOKS:

1. Classic Data Structures by D. Samanta, 2005, PHI
2. Design and Analysis of Computer Algorithms by Aho, Hopcraft, Ullman 1998, PEA.
3. Introduction to the Design and Analysis of Algorithms by Goodman, Hedetniemi, TMG.

COURSE OUTCOMES:

After completion of the course, students will be able to

- Analyze the complexity of algorithms and apply asymptotic notations.
- Apply non-linear data structures and their operations.
- Understand and apply greedy, divide and conquer algorithms.
- Develop dynamic programming algorithms for various real-time applications.
- Illustrate Backtracking algorithms for various applications.

Online Learning Resources: https://www.tutorialspoint.com/advanced_data_structures/index.asp
http://peterindia.net/Algorithms.html

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0502T	3	0	0	3	CIE	30 M
Course Title	:	Object Oriented Programming Through Java					SEE	70 M

COURSE OBJECTIVES:

- To understand object oriented concepts and problem solving techniques
- To obtain knowledge about the principles of inheritance and polymorphism
- To implement the concept of packages, interfaces, exception handling and concurrencymechanism.
- To design the GUIs using applets and swing controls.

UNIT-I:

Introduction: Introduction to Object Oriented Programming, The History and Evolution of Java,Introduction to Classes, Objects, Methods, Constructors, this keyword, Garbage Collection, Data Types,Variables, Type Conversion and Casting, Arrays, Operators, Control Statements, Method Overloading,Constructor Overloading, Parameter Passing, Recursion, String Class and String handling methods.

UNIT-II:

Inheritance: Basics, Using Super, Creating Multilevel hierarchy, Method overriding, Dynamic Method Dispatch, Using Abstract classes, Using final with inheritance, Object class,

Packages: Basics, Finding packages and CLASSPATH, Access Protection, Importing packages.

Interfaces: Definition, Implementing Interfaces, Extending Interfaces, Nested Interfaces, Applying Interfaces, Variables in Interfaces

UNIT-III:

Exception handling - Fundamentals, Exception types, Uncaught exceptions, using try and catch, multiplecatch clauses, nested try statements, throw, throws and finally, built-in exceptions, creating own exceptionsubclasses.

Stream based I/O (java.io) – The Stream classes-Byte streams and Character streams, Reading consoleInput and Writing Console Output, File class, Reading and Writing Files, Random access file operations,The Console class, Serialization, Enumerations, Autoboxing, Generics.

UNIT-IV:

Multithreading: The Java thread model, Creating threads, Thread priorities, Synchronizing threads, Interthread communication.

The Collections Framework (java.util): Collections overview, Collection Interfaces, The Collectionclasses- Array List, Linked List, Hash Set, Tree Set, Priority Queue, Array Deque. Hashtable, Properties, Stack, Vector, String Tokenizer, Bit Set, Date, Calendar, Random, Formatter, Scanner.

UNIT-V:

Applet: Basics, Architecture, Applet Skeleton, requesting repainting, using the status window, passing parameters to applets

GUI Programming with Swings – The origin and design philosophy of swing, components and containers,layout managers, event handling, using a push button, jtextfield, jlabel and image icon, the swing buttons,jtext field, jscrollpane, jlist, jcombobox, trees, jtable, An overview of jmenubar, jmenu and jmenuitem,creating a main menu, showmessagedialog, showconfirmdialog, showinputdialog, showoptiondialog,jdialog, create a modeless dialog.

TEXT BOOKS:

1. Java The complete reference, 9th edition, Herbert Schildt, McGraw Hill Education (India) Pvt. Ltd.
2. Java How to Program, 10th Edition, Paul Dietel, Harvey Dietel, Pearson Education.

REFERENCE BOOKS:

1. Understanding Object-Oriented Programming with Java, updated edition, T. Budd, Pearson Education.
2. Core Java Volume – 1 Fundamentals, Cay S. Horstmann, Pearson Education.
3. Java Programming for core and advanced learners, Sagayaraj, Dennis, KarthikandGajalakshmi,University Press
4. Introduction to Java programming, Y. Daniel Liang, Pearson Education.
5. Object Oriented Programming through Java, P. Radha Krishna, University Press.
6. Programming in Java, S. Malhotra, S. Chaudhary, 2nd edition, Oxford Univ. Press.
7. Java Programming and Object-oriented Application Development, R.A. Johnson,Cengage Learning

COURSE OUTCOMES:

After completion of the course, students will be able to

- Solve real-world problems using OOP techniques.
- Apply code reusability through inheritance, packages and interfaces
- Solve problems using java collection framework and I/O classes.
- Develop applications by using parallel streams for better performance.
- Develop applets for web applications.
- Build GUIs and handle events generated by user interactions.

Online Learning Resources: https://www.w3schools.com/java/java_oop.asp
http://peterindia.net/JavaFiles.html

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0503T	3	0	0	3	CIE	30 M
Course Title	:	Software Engineering					SEE	70 M

UNIT-I:

Basic concepts in software engineering and software project management: Basic concepts: abstraction versus decomposition, evolution of software engineering techniques, Software development life cycle (SDLC) models: Iterative waterfall model, Prototype model, Evolutionary model, Spiral model, RAD model, Agile models, software project management: project planning, project estimation, COCOMO, Halstead's Software Science, project scheduling, staffing, Organization and team structure, risk management, configuration management.

UNIT-II:

Requirements analysis and specification: The nature of software, The Unique nature of Webapps, Software Myths, Requirements gathering and analysis, software requirements specification, Traceability, Characteristics of a Good SRS Document, IEEE 830 guidelines, representing complex requirements using decision tables and decision trees, overview of formal system development techniques, axiomatic specification, algebraic specification.

UNIT-III:

Software Design: Good Software Design, Cohesion and coupling, Control Hierarchy: Layering, Control Abstraction, Depth and width, Fan-out, Fan-in, Software design approaches, object oriented vs. function oriented design. Overview of SA/SD methodology, structured analysis, Data flow diagram, Extending DFD technique to real life systems, Basic Object oriented concepts, UML Diagrams, Structured design, Detailed design, Design review, Characteristics of a good user interface, User Guidance and Online Help, Mode-based vs Mode-less Interface, Types of user interfaces, Component-based GUI development, User interface design methodology: GUI design methodology.

UNIT-IV:

Coding and Testing: Coding standards and guidelines, code review, software documentation, Testing, Black Box Testing, White Box Testing, debugging, integration testing, Program Analysis Tools, system testing, performance testing, regression testing, Testing Object Oriented Programs.

UNIT-V:

Software quality, reliability, and other issues: Software reliability, Statistical testing, Software quality and management, ISO 9000, SEI capability maturity model (CMM), Personal software process (PSP), Six sigma, Software quality metrics, CASE and its scope, CASE environment, CASE support in software life cycle, Characteristics of software maintenance, Software reverse engineering, Software maintenance processes model, Estimation maintenance cost. Basic issues in any reuse program, Reuse approach, Reuse at organization level.

TEXT BOOKS:

1. Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.
2. Pressman R, "Software Engineering- Practioner Approach", McGraw Hill.

REFERENCE BOOKS:

1. Somerville, “Software Engineering”, Pearson 2.
2. Richard Fairley, “Software Engineering Concepts”, Tata McGraw Hill.
3. JalotePankaj, “An integrated approach to Software Engineering”, Narosa

COURSE OUTCOMES:

After completion of the course, students will be able to

- Obtain basic software life cycle activity skills.
- Design software requirements specifications for given problems.
- Implement structure, object oriented analysis and design for given problems.
- Design test cases for given problems.
- Apply quality management concepts at the application level.

Online Learning Resources:

https://nptel.ac.in/courses/106/105/106105182/
http://peterindia.net/SoftwareDevelopment.html

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to all branches of Engineering)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	20AMC9901	3	0	0	0	CIE	30 M
Course Title	:	Environmental Sciences					SEE	

COURSE OBJECTIVES:

• To make the students to get awareness on environment

• To understand the importance of protecting natural resources, ecosystems for future generationsand pollution causes due to the day to day activities of human life

• To save earth from the inventions by the engineers.

UNIT-I:

Multidisciplinary Nature of Environmental Studies: – Definition, Scope and Importance – Need forPublic Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associatedproblems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction– Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilizationof surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems –Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources,case studies – Food resources: World food problems, changes caused by agriculture and overgrazing,effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energyresources:

UNIT-II:

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumersand decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs andecological pyramids – Introduction, types, characteristic features, structure and function of the followingecosystem:

a. Forest ecosystem.

b. Grassland ecosystem

c. Desert ecosystem

d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation : Introduction 0 Definition: genetic, species and ecosystem diversity– Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social,ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a megadiversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife,man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situand Ex-situ conservation of biodiversity.

UNIT-III:

Environmental Pollution: Definition, Cause, effects and control measures of :

a. Air Pollution.

b. Water pollution

c. Soil pollution

d. Marine pollution

e. Noise pollution
f. Thermal pollution
g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role ofan individual in prevention of pollution – Pollution case studies – Disaster management: floods,earthquake, cyclone and landslides.

UNIT-IV:

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problemsrelated to energy – Water conservation, rain water harvesting, watershed management – Resettlement andrehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues andpossible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidentsand holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – EnvironmentProtection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control ofPollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement ofenvironmental legislation – Public awareness.

UNIT-V:

Human Population And The Environment: Population growth, variation among nations. Populationexplosion – Family Welfare Programmes. – Environment and human health – Human Rights – ValueEducation – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environmentand human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain –Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

TEXT BOOKS:

1. Text book of Environmental Studies for Undergraduate Courses ErachBharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education
3. S.AzeemUnnisa, "Environmental Studies" Academic Publishing Company
4. K.RaghavanNambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

REFERENCE BOOKS:

1. Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
2. M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall ofIndia Private limited
5. G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science,Prentice hall of India Private limited.

COURSE OUTCOMES:

At the end of the course, the student will be able to

• Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewableresources.

• Understand flow and bio-geo- chemical cycles and ecological pyramids.

• Understand various causes of pollution and solid waste management and related preventivemeasures.

• About the rainwater harvesting, watershed management, ozone layer depletion and waste landreclamation.

• Casus of population explosion, value education and welfare programmes.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0503P	0	0	3	1.5	CIE	30 M
Course Title	:	Software Engineering Lab					SEE	70 M

COURSE OBJECTIVES:

- To learn and implement the fundamental concepts of Software Engineering.
- To explore functional and non-functional requirements through SRS.
- To practice the various design diagrams through the appropriate tool.
- To learn to implement various software testing strategies.

Course Outcomes (CO):

After completion of the course, students will be able to

- Acquaint with historical and modern software methodologies
- Understand the phases of software projects and practice the activities of each phase
- Practice clean coding
- Take part in project management
- Adopt skills such as distributed version control, unit testing, integration testing, build management, and deployment

List of Experiments:

1. Draw the Work Breakdown Structure for the system to be automated
2. Schedule all the activities and sub-activities Using the PERT/CPM charts
3. Define use cases and represent them in use-case document for all the stakeholders of the system to be automated
4. Identify and analyze all the possible risks and its risk mitigation plan for the system to be automated
5. Diagnose any risk using Ishikawa Diagram (Can be called as Fish Bone Diagram or Cause& Effect Diagram)
6. Define Complete Project plan for the system to be automated using Microsoft Project Tool
7. Define the Features, Vision, Business objectives, Business rules and stakeholders in the vision document
8. Define the functional and non-functional requirements of the system to be automated by using Use cases and document in SRS document
9. Define the following traceability matrices :
    1. Use case Vs. Features
    2. Functional requirements Vs. Usecases
10. Estimate the effort using the following methods for the system to be automated:
    1. Function point metric
    2. Usecase point metric
11. Develop a tool which can be used for quantification of all the non-functional requirements
12. Write C/C++/Java/Python program for classifying the various types of coupling.
13. Write a C/C++/Java/Python program for classifying the various types of cohesion.

14. Write a C/C++/Java/Python program for object oriented metrics for design proposed by Chidamber and Kremer. (Popularly called CK metrics)
15. Convert the DFD into appropriate architecture styles.
16. Draw a complete class diagram and object diagrams using Rational tools
17. Define the design activities along with necessary artifacts using Design Document.
18. Reverse Engineer any object-oriented code to an appropriate class and object diagrams.
19. Test a piece of code that executes a specific functionality in the code to be tested and asserts a certain behavior or state using Junit.
20. Test the percentage of code to be tested by unit test using any code coverage tools
21. Define appropriate metrics for at least 3 quality attributes for any software application of your interest.
22. Define a complete call graph for any C/C++ code. (Note: The student may use any tool that generates call graph for source code)

References:

1. Software Engineering? A Practitioner‟s Approach, Roger S. Pressman, 1996, MGH.
2. Software Engineering by Ian Sommerville, Pearson Edu, 5th edition, 1999
3. An Integrated Approach to software engineering by PankajJalote , 1991 Narosa

Online Learning Resources/Virtual Labs:

http://vlabs.iitkgp.ac.in/se/

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0501P	0	0	3	1.5	CIE	30 M
Course Title	:	Advanced Data Structures and Algorithms Lab					SEE	70 M

COURSE OBJECTIVES:

- Learn data structures for various applications.
- Implement different operations of data structures by optimizing the performance.
- Develop applications using Greedy, Divide and Conquer, dynamic programming.
- Implement applications for backtracking algorithms using relevant data structures

List of Experiments:

1. Write a program to implement the following operations on Binary Search Tree:
a) Insert b) Delete c) Search d) Display
2. Write a program to perform a Binary Search for a given set of integer values.
3. Write a program to implement Splay trees.
4. Write a program to implement Merge sort for the given list of integer values.
5. Write a program to implement Quicksort for the given list of integer values.
6. Write a program to find the solution for the knapsack problem using the greedy method.
7. Write a program to find minimum cost spanning tree using Prim's algorithm
8. Write a program to find minimum cost spanning tree using Kruskal's algorithm
9. Write a program to find a single source shortest path for a given graph.
10. Write a program to find the solution for job sequencing with deadlines problems.
11. Write a program to find the solution for a 0-1 knapsack problem using dynamic programming.
12. Write a program to solve Sum of subsets problem for a given set of distinct numbers usingbacktracking.
13. Implement N Queen's problem using Back Tracking

REFERENCE BOOKS:

1. Y Daniel Liang, "Introduction to Programming using Python", Pearson.
2. Benjamin Baka, David Julian, "Python Data Structures and Algorithms", Packt Publishers,2017.
3. Rance D. Necaise, "Data Structures and Algorithms using Python", Wiley Student Edition.

COURSE OUTCOMES:

After completion of the course, students will be able to

- Understand and apply data structure operations.
- Understand and apply non-linear data structure operations.
- Apply Greedy, divide and conquer algorithms.
- Develop dynamic programming algorithms for various real-time applications.
- Illustrate and apply backtracking algorithms, further able to understand non-deterministicAlgorithms

Online Learning Resources/Virtual Labs:http://cse01-iiith.vlabs.ac.in/
http://peterindia.net/Algorithms.html

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0502P	0	0	3	1.5	CIE	30 M
Course Title	:	Object Oriented Programming Through Java Lab					SEE	70 M

COURSE OBJECTIVES:

- To introduce the concepts of Java.
- To Practice object-oriented programs and build java applications.
- To implement java programs for establishing interfaces.
- To implement sample programs for developing reusable software components.

List of Experiments:

Week-1

a. Installation of Java software, study of any Integrated development environment, Use Eclipse orNetbeans platform and acquaint with the various menus. Create a test project, add a test class and run
it.

See how you can use auto suggestions, auto fill. Try code formatter and code refactoring likerenaming variables, methods and classes. Try debug step by step with java program to find primenumbers between 1 to n.

b. Write a Java program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a,b, c and use the quadratic formula.

c. Develop a Java application to generate Electricity bills. Create a class with the following members: Consumer no., consumer name, previous month reading, current month reading, type of EB connection(i.e domestic or commercial). Commute the bill amount using the following tariff.If the type of the EB connection is domestic, calculate the amount to be paid as follows:

- First 100 units - Rs. 1 per unit
- 101-200 units - Rs. 2.50 per unit
- 201 -500 units - Rs. 4 per unit
- > 501 units - Rs. 6 per unit

If the type of the EB connection is commercial, calculate the amount to be paid as follows:

- First 100 units - Rs. 2 per unit
- 101-200 units - Rs. 4.50 per unit
- 201 -500 units - Rs. 6 per unit
- > 501 units - Rs. 7 per unit

d. Write a Java program to multiply two given matrices.

Week-2

a. Write Java program on use of inheritance, preventing inheritance using final, abstract classes.

b. Write Java program on dynamic binding, differentiating method overloading and overriding.

c. Develop a java application to implement currency converter (Dollar to INR, EURO to INR, Yen)using Interfaces.

Week-3

a. Write Java program that inputs 5 numbers, each between 10 and 100 inclusive. As each number is read, display it only if it's not a duplicate of any number already read display the complete set ofunique values input after the user enters each new value.

b. Write a Java Program to create an abstract class named Shape that contains two integers and anempty method named print Area(). Provide three classes named Rectangle, Triangle and Circle suchthat each one of the classes extends the class Shape. Each one of the classes contains only themethod print Area () that prints the area of the given shape.

c. Write a Java program to read the time intervals (HH:MM) and to compare system time if thesystem Time between your time intervals print correct time and exit else try again to repute thesame thing. By using StringToknizer class.

Week-4

a. Write a Java program to implement user defined exception handling.

b. Write java program that inputs 5 numbers, each between 10 and 100 inclusive. As each numberis read display it only if it‘s not a duplicate of any number already read. Display the complete setof unique values input after the user enters each new value.

Week-5

a. Write a Java program that creates a user interface to perform integer division. The user enterstwo numbers in the text fields, Num1 and Num2. The division of Num1 and Num2 is displayedin the Result field when the Divide button is clicked. If Num1 and Num2 were not integers, theprogram would throw a Number Format Exception. If Num2 were zero, the program would throwan Arithmetic Exception Display the exception in a message dialog box.

b. Write a Java program that creates three threads. First thread displays ―Good Morning‖ everyone second, the second thread displays ―Hello‖ every two seconds and the third thread displays―Welcome‖ every three seconds.

Week-6

a. Write a java program to split a given text file into n parts. Name each part as the name of theoriginal file followed by .part where n is the sequence number of the part file.

b. Write a Java program that reads a file name from the user, displays information about whetherthe file exists, whether the file is readable, or writable, the type of file and the length of the filein bytes.

Week-7

a. Write a java program that displays the number of characters, lines and words in a text file.

b. Write a java program that reads a file and displays the file on the screen with line number beforeeach line.

Week-8

a. Write a Java program that correctly implements the producer-consumer problem using theconcept of inter thread communication.

b. Develop a Java application for stack operation using Buttons and JOptionPane input andMessage dialog box.

c. Develop a Java application to perform Addition, Division, Multiplication and subtraction usingthe JOptionPane dialog Box and Textfields.

Week-9

a. Develop a Java application for the blinking eyes and mouth should open while blinking.

b. Develop a Java application that simulates a traffic light. The program lets the user select one ofthe three lights: Red, Yellow or Green with radio buttons. On selecting a button an appropriatemessage with ―STOP‖ or ―READY‖ or ‖GO‖ should appear above the buttons in the selected color.Initially, there is no message shown.

Week-10

a. Develop a Java application to implement the opening of a door while opening man shouldpresent before hut and closing man should disappear.

b. Develop a Java application by using JtextField to read decimal values and converting a decimalnumber into a binary number then print the binary value in another JtextField.

Week-11

a. Develop a Java application that handles all mouse events and shows the event name at the centerof the window when a mouse event is fired. Use adapter classes.

b. Develop a Java application to demonstrate the key event handlers.

Week-12

a. Develop a Java application to find the maximum value from the given type of elements using ageneric function.

b. Develop a Java application that works as a simple calculator. Use a grid layout to arrange buttonsfor the digits and for the +, -,*, % operations. Add a text field to display the result.

c . Develop a Java application for handling mouse events.

REFERENCE BOOKS:

1. P. J. Deitel, H. M. Deitel, “Java for Programmers”, Pearson Education, PHI, 4th Edition, 2007.
2. P. Radha Krishna, “Object Oriented Programming through Java”, Universities Press, 2nd Edition,2007
3. Bruce Eckel, “Thinking in Java”, Pearson Education, 4th Edition, 2006.
4. Sachin Malhotra, Saurabh Chaudhary, “Programming in Java”, Oxford University Press, 5th Edition, 2010.

COURSE OUTCOMES:

After completion of the course, students will be able to

- Recognize the Java programming environment.
- Develop efficient programs using multithreading.
- Design reliable programs using Java exception handling features.
- Extend the programming functionality supported by Java.
- Select appropriate programming constructs to solve a problem.

Online Learning Resources/Virtual Labs:https://java-iitd.vlabs.ac.in/
http://peterindia.net/JavaFiles.html

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester CSE)

Course Category	:	Skill Oriented Course	L	T	P	C	Exam	3 Hrs
Course Code	:	20ASC0502	1	0	2	2	CIE	30 M
Course Title	:	Web Application Development					SEE	

COURSE OBJECTIVES:

• Learn website development using HTML, CSS, JavaScript.
• Understand the concepts of responsive web development using the bootstrap framework
• Make use of the JQueryjavascript library to provide interactiveness to the websites.
• Discover how to use Google Charts to provide a better way to visualize data on a website
• Learn Content Management Systems to speed the development process

List of Experiments:

Activities:

Module - 1:

HTML: What is a browser?, What is HTML?, Elements and Tags, Basic HTML5 structure, Metadata,
<title>, Adding favicon, Comments, headings
Task: Create a Basic HTML document

Module - 2:

HTML (continued): Block-Level Elements & Inline Elements, Links (Understand Absolute vs Relative
paths), Lists, Images, iframe (embed youtube video)
Task: Create your Profile Page

Module - 3:

HTML (continued): Tables: <table>, <tr>, <th>, <td>, Attributes for each Table element
Task: Create a Class Timetable (to merge rows/columns, use rowspan/colspan)

Module - 4:

HTML (continued): Form Elements: <input>, <select>, <textarea>, <button>, Attributes for each Form element
Task: Create a Student Hostel Application Form

Module - 5:

Cascading Style Sheets (CSS): CSS Properties, Types of CSS, Selectors, box model, Pseudo-elements,z-index
Task: Make the Hostel Application Form designed in Module -4 beautiful using CSS (add colors, backgrounds, change font properties, borders, etc.)

Module - 6:

Bootstrap - CSS Framework: Layouts (Containers, Grid system), Forms, Other Components
Task: Style the Hostel Application Form designed in Module-5still more beautiful using Bootstrap CSS (Re-size browser and check how the webpage displays in mobile resolution)

Module - 7:

HTTP & Browser Developer Tools: Understand HTTP Headers (Request & Response Headers), URL&its Anatomy, Developer Tools: Elements/Inspector, Console, Network, Sources, performance,Application Storage.

Task:Analyse various HTTP requests (initiators, timing diagrams, responses) and identify problems ifany.

Module - 8:

Javascript: Variables, Data Types, Operators, Statements, Objects, Functions, Events & Event Listeners, DOM.

Task: Design a simple calculator using JavaScript to perform sum, product, difference, and quotientoperations:

Module - 9:

Dynamic HTML with JavaScript: Manipulate DOM, Error Handling, Promises, async/await, Modules.

Task:Design& develop a Shopping Cart Application with features including Add Products, Update Quantity, Display Price(Sub-Total & Total), Remove items/products from the cart.

Module - 10:

JQuery - A Javascript Library: Interactions, Widgets, Effects, Utilities, Ajax using JQuery.

Task: Validate all Fields and Submit the Hostel Application Form designed in Module-6 using JQuery

Module - 11:

Google Charts: Understand the Usage of Pie chart, Bar Chart, Histogram, Area & Line Charts, GanttCharts.

Task: Develop an HTML document to illustrate each chart with real-time examples.

Module - 12:

Open Source CMS (Content Management System): What is a CMS?, Install CMS, Themes, Plugins.

Task: Develop an E-learning website using any CMS(for example WordPress)

REFERENCE BOOKS:

1. Deitel and Deitel and Nieto, ―Internet and World Wide Web - How to Program‖, Prentice Hall, 5th Edition, 2011.
2. Web Technologies, Uttam K. Roy, Oxford Higher Education., 1st edition, 10th impression, 2015.
3. Stephen Wynkoop and John Burke ―Running a Perfect Website‖, QUE, 2nd Edition,1999.
4. Jeffrey C and Jackson, ―Web Technologies A Computer Science PerspectivePearsonEducation, 2011.
5. Gopalan N.P. and Akilandeswari J., ―Web Technology, Prentice Hall of India, 2011.

COURSE OUTCOMES:

After completion of the course, students will be able to

- Construct web sites with valid HTML, CSS, JavaScript
- Create responsive Web designs that work on phones, tablets, or traditional laptops and widescreen monitors.
- Develop websites using jQuery to provide interactivity and engaging user experiences
- Embed Google chart tools in a website for better visualization of data.
- Design and develop web applications using Content Management Systems like WordPress

Online Learning Resources/Virtual Labs:

a. HTML: https://html.spec.whatwg.org/multipage/

b. HTML: https://developer.mozilla.org/en-US/docs/Glossary/HTML5
c. CSS: https://www.w3.org/Style/CSS/
d. Bootstrap - CSS Framework: https://getbootstrap.com/
e. Browser Developer Tools:
https://developer.mozilla.org/enUS/docs/Learn/Common_questions/What_are_browser_developer_tools
f. Javascript: https://developer.mozilla.org/en-US/docs/Web/JavaScript
g. JQuery: https://jquery.com
h. Google Charts: https://developers.google.com/chart
i. Wordpress: https://wordpress.com

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Basic Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5409	3	0	0	3	CIE	30 M
Course Title	:	Probability and Statistics					SEE	70 M

Course Objectives:
1) To familiarize the students with the foundations of probability and statistical methods
2) To impart probability

Unit 1: Descriptive statistics and methods for data science 10 hrs

Data science, Statistics Introduction, Population vs Sample, Collection of data, primary andsecondary data, Type of variable: dependent and independent Categorical and Continuousvariables, Data visualization, Measures of Central tendency, Measures of Variability (spread orvariance) Skewness Kurtosis, correlation, correlation coefficient, rank correlation, regressioncoefficients, principle of least squares, method of least squares, regression lines.

Learning Outcomes:
At the end of this unit, the student will be able to
- summarize the basic concepts of data science and its importance in engineering (L2)
- analyze the data quantitatively or categorically, measure of averages, variability (L4)
- adopt correlation methods and principle of least squares, regression analysis (L5)

UNIT 2: Probability 8 hrs

Probability, probability axioms, addition law and multiplicative law of probability, conditionalprobability, Baye's theorem, random variables (discrete and continuous), probability densityfunctions, properties, mathematical expectation.

Learning Outcomes:
At the end of this unit, the student will be able to
- define the terms trial, events, sample space, probability, and laws of probability (L1)
- make use of probabilities of events in finite sample spaces from experiments (L3)
- apply Baye's theorem to real time problems (L3)
- explain the notion of random variable, distribution functions and expected value(L2)

UNIT 3: Probability distributions 6 hrs

Probability distribution - Binomial, Poisson approximation to the binomial distribution andnormal distribution-their properties.

Learning Outcomes:
At the end of this unit, the student will be able to
- apply Binomial and Poisson distributions for real data to compute probabilities,theoretical frequencies (L3)
- interpret the properties of normal distribution and its applications (L2)

Unit4: Estimation and Testing of hypothesis, large sample tests 8 hrs

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of nullhypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, twotypes of errors and power of the test. Large Sample Tests: Test for single proportion, differenceof proportions, test for single mean and difference of means. Confidence interval for parametersin one sample and two sample problems

Learning Outcomes:

At the end of this unit, the student will be able to

- explain the concept of estimation, interval estimation and confidence intervals (L2)
- apply the concept of hypothesis testing for large samples (L4)

Unit 5: Small sample tests 8 hrs

Student t-distribution (test for single mean, two means and paired t-test), testing of equality ofvariances (F-test), $\chi 2$ - test for goodness of fit, $\chi 2$ - test for independence of attributes.

Learning Outcomes:

At the end of this unit, the student will be able to

- apply the concept of testing hypothesis for small samples to draw the inferences (L3)
- estimate the goodness of fit (L5)

Text Books:

1. Miller and Freunds, Probability and Statistics for Engineers,7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

Reference Books:

1. S. Ross, a First Course in Probability, Pearson Education India, 2002.
2. W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.

Course Learning Outcomes:

Upon successful completion of this course, the student should be able to

- make use of the concepts of probability and their applications (L3)
- apply discrete and continuous probability distributions (L3)
- classify the concepts of data science and its importance (L4)
- interpret the association of characteristics and through correlation and regression tools (L4)
- design the components of a classical hypothesis test (L6)
- infer the statistical inferential methods based on small and large sampling tests (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0504T	3	0	0	3	CIE	30 M
Course Title	:	Database Management Systems					SEE	70 M

COURSE OBJECTIVES:

This course is designed to:

• Train in the fundamental concepts of database management systems, database modeling and design, SQL, PL/SQL and system implementation techniques.

• Enable students to model ER diagrams for any customized application

• Inducting appropriate strategies for optimization of queries.

• Provide knowledge on concurrency techniques

• Demonstrate the organization of Databases.

UNIT-I:

Introduction: Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Relational Databases, Database Design, Data Storage and Querying, Transaction Management, Database Architecture, Data Mining and Information Retrieval, Specialty Databases, Database users and Administrators,

Database Design and the E-R Model: Overview of the Design Process, The Entity-Relationship Model, Constraints, Removing Redundant Attributes in Entity Sets, Entity-Relationship Diagrams, Reduction to Relational Schemas, Entity-Relationship Design Issues.

UNIT-II:

Relational Database Design: Features of Good Relational Designs, Atomic Domains and First Normal Form, Decomposition Using Functional Dependencies, Functional-Dependency Theory, Algorithms for Decomposition, Decomposition Using Multivalued Dependencies, More Normal Forms.

Introduction to Relational Model: Structure of Relational Databases, Database Schema, Keys, Schema Diagrams, Relational Query Languages, Relational Operations

UNIT-III:

Introduction to SQL: Overview of the SQL Query Language, SQL Data Definition, Basic Structure of SQL Queries, Additional Basic Operations, Set Operations, Null Values, Aggregate Functions, Nested Sub-queries, Modification of the Database. Intermediate SQL: Joint Expressions, Views, Transactions, Integrity Constraints, SQL Data types and schemas, Authorization.

Advanced SQL: Accessing SQL from a Programming Language, Functions and Procedures, Triggers, Recursive Queries, OLAP, Formal relational query languages.

UNIT-IV:

Query Processing: Overview, Measures of Query cost, Selection operation, sorting, Join Operation, other operations, Evaluation of Expressions.

Query optimization: Overview, Transformation of Relational Expressions, Estimating statistics of Expression results, Choice of Evaluation Plans, Materialized views, Advanced Topics in Query Optimization.

UNIT-V:

Transaction Management:

Transactions: Concept, A Simple Transactional Model, Storage Structures, Transaction Atomicity and Durability, Transaction Isolation, Serializability, Isolation and Atomicity, Transaction Isolation Levels, Implementation of Isolation Levels, Transactions as SQL Statements.

Concurrency Control: Lock-based Protocols, Deadlock Handling, Multiple granularity, Timestamp-based Protocols, and Validation-based Protocols.

Recovery System: Failure Classification, Storage, Recovery and Atomicity, Recovery Algorithm, Buffer Management, Failure with Loss of Nonvolatile Storage, Early Lock Release and Logical Undo Operations.

TEXT BOOKS:

1. A.Silberschatz, H.F.Korth, S.Sudarshan, “Database System Concepts”,6/e, TMH 2019

REFERENCE BOOKS:

1. Database Management System, 6/e RamezElmasri, Shamkant B. Navathe, PEA
2. Database Principles Fundamentals of Design Implementation and Management, Carlos Coronel, Steven Morris, Peter Robb, Cengage Learning.
3. Database Management Systems, 3/e, Raghurama Krishnan, Johannes Gehrke,TMH

COURSE OUTCOMES:

After completion of the course, students will be able to

- Design a database for a real-world information system
- Define transactions that preserve the integrity of the database
- Generate tables for a database
- Organize the data to prevent redundancy
- Pose queries to retrieve the information from the database.

Online Learning Resources:

https://onlinecourses.nptel.ac.in/noc21_cs04/preview

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0506T	3	0	0	3	CIE	30 M
Course Title	:	Operating Systems					SEE	70 M

COURSE OBJECTIVES:

The course is designed to

- Understand basic concepts and functions of operating systems
- Understand the processes, threads and scheduling algorithms.
- Provide good insight on various memory management techniques
- Expose the students with different techniques of handling deadlocks
- Explore the concept of file-system and its implementation issues
- Familiarize with the basics of the Linux operating system
- Implement various schemes for achieving system protection and security

UNIT-I:

Operating Systems Overview: Introduction, Operating system functions, Operating systems operations, Computing environments, Open-Source Operating Systems

System Structures: Operating System Services, User and Operating-System Interface, systems calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Operating system debugging, System Boot.

UNIT-II:

Process Concept: Process scheduling, Operations on processes, Inter-process communication, Communication in client server systems.

Multithreaded Programming: Multithreading models, Thread libraries, Threading issues, Examples.

Process Scheduling: Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling, Thread scheduling, Examples.

Inter-process Communication: Race conditions, Critical Regions, Mutual exclusion with busy waiting, Sleep and wakeup, Semaphores, Mutexes, Monitors, Message passing, Barriers, Classical IPC Problems - Dining philosophers problem, Readers and writers problem.

UNIT-III:

Memory-Management Strategies: Introduction, Swapping, Contiguous memory allocation, Paging, Segmentation, Examples.

Virtual Memory Management: Introduction, Demand paging, Copy on-write, Page replacement, Frame allocation, Thrashing, Memory-mapped files, Kernel memory allocation, Examples.

UNIT-IV:

Deadlocks: Resources, Conditions for resource deadlocks, Ostrich algorithm, Deadlock detection And recovery, Deadlock avoidance, Deadlock prevention.

File Systems: Files, Directories, File system implementation, management and optimization.

Secondary-Storage Structure: Overview of disk structure, and attachment, Disk scheduling, RAID structure, Stable storage implementation.

UNIT-V:

System Protection: Goals of protection, Principles and domain of protection, Access matrix, Access control, Revocation of access rights.

System Security: Introduction, Program threats, System and network threats, Cryptography as a security, User authentication, implementing security defenses, firewalling to protect systems and networks, Computer security classification.

TEXT BOOKS:

1. Silberschatz A, Galvin P B, and Gagne G, Operating System Concepts, 9th edition, Wiley, 2016.
2. Tanenbaum A S, Modern Operating Systems, 3rd edition, Pearson Education, 2008.
(Topics: Inter-process Communication and File systems.)

REFERENCE BOOKS:

1. Tanenbaum A S, Woodhull A S, Operating Systems Design and Implementation, 3rd edition, PHI, 2006.
2. Dhamdhere D M, Operating Systems A Concept Based Approach, 3rd edition, Tata McGraw-Hill, 2012.
3. Stallings W, Operating Systems -Internals and Design Principles, 6th edition, Pearson Education, 2009
4. Nutt G, Operating Systems, 3rd edition, Pearson Education, 2004

COURSE OUTCOMES:

After completion of the course, students will be able to

- Realize how applications interact with the operating system
- Analyze the functioning of a kernel in an Operating system.
- Summarize resource management in operating systems
- Analyze various scheduling algorithms
- Examine concurrency mechanism in Operating Systems
- Apply memory management techniques in the design of operating systems
- Understand the functionality of the file system
- Compare and contrast memory management techniques.
- Understand deadlock prevention and avoidance.
- Perform administrative tasks on Linux based systems..

Online Learning Resources:

https://nptel.ac.in/courses/106/106/106106144/
http://peterindia.net/OperatingSystems.html

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0505T	3	0	0	3	CIE	30 M
Course Title	:	Computer Organization & Architecture					SEE	70 M

COURSE OBJECTIVES:

- To learn the fundamentals of computer organization and its relevance to classical and modernproblems of computer design.
- To understand the structure and behavior of various functional modules of a computer.
- To learn the techniques that computers use to communicate with I/O devices
- To acquire the concept of pipelining and exploitation of processing speed.
- To learn the basic characteristics of multiprocessors
- To understand basics of 8086 Microprocessor and 8051 Microcontroller.
- To understand architecture of 8086 Microprocessor and 8051 Microcontroller.
- To learn Assembly Language Programming of 8086 and 8051.

Unit-I

Processing Unit: Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control, and Multi programmed Control.

UNIT-II:

The Memory System: Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory ManagementRequirements, Secondary Storage.

Input/Output Organization: Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces.

UNIT-III:

Pipelining: Basic Concepts, Data Hazards, Instruction Hazards, Influence on Instruction Sets.

Large Computer Systems: Forms of Parallel Processing, Array Processors, The Structure of GeneralPurpose multiprocessors, Interconnection Networks.

UNIT-IV:

Microprocessors - I: 8085 microprocessor Review (brief details only), 8086 microprocessor, Functional Diagram, register organization 8086, Flag register of 8086 and its functions, Addressing modes of 8086, Pin diagram of 8086, Minimum mode & Maximum mode operation of 8086, Interrupts in 8086, Instruction set of 8086.

UNIT-V:

Interfacing & Microcontrollers : Overview of 8051 microcontroller, Architecture, I/O ports and Memory organization, addressing modes and instruction set of 8051(Brief details only), Simple Programs.

TEXT BOOKS:

1. Carl Hamacher, ZvonkoVranesic, SafwatZaky, "Computer Organization", 5th Edition, McGraw Hill Education, 2013.
2. "Computer Organization and Architecture: Designing for Performance" by William Stallings.
3. "Microprocessors and Interfacing" by Douglas V. Hall, Revised Second Edition, McGraw Hill Education.
4. "The 8051 Microcontroller: Architecture, Programming, and Applications" by Kenneth J. Ayala, 2nd Edition, West Publications.
5. A.K.Ray, K.M.Bhurchandi,"Advanced Microprocessors and Peripherals", Tata McGraw HillPublications,2000.

REFERENCE BOOKS:

1. M.Morris Mano, "Computer System Architecture", 3rd Edition, Pearson Education.
2. Themes and Variations, Alan Clements, "Computer Organization and Architecture", CENGAGELearning.
3. SmrutiRanjanSarangi, "Computer Organization and Architecture", McGraw Hill Education.
4. John P.Hayes, "Computer Architecture and Organization", McGraw Hill EducationLearning
5. N.Sentil Kumar, M.Saravanan, S.Jeevananthan, "Microprocessors and Microcontrollers", Oxford University Press,2010.
6. Krishna Kant, "Microprocessors and Microcontrollers", PHI Publications, 2010.

COURSE OUTCOMES:

After completion of the course, students will be able to

- Understand computer architecture concepts related to the design of modern processors, memories and I/Os
- Identify the hardware requirements for cache memory and virtual memory
- Design algorithms to exploit pipelining and multiprocessors
- Understand the importance and trade-offs of different types of memories.
- Identify pipeline hazards and possible solutions to those hazards
- Design and develop any application using 8086 Microprocessor.
- Design and develop any application using 8051 Microcontroller.

Online Learning Resources: https://nptel.ac.in/courses/106/103/106103068/

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0507T	3	0	0	3	CIE	30 M
Course Title	:	Computer Networks					SEE	70 M

Course Objectives:
This course is designed to:

- Understand the basic concepts of Computer Networks.
- Introduce the layered approach for design of computer networks
- Familiarize with the applications of Internet
- Explore the network protocols used in Internet environment
- Explain the format of headers of IP, TCP and UDP
- Elucidate the design issues for a computer network

Unit – 1: Computer Networks and the Internet
What is the Internet?, The Network Edge, The Network Core, Delay, Loss, and Throughput in Packet-Switched Networks, Protocol Layers and their Service Models, Networks under attack, History of Computer Networking and the Internet

Learning Outcomes:
At the end of the unit, students will be able to:

- Enumerate the hardware components of a computer network (L1)
- List the layers of a Computer Network (L1)
- Identify the performance metrics of a computer network (L3)

Unit – 2: Application Layer
Principles of Network Applications, The web and HTTP, File transfer: FTP, Electronic mail in the internet, DNS-The Internet's Directory Service, Peer-to-Peer Applications

Learning outcomes:
At the end of the unit, students will be able to:

- Design new applications of a computer network (L6)
- Analyze the application protocols (L4)
- Extend the existing applications (L2)

Unit – 3 : Transport Layer
Introduction and Transport-Layer Services, Multiplexing and De-multiplexing, Connectionless Transport: UDP, Principles of Reliable Data transfer, Connection-Oriented Transport: TCP, Principles of Congestion Control, TCP Congestion Control

Learning outcomes:
At the end of the unit, students will be able to:

- Design Congestion control algorithms (L6)
- Select the appropriate transport protocol for an application (L3)
- Identify the transport layer services (L3)

Unit – 4 :The Network Layer
Introduction, Virtual Circuit and Datagram Networks, The Internet Protocol(IP): Forwarding and Addressing in the Internet, Routing Algorithms, Routing in the Internet, Broadcast and Multicast Routing

Learning outcomes:
At the end of the unit, students will be able to:
- Compare routing algorithms (L4)
- Design routing algorithms (L6)
- Extend the existing routing protocols (L2)

Unit – 5: The Layer: Links, Access Networks, and LANs
Introduction to the Link Layer, Error-Detection and Correction Techniques, Multiple Access Links and Protocols, Switched Local Area Networks, Link Virtualization: A Network as a Link Layer, Data Center Networking, Retrospective: A Day in the Life of a Web Page Request

Learning outcomes:
At the end of the unit, students will be able to:
- Compare medium access protocols (L4)
- Classify the computer networks (L2)
- Design a Data Centre for an organization (L6)

Course Outcomes:
Upon completion of the course, the students should be able to:
1. Identify the software and hardware components of a Computer network (L3)
2. Develop new routing, and congestion control algorithms (L3)
3. Assess critically the existing routing protocols (L5)
4. Explain the functionality of each layer of a computer network (L2)
5. Choose the appropriate transport protocol based on the application requirements (L3)

Text Books:
1. James F. Kurose, Keith W. Ross, “Computer Networking: A Top-Down Approach”, 6th edition, Pearson, 2019.

References:
1. Forouzan, “Datacommunications and Networking”, 5th Edition, McGraw Hill Publication.
2. Andrew S.Tanenbaum, David j.wetherall, “Computer Networks”, 5th Edition, PEARSON.
3. YouluZheng, ShakilAkthar, “Networks for Computer Scientists and Engineers”, Oxford Publishers, 2016.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0504P	0	0	3	1.5	CIE	30 M
Course Title	:	Database Management Systems Laboratory					SEE	70 M

COURSE OBJECTIVES:

- To implement the basic knowledge of SQL queries and relational algebra.
- To construct database models for different database applications.
- To apply normalization techniques for refining of databases.
- To practice various triggers, procedures, and cursors usingPL/SQL.
- To design and implementation of a database for an organization

List of Experiments:

Week-1: CREATION OF TABLES

1. Create a table called Employee with the following structure.

Name	Type
Empno	Number
Ename	Varchar2(20)
Job	Varchar2(20)
Mgr	Number
Sal	Number

a. Add a column commission with domain to the Employee table.
b. Insert any five records into the table.
c. Update the column details of job
d. Rename the column of Employ table using alter command.
e. Delete the employee whose empno is19.

2. Create department table with the following structure.

Name	Type
Deptno	Number
Deptname	Varchar2(20)
location	Varchar2(20)

a. Add column designation to the department table.
b. Insert values into thetable.
c. List the records of emp table grouped bydeptno.
d. Update the record where deptno is9.
e. Delete any column data from thetable

3. Create a table called Customertable

Name	Type
Cust name	Varchar2(20)
Cust street	Varchar2(20)
Cust city	Varchar2(20)

a. Insert records into thetable.
b. Add salary column to thetable.
c. Alter the table columndomain.
d. Drop salary column of the customertable.
e. Delete the rows of customer table whose ust_city is ‘hyd’.
f. Create a table called branchtable.

Name	Type
Branch name	Varchar2(20)
Branch city	Varchar2(20)
asserts	Number

4. Increase the size of data type for asserts to the branch.
a. Add and drop a column to the branch table.
b. Insert values to the table.
c. Update the branch name column
d. Delete any two columns from the table

5. Create a table called sailor table

Name	Type
Sid	Number
Sname	Varchar2(20)
rating	Varchar2(20)

a. Add column age to the sailor table.
b. Insert values into the sailor table.
c. Delete the row with rating>8.
d. Update the column details of sailor.
e. Insert null values into the table.

6. Create a table called reserves table

Name	Type
Boat id	Integer
sid	Integer
day	Integer

a. Insert values into the reservestable.
b. Add column time to the reservestable.
c. Alter the column day data type todate.
d. Drop the column time in thetable.
e. Delete the row of the table with somecondition.

Week-2: QUERIES USING DDL AND DML

1. a. Create a user and grant all permissions to theuser.
b. Insert the any three records in the employee table and use rollback. Check theresult.
c. Add primary key constraint and not null constraint to the employeetable.
d. Insert null values to the employee table and verify theresult.
2. a. Create a user and grant all permissions to the user.
b. Insert values in the department table and use commit.
c. Add constraints like unique and not null to the department table.
d. Insert repeated values and null values into the table.
3. a. Create a user and grant all permissions to the user.
b. Insert values into the table and use commit.
c. Delete any three records in the department table and use rollback.
d. Add constraint primary key and foreign key to the table.
4. a. Create a user and grant all permissions to theuser.
b. Insert records in the sailor table and usecommit.
c. Add save point after insertion of records and verify save point.
d. Add constraints not null and primary key to the sailortable.
5. a. Create a user and grant all permissions to theuser.
b. Use revoke command to remove userpermissions.
c. Change password of the user created.
d. Add constraint foreign key and not null.
6. a. Create a user and grant all permissions to theuser.
b. Update the table reserves and use savepointandrollback.
c. Add constraint primary key, foreign key and not null to the reserves table
d. Delete constraint not null to the table column

Week-3:QUERIES USING AGGREGATE FUNCTIONS

1. a. By using the group by clause, display the enames who belongs to deptno 10 alongwithaveragesalary.
b. Display lowest paid employee details under each department.
c. Display number of employees working in each department and their department number.
d. Using built in functions, display number of employees working in each department and their department name from dept table. Insert deptname to dept table and insert deptname for each row, do the required thing specified above.
e. List all employees which start with either B or C.
f. Display only these ename of employees where the maximum salary is greater than or equal to 5000.
2. a. Calculate the average salary for each different job.
b. Show the average salary of each job excluding manager.
c. Show the average salary for all departments employing more than three people.
d. Display employees who earn more than the lowest salary in department 30

e. Show that value returned by sign (n)function.
f. How many days between day of birth to current date
3. a. Show that two substring as single string.
b. List all employee names, salary and 15% rise in salary.
c. Display lowest paid emp details under each manager
d. Display the average monthly salary bill for eachdeptno.
e. Show the average salary for all departments employing more than two people.
f. By using the group by clause, display the eid who belongs to deptno 05 along with average salary.
4. a. Count the number of employees in department20
b. Find the minimum salary earned by clerk.
c. Find minimum, maximum, average salary of all employees.
d. List the minimum and maximum salaries for each job type.
e. List the employee names in descending order.
f. List the employee id, names in ascending order byempid.
5. a. Find the sids ,names of sailors who have reserved all boats called"INTERLAKE
Find the age of youngest sailor who is eligible to vote for each rating level with at least two such sailors.
b. Find the sname , bid and reservation date for each reservation.
c. Find the ages of sailors whose name begin and end with B and has at least 3characters.
d. List in alphabetic order all sailors who have reserved redboat.
e. Find the age of youngest sailor for each rating level.
6. a. List the Vendors who have delivered products within 6 months from order date.
b. Display the Vendor details who have supplied both Assembled and Subparts.
c. Display the Sub parts by grouping the Vendor type (Local or NonLocal).
d. Display the Vendor details in ascending order.
e. Display the Sub part which costs more than any of the Assembled parts.
f. Display the second maximum cost Assembled part.

Week-4: PROGRAMS ON PL/SQL
1. a. Write a PL/SQL program to swaptwonumbers.
b. Write a PL/SQL program to find the largest of three numbers.
2. a. Write a PL/SQL program to find the total and average of 6 subjects and display the grade.
b. Write a PL/SQL program to find the sum of digits in a given number.
3. a. Write a PL/SQL program to display the number in reverse order.
b. Writea PL/SQLprogramtocheckwhetherthegivennumberisprimeornot.
4. a. Write a PL/SQL program to find the factorial of a given number.
b. Write a PL/SQL code block to calculate the area of a circle for a value of radius varying from 3 to 7. Store the radius and the corresponding values of calculated area in an empty table named areas, consisting of two columns radius and area.
5. a. Write a PL/SQL program to accept a string and remove the vowels from the string. (When 'hello' passed to the program it should display 'Hll' removing e and o from the world Hello).
b. Write a PL/SQL program to accept a number and a divisor. Make sure the divisor is less than or equal to 10. Else display an error message. Otherwise Display the remainderin words.

Week-5: PROCEDURES AND FUNCTIONS
1. Write a function to accept employee number as parameter and return Basic +HRA together as single column.
2. Accept year as parameter and write a Function to return the total net salary spent for a given year.

3. Create a function to find the factorial of a given number and hence findNCR.
4. Write a PL/SQL block o pint prime Fibonacci series using local functions.
5. Create a procedure to find the lucky number of a given birthdate.
6. Create function to the reverse of given number

Week-6: TRIGGERS

1. Create a row level trigger for the customers table that would fire for INSERT or UPDATE or DELETE operations performed on the CUSTOMERS table. This trigger will display the salary difference between the old values and new values:

CUSTOMERS table:

ID	NAME	AGE	ADDRESS	SALARY
1	Alive	24	Khammam	2000
2	Bob	27	Kadappa	3000
3	Catri	25	Guntur	4000
4	Dena	28	Hyderabad	5000
5	Eeshwar	27	Kurnool	6000
6	Farooq	28	Nellore	7000

2. Creation of insert trigger, delete trigger, update trigger practice triggers using the passenger database.

Passenger(Passport_ id INTEGER PRIMARY KEY, Name VARCHAR (50) NotNULL, Age Integer Not NULL, Sex Char, Address VARCHAR (50) NotNULL);

a. Write a Insert Trigger to check the Passport_id is exactly six digits or not.

b. Write a trigger on passenger to display messages '1 Record is inserted', '1 record is deleted', '1 record is updated' when insertion, deletion and updation are done on passenger respectively.

3. Insert row in employee table using Triggers. Every trigger is created with name any trigger have same name must be replaced by new name. These triggers can raised before insert, update or delete rows on data base. The main difference between a trigger and a stored procedure is that the former is attached to a table and is only fired when an INSERT, UPDATE or DELETE occurs.

4. Convert employee name into uppercase whenever an employee record is inserted or updated. Trigger to fire before the insert or update.

5. Trigger before deleting a record from emp table. Trigger will insert the row to be deleted into table called delete _emp and also record user who has deleted the record and date and time of delete.

6. Create a transparent audit system for a table CUST_MSTR. The system must keep track of the records that are being deleted or updated.

Week-7:PROCEDURES

1. Create the procedure for palindrome of given number.
2. Create the procedure for GCD: Program should load two registers with two Numbers and then apply the logic for GCD of two numbers. GCD of two numbers is performed by dividing the greater number by the smaller number till the remainder is zero. If it is zero, the divisor is the GCD if not the remainder and the divisors of the previous division are the new set of two numbers. The process is repeated by dividing greater of the two numbers by the smaller number till the remainder is zero and GCD is found.
3. Write the PL/SQL programs to create the procedure for factorial of given number.
4. Write the PL/SQL programs to create the procedure to find sum of N natural number.
5. Write the PL/SQL programs to create the procedure to find Fibonacci series.

6. Write the PL/SQL programs to create the procedure to check the given number is perfect or not.

Week-8: CURSORS

1. Write a PL/SQL block that will display the name, dept no, salary of fist highest paid employees.
2. Update the balance stock in the item master table each time a transaction takes place in the item transaction table. The change in item master table depends on the item id is already present in the item master then update operation is performed to decrease the balance stock by the quantity specified in the item transaction in case the item id is not present in the item master table then the record is inserted in the item master table.
3. Write a PL/SQL block that will display the employee details along with salary using cursors.
4. To write a Cursor to display the list of employees who are working as a Managers or Analyst.
5. To write a Cursor to find employee with given job and deptno.
6. Write a PL/SQL block using implicit cursor that will display message, the salaries of all theemployees in the 'employee' table are updated. If none of the employee's salary are updated we getamessage 'None of the salaries were updated'. Else we get a message like for example, 'Salaries for 1000 employees are updated' if there are 1000 rows in 'employee' table

Week-9: CASE STUDY: BOOK PUBLISHING COMPANY

A publishing company produces scientific books on various subjects. The books are written by authors who specialize in one particular subject. The company employs editors who, not necessarily being specialists in a particular area, each take sole responsibility for editing one or more publications.

A publication covers essentially one of the specialist subjects and is normally written by a single author. When writing a particular book, each author works with on editor, but may submit another work for publication to be supervised by other editors. To improve their competitiveness, the company tries to employ a variety of authors, more than one author being a specialist in a particular subject for the above case study, do thefollowing:

1. Analyze the datarequired.
2. Normalize theattributes.

Create the logical data model using E-R diagrams

Week-10: CASE STUDY GENERAL HOSPITAL

AGeneralHospitalconsistsofanumberofspecializedwards(suchasMaternity,Pediatric,Oncology, etc.). Each ward hosts a number of patients, who were admitted on the recommendation of their ownGP and confirmed by a consultant employed by the Hospital. On admission, the personal details of every patient are recorded. A separate register is to be held to store the information of the tests undertaken and the results of a prescribed treatment. A number of tests may be conducted for each patient. Each patient is assigned to one leading consultant but may be examined by another doctor, if required. Doctors are specialists in some branch of medicine and may be leading consultants for a number of patients, not necessarily from the same ward. For the above case study, do the following.

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

Week-11: CASE STUDY: CAR RENTAL COMPANY

database is to be designed for a car rental company. The information required includes a description of cars, subcontractors (i.e. garages), company expenditures, company revenues and customers. Cars are to be described by such data as: make, model, year of production, engine size, fuel type, number of passengers, registration number, purchase price, purchase date, rent price and insurance details. It is the company policy not to keep any car for a period exceeding one year. All major repairs and maintenance are done by subcontractors (i.e. franchised garages), with whom CRC has long-term agreements. Therefore the data about garages to be kept in the database includes garage names, addresses, range of services and the like. Some garages require payments immediately after a repair has been made; with others CRC has made arrangements for credit facilities. Company expenditures are to be registered for all outgoings connected with purchases, repairs, maintenance, insurance etc. Similarly the cash inflow coming from all sources: Car hire, car sales, insurance claims must be kept of file. CRC maintains a reasonably stable client base. For this privileged category of customers special credit card facilities are provided. These customers may also book in advance a particular car. These reservations can be made for any period of time up to one month. Casual customers must pay a deposit for an estimated time of rental, unless they wish to pay by credit card. All major credit cards are accepted. Personal details such as name, address, telephone number, driving license, number about each customer are keptin the database. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.

Create the logical data model using E-R diagrams

Week-12: CASE STUDY: STUDENT PROGRESS MONITORING SYSTEM

A database is to be designed for a college to monitor students' progress throughout their course of study. The students are reading for a degree (such as BA, BA (Hons.) M.Sc., etc) within the framework of the modular system. The college provides a number of modules, each being characterized by its code, title, credit value, module leader, teaching staff and the department they come from. A module is coordinated by a module leader who shares teaching duties with one or more lecturers. A lecturer may teach (and be a module leader for) more than one module. Students are free to choose any module they wish but the following rules must be observed: Some modules require pre- requisites modules and some degree programs have compulsory modules. The database is also to contain some information about
studentsincludingtheirnumbers,names,addresses,degreestheyreadfor,andtheirpastperformancei.e. modules taken and examination results. For the above case study, do the following:

1. Analyze the data required.
2. Normalize the attributes.
3. Create the logical data model i.e., ERdiagrams.
4. Comprehend the data given in the case study by creating respective tables with primary keys and foreign keys wherever required.
5. Insert values into the tables created (Be vigilant about Master- Slavetables).
6. Display the Students who have taken M.Sccourse
7. Display the Module code and Number of Modules taught by each Lecturer.
8. Retrieve the Lecturer names who are not Module Leaders.
9. Display the Department name which offers ‘English ‘module.
10. Retrieve the Prerequisite Courses offered by every Department (with Department names).
11. Present the Lecturer ID and Name who teaches‘Mathematics’.
12. Discover the number of years a Module is taught.
13. List out all the Faculties who work for ‘Statistics ‘Department.
14. List out the number of Modules taught by each Module Leader.
15. List out the number of Modules taught by a particular Lecturer.

16. Create a view which contains the fields of both Department and Module tables. (Hint- The fields like Module code, title, credit, Department code and its name).
17. Update the credits of all the prerequisite courses to 5. Delete the Module 'History' from the Module table.

REFERENCE BOOKS:

1. RamezElmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013.
2. Peter Rob, Carles Coronel, "Database System Concepts", Cengage Learning, 7th Edition, 2008.

COURSE OUTCOMES:

After completion of the course, students will be able to

- Design database for any real world problem
- Implement PL/SQL programs
- Define SQL queries
- Decide the constraints
- Investigate for data inconsistency

Online Learning Resources/Virtual Labs:

http://www.scoopworld.in
http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0507P	0	0	3	1.5	CIE	30 M
Course Title	:	Computer Networks Lab					SEE	70 M

Course Objectives:
This course is designed to:

- Understand the different types of networks
- Discuss the software and hardware components of a network
- Enlighten the working of networking commands supported by operating system
- Impart knowledge of Network simulator 2/3
- Familiarize the use of networking functionality supported by JAVA
- Familiarize with computer networking tools.

List of Experiments

1. Study different types of Network cables (Copper and Fiber) and prepare cables (Straight and Cross) to connect Two or more systems. Use crimping tool to connect jacks. Use LAN tester to connect the cables.

   Install and configure Network Devices: HUB, Switch and Routers. Consider both manageable and non-manageable switches. Do the logical configuration of the system. Set the bandwidth of different ports.

   Install and Configure Wired and Wireless NIC and transfer files between systems in Wired LAN and Wireless LAN. Consider both adhoc and infrastructure mode of operation.
2. Work with the commands Ping, Tracert, Ipconfig, pathping, telnet, ftp, getmac, ARP, Hostname, Nbtstat, netdiag, and Nslookup
3. Use Sniffers for monitoring network communication (Ethereal)
4. Find all the IP addresses on your network. Unicast, Multicast, and Broadcast on your network.
5. Use Packet tracer software to build network topology and configure using Distance vector routing protocol.
6. Use Packet tracer software to build network topology and configure using Link State routing protocol.
7. Using JAVA RMI Write a program to implement Basic Calculator
8. Implement a Chatting application using JAVA TCP and UDP sockets.
9. Hello command is used to know whether the machine at the other end is working or not. Echo command is used to measure the round trip time to the neighbour. Implement Hello and Echo commands using JAVA.
10. Use Ethereal tool to capture the information about packets.
11. Install Network Simulator 2/3. Create a wired network using dumbbell topology. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.
12. Create a static wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

13. Create a mobile wireless network. Attach agents, generate both FTP and CBR traffic, and transmit the traffic. Vary the data rates and evaluate the performance using metric throughput, delay, jitter and packet loss.

Course outcomes:

Upon completion of the course, the students should be able to:

- Design scripts for Wired network simulation (L6)
- Design scripts of static and mobile wireless networks simulation (L6)
- Analyze the data traffic using tools (L4)
- Design JAVA programs for client-server communication (L6)
- Construct a wired and wireless networks using the real hardware (L3)

Reference Books:

1. ShivendraS.Panwar, Shiwen Mao, Jeong-dong Ryoo, and Yihan Li, “TCP/IP Essentials A Lab-Based Approach”, Cambridge University Press, 2004.

2. Cisco Networking Academy, “CCNA1 and CCNA2 Companion Guide”, Cisco Networking Academy Program, 3rd edition, 2003.

3. Ns Manual, Available at: https://www.isi.edu/nsnam/ns/ns-documentation.html, 2011.

4. Elloitte Rusty Harold, “Java Network Programming”, 3rd edition, O’REILLY, 2011.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Professional Core	L	T	P	C	Exam	3 Hrs
Course Code	:	20APC0506P	0	0	3	1.5	CIE	30 M
Course Title	:	Operating Systems Lab					SEE	70 M

COURSE OBJECTIVES:

- To familiarize students with the architecture of OS.
- To provide necessary skills for developing and debugging CPU Scheduling algorithms.
- To elucidate the process management and scheduling and memory management.
- To explain the working of an OS as a resource manager, file system manager, process manager, memory manager, and page replacement tool.
- To provide insights into system calls, file systems and deadlock handling.

List of Experiments:

1. Practicing of Basic UNIX Commands.
2. Write programs using the following UNIX operating system calls
Fork, exec, getpid, exit, wait, close, stat, opendir and readdir
3. Simulate UNIX commands like cp, ls, grep, etc.,
4. Simulate the following CPU scheduling algorithms
a) Round Robin b) SJF c) FCFS d) Priority
5. Implement a dynamic priority scheduling algorithm.
6. Assume that there are five jobs with different weights ranging from 1 to 5. Implement round robin algorithm with time slice equivalent to weight.
7. Implement priority scheduling algorithm. While executing, no process should wait for more than 10 seconds. If the waiting time is more than 10 seconds that process has to be executed for at least 1 second before waiting again.
8. Control the number of ports opened by the operating system with
a) Semaphore b) Monitors.
9. Simulate how parent and child processes use shared memory and address space.
10. Simulate sleeping barber problem.
11. Simulate dining philosopher's problem.
12. Simulate producer-consumer problem using threads.
13. Implement the following memory allocation methods for fixed partition
a) First fit b) Worst fit c) Best fit
14. Simulate the following page replacement algorithms
a) FIFO b) LRU c) LFU etc.,
15. Simulate Paging Technique of memory management
16. Simulate Bankers Algorithm for Dead Lock avoidance and prevention
17. Simulate the following file allocation strategies
a) Sequential b) Indexed c) Linked
18. Simulate all File Organization Techniques
a) Single level directory b) Two level c) Hierarchical d) DAG

REFERENCE BOOKS:

1. "Operating System Concepts", Abraham Silberchatz, Peter B. Galvin, Greg Gagne, Eighth

Edition, John Wiley.
2. “Operating Systems: Internals and Design Principles”, Stallings, Sixth Edition–2009, Pearson Education
3. “Modern Operating Systems”, Andrew S Tanenbaum, Second Edition, PHI.
4. “Operating Systems”, S.Haldar, A.A.Aravind, Pearson Education.
5. “Principles of Operating Systems”, B.L.Stuart, Cengage learning, India Edition.2013-2014
6. “Operating Systems”, A.S.Godbole, Second Edition, TMH.
7. “An Introduction to Operating Systems”, P.C.P. Bhatt, PHI.

COURSE OUTCOMES:

After completion of the course, students will be able to

- Trace different CPU Scheduling algorithms (L2).
- Implement Bankers Algorithms to Avoid and prevent the Dead Lock (L3).
- Evaluate Page replacement algorithms (L5).
- Illustrate the file organization techniques (L4).
- Illustrate shared memory process (L4).
- Design new scheduling algorithms (L6)

Online Learning Resources/Virtual Labs:

https://www.cse.iitb.ac.in/~mythili/os/
http://peterindia.net/OperatingSystems.html

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Skill Oriented Course	L	T	P	C	Exam	3 Hrs
Course Code	:	20ASC0503	1	0	2	2	CIE	30 M
Course Title	:	Exploratory Data Analytics with R					SEE	70 M

COURSE OBJECTIVES:

• How to manipulate data within R and to create simple graphs and charts used in introductory statistics.

• The given data using different distribution functions in R.

• The hypothesis testing and calculate confidence intervals; perform linear regression models for data analysis.

• The relevance and importance of the theory in solving practical problems in the real world.

List of Experiments:

1: INTRODUCTION TO COMPUTING

a. Installation of R

b. The basics of R syntax, workspace

c. Matrices and lists

d. Subsetting

e. System-defined functions; the help system

f. Errors and warnings; coherence of the workspace

2: GETTING USED TO R: DESCRIBING DATA

a. Viewing and manipulating Data

b. Plotting data

c. Reading the data from console, file (.csv) local disk and web

d. Working with larger datasets

3: SHAPE OF DATA AND DESCRIBING RELATIONSHIPS

a. Tables, charts and plots.

b. Univariate data, measures of central tendency, frequency distributions, variation, and Shape.

c. Multivariate data, relationships between a categorical and a continuous variable,

d. Relationship between two continuous variables – covariance, correlation coefficients, comparing multiple correlations.

e. Visualization methods – categorical and continuous variables, two categorical variables, two continuous variables.

4: PROBABILITY DISTRIBUTIONS

a. Sampling from distributions – Binomial distribution, normal distribution

b. tTest, zTest, Chi Square test

c. Density functions

d. Data Visualization using ggplot – Box plot, histograms, scatter plotter, line chart, bar chart, heat maps

5: EXPLORATORY DATA ANALYSIS Demonstrate the range, summary, mean, variance, median, standard deviation, histogram, box plot, scatter plot using population dataset.

6: TESTING HYPOTHESES

a. Null hypothesis significance testing

b. Testing the mean of one sample

c. Testing two means

7: PREDICTING CONTINUOUS VARIABLES

a. Linear models

b. Simple linear regression

c. Multiple regression

d. Bias-variance trade-off – cross-validation

8: CORRELATION

a. How to calculate the correlation between two variables.

b. How to make scatter plots.

c. Use the scatter plot to investigate the relationship between two variables

9: TESTS OF HYPOTHESES

a. Perform tests of hypotheses about the mean when the variance is known.

b. Compute the p-value.

c. Explore the connection between the critical region, the test statistic, and the p-value

10: ESTIMATING A LINEAR RELATIONSHIP Demonstration on a Statistical Model for a Linear Relationship

a. Least Squares Estimates

b. The R Function lm

c. Scrutinizing the Residuals

11: APPLY-TYPE FUNCTIONS

a. Defining user defined classes and operations, Models and methods in R

b. Customizing the user's environment

c. Conditional statements

d. Loops and iterations

12: STATISTICAL FUNCTIONS IN R

a. Write Demonstrate Statistical functions in R

b. Statistical inference, contingency tables, chi-square goodness of fit, regression, generalized linear models, advanced modeling methods.

REFERENCE BOOKS:

1. SandipRakshit, “Statistics with R Programming”, McGraw Hill Education, 2018.

2. Gareth James, Daniela Witten, Trevor Hastie, Robert Tibshirani, “AN Introduction to Statistical Learning: with Applications in R”, Springer Texts in Statistics, 2017.

3. Joseph Schmuller, “Statistical Analysis with R for Dummies”, Wiley, 2017.

4. K G Srinivasa, G M Siddesh, ChetanShetty, Sowmya B J, “Statistical Programming in R”, Oxford Higher Education, 2017.

COURSE OUTCOMES:

After completion of the course, students will be able to

- Install and use R for simple programming tasks.
- Extend the functionality of R by using add-on packages
- Extract data from files and other sources and perform various data manipulation tasks on them.
- Explore statistical functions in R.
- Use R Graphics and Tables to visualize results of various statistical operations on data.
- Apply the knowledge of R gained to data Analytics for real-life applications.

Online Learning Resources/Virtual Labs:

1. www.oikostat.ch
2. https://learningstatisticswithr.com/

3. https://www.coursera.org/learn/probability-intro#syllabus
4. https://www.isibang.ac.in/~athreya/psweur/

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	20AMC9903	2	1	0	0	CIE	30 M
Course Title	:	Biology for Engineers					SEE	

COURSE OBJECTIVES:-

- To provide basic understanding about life and life Process. Animal an plant systems. To understand what bimolecules, are, their structures are functions. Application of certain bimolecules in Industry.
- Brief introduction about human physiology and bioengineering.
- To understand hereditary units, i.e. DNA (genes) and RNA and their synthesis in living organism.
- How biology Principles can be applied in our daily life using different technologies.
- Brief introduction to the production of transgenic microbes, Plants and animals.

Unit I: Introduction to Basic Biology

Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification.

Learning Outcomes: After completing this unit, the student will be able to

- Summarize the basis of life. (L1)
- Understand the difference between lower organisms (prokaryotes) from higher organisms (eukaryotes). (L2)
- Understand how organisms are classified. (L3)

Unit II: Introduction to Biomolecules

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Learning Outcomes: After completing this unit, the student will be able to

- Understand what are biomolecules? their role in living cells, their structure, function and how they are produced. (L1)
- Interpret the relationship between the structure and function of nucleic acids. (L2)
- Summarize the applications of enzymes in industry. (L3)
- Understand what is fermentation and its applications of fermentation in industry. (L4)

Unit III: Human Physiology

Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

Learning Outcomes: After completing this unit, the student will be able to

- Understand what nutrients are (L1)
- Understand the mechanism and process of important human functions (L2 & L3)

Unit IV: Introduction to Molecular Biology and recombinant DNA Technology

Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. rDNA technology. Introduction to gene cloning.

Learning Outcomes: After completing this unit, the student will be able to

- Understand and explain about gene structure and replication in prokaryotes and Eukaryotes (L1)
- How genetic material is replicated and also understands how RNA and proteins are synthesized. (L2)
- Understand about recombinant DNA technology and its application in different fields.(L3)
- Explain what is cloning. (L4)

Unit V: Application of Biology

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

Learning Outcomes: After completing this unit, the student will be able to Understand.

- How biology is applied for production of useful products for mankind.(L1)
- What are biosensors, biochips etc. (L2)
- Understand transgenic plants and animals and their production (L3)

TEXT BOOKS:

1. P.K.Gupta, Cell and Molecular Biology, 5th Edition, Rastogi Publications –
2. U. Satyanarayana. Biotechnology, Books & Allied Ltd 2017

REFERENCE BOOKS:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, “Biology: A Global Approach”, Pearson Education Ltd, 2018.
2. T Johnson, Biology for Engineers, CRC press, 2011
3. J.M. Walker and E.B. Gingold, Molecular Biology and Biotechnology 2nd ed..Panima Publications. PP 434.
4. David Hames, Instant Notes in Biochemistry –2016
5. Phil Tunner, A. Mctennan, A. Bates & M. White, Instant Notes – Molecular Biology – 2014

COURSE OUTCOMES: After successful completion of the course, the students will be able to:

1. Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
2. Explain about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.
3. Briefly about human physiology.
4. Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
5. Know about application of biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes, plants and animals.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester CSE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	--
Course Code	:		0	0	2	0	CIE	--
Course Title	:	NSS/NCC/NSO Activities					SEE	

COMMUNITY SERVICE PROJECT

……Experiential learning through community engagement

Introduction

• Community Service Project is an experiential learning strategy that integrates meaningful community service with instruction, participation, learning and community development

• Community Service Project involves students in community development and service activities and applies the experience to personal and academic development.

• Community Service Project is meant to link the community with the college for mutual benefit. The community will be benefited with the focused contribution of the college students for the village/ local development. The college finds an opportunity to develop social sensibility and responsibility among students and also emerge as a socially responsible institution.

Objective

Community Service Project should be an integral part of the curriculum, as an alternative to the 2 months of Summer Internships / Apprenticeships / On the Job Training, whenever there is an exigency when students cannot pursue their summer internships. The specific objectives are;

• To sensitize the students to the living conditions of the people who are around them,

• To help students to realize the stark realities of the society.

• To bring about an attitudinal change in the students and help them to develop societal consciousness, sensibility, responsibility and accountability

• To make students aware of their inner strength and help them to find new /out of box solutions to the social problems.

• To make students socially responsible citizens who are sensitive to the needs of the disadvantaged sections.

• To help students to initiate developmental activities in the community in coordination with public and government authorities.

• To develop a holistic life perspective among the students by making them study culture, traditions, habits, lifestyles, resource utilization, wastages and its management, social problems, public administration system and the roles and responsibilities of different persons across different social systems.

Implementation of Community Service Project

• Every student should put in a 6 weeks for the Community Service Project during the summer vacation.

• Each class/section should be assigned with a mentor.

• Specific Departments could concentrate on their major areas of concern. For example, Dept. of Computer Science can take up activities related to Computer Literacy to different sections of people like - youth, women, house-wives, etc

• A log book has to be maintained by each of the student, where the activities undertaken/involved to be recorded.

• The logbook has to be countersigned by the concerned mentor/faculty incharge.

• Evaluation to be done based on the active participation of the student and grade could be awarded by the mentor/faculty member.
• The final evaluation to be reflected in the grade memo of the student.
• The Community Service Project should be different from the regular programmes of NSS/NCC/Green Corps/Red Ribbon Club, etc.
• Minor project report should be submitted by each student. An internal Viva shall also be conducted by a committee constituted by the principal of the college.
• Award of marks shall be made as per the guidelines of Internship/apprentice/ on the job training

Procedure
• A group of students or even a single student could be assigned for a particular habitation or village or municipal ward, as far as possible, in the near vicinity of their place of stay, so as to enable them to commute from their residence and return back by evening or so.
• The Community Service Project is a twofold one –
o First, the student/s could conduct a survey of the habitation, if necessary, in terms of their own domain or subject area. Or it can even be a general survey, incorporating all the different areas. A common survey format could be designed. This should not be viewed as a duplication of work by the Village or Ward volunteers, rather, it could be another primary source of data.
o Secondly, the student/s could take up a social activity, concerning their domain or subject area. The different areas, could be like –
▪ Agriculture
▪ Health
▪ Marketing and Cooperation
▪ Animal Husbandry
▪ Horticulture
▪ Fisheries
▪ Sericulture
▪ Revenue and Survey
▪ Natural Disaster Management
▪ Irrigation
▪ Law & Order
▪ Excise and Prohibition
▪ Mines and Geology
▪ Energy
▪ Internet
▪ Free Electricity
▪ Drinking Water

EXPECTED OUTCOMES

BENEFITS OF COMMUNITY SERVICE PROJECT TO STUDENTS

Learning Outcomes
• Positive impact on students' academic learning
• Improves students' ability to apply what they have learned in "the real world"
• Positive impact on academic outcomes such as demonstrated complexity of understanding, problem analysis, problem-solving, critical thinking, and cognitive development
• Improved ability to understand complexity and ambiguity

Personal Outcomes

• Greater sense of personal efficacy, personal identity, spiritual growth, and moral development

• Greater interpersonal development, particularly the ability to work well with others, and build leadership and communication skills

Social Outcomes

• Reduced stereotypes and greater inter-cultural understanding

• Improved social responsibility and citizenship skills

• Greater involvement in community service after graduation

Career Development

• Connections with professionals and community members for learning and career opportunities

• Greater academic learning, leadership skills, and personal efficacy can lead to greater opportunity Relationship with the Institution

• Stronger relationships with faculty

• Greater satisfaction with college

• Improved graduation rates

BENEFITS OF COMMUNITY SERVICE PROJECT TO FACULTY MEMBERS

• Satisfaction with the quality of student learning

• New avenues for research and publication via new relationships between faculty and community

• Providing networking opportunities with engaged faculty in other disciplines or institutions

• A stronger commitment to one's research

BENEFITS OF COMMUNITY SERVICE PROJECT TO COLLEGES AND UNIVERSITIES

• Improved institutional commitment

• Improved student retention

• Enhanced community relations

BENEFITS OF COMMUNITY SERVICE PROJECT TO COMMUNITY

• Satisfaction with student participation

• Valuable human resources needed to achieve community goals

• New energy, enthusiasm and perspectives applied to community work

• Enhanced community-university relations.

SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT

The following the recommended list of projects for Engineering students. The lists are not exhaustive and open for additions, deletions and modifications. Colleges are expected to focus on specific local issues for this kind of projects. The students are expected to carry out these projects with involvement, commitment, responsibility and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of projects. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting shall be ensured.

For Engineering Students

1. Water facilities and drinking water availability
2. Health and hygiene
3. Stress levels and coping mechanisms
4. Health intervention programmes
5. Horticulture
6. Herbal plants
7. Botanical survey
8. Zoological survey
9. Marine products
10. Aqua culture
11. Inland fisheries
12. Animals and species
13. Nutrition
14. Traditional health care methods
15. Food habits
16. Air pollution
17. Water pollution
18. Plantation
19. Soil protection
20. Renewable energy
21. Plant diseases
22. Yoga awareness and practice
23. Health care awareness programmes and their impact
24. Use of chemicals on fruits and vegetables
25. Organic farming
26. Crop rotation
27. Floury culture
28. Access to safe drinking water
29. Geographical survey
30. Geological survey
31. Sericulture
32. Study of species
33. Food adulteration
34. Incidence of Diabetes and other chronic diseases
35. Human genetics
36. Blood groups and blood levels
37. Internet Usage in Villages
38. Android Phone usage by different people
39. Utilisation of free electricity to farmers and related issues
40. Gender ration in schooling lvel- observation.

Complimenting the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programmes are;

Programmes for School Children

1. Reading Skill Programme (Reading Competition)
2. Preparation of Study Materials for the next class.

3. Personality / Leadership Development
4. Career Guidance for X class students
5. Screening Documentary and other educational films
6. Awareness Programme on Good Touch and Bad Touch (Sexual abuse)
7. Awareness Programme on Socially relevant themes.

Programmes for Women Empowerment

1. Government Guidelines and Policy Guidelines
2. Womens' Rights
3. Domestic Violence
4. Prevention and Control of Cancer
5. Promotion of Social Entrepreneurship

General Camps

1. General Medical camps
2. Eye Camps
3. Dental Camps
4. Importance of protected drinking water
5. ODF awareness camp
6. Swatch Bharath
7. AIDS awareness camp
8. Anti Plastic Awareness
9. Programmes on Environment
10. Health and Hygiene
11. Hand wash programmes
12. Commemoration and Celebration of important days

Programmes for Youth Empowerment

1. Leadership
2. Anti-alcoholism and Drug addiction
3. Anti-tobacco
4. Awareness on Competitive Examinations
5. Personality Development

Common Programmes

1. Awareness on RTI
2. Health intervention programmes
3. Yoga
4. Tree plantation
5. Programmes in consonance with the Govt. Departments like –
    - i. Agriculture
    - ii. Health
    - iii. Marketing and Cooperation
    - iv. Animal Husbandry
    - v. Horticulture
    - vi. Fisheries
    - vii. Sericulture
    - viii. Revenue and Survey

ix. Natural Disaster Management
x. Irrigation
xi. Law& Order
xii. Excise and Prohibition
xiii. Mines and Geology
xiv. Energy

Role of Students:

• Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.

• For conducting special camps like Health related, they will be coordinating with the Governmental agencies.

• As and when required the College faculty themselves act as Resource Persons.

• Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.

• And also with the Governmental Departments. If the programme is rolled out, the District Administration could be roped in for the successful deployment of the programme.

• An in-house training and induction programme could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.

Timeline for the Community Service Project Activity

Duration: 8 weeks

1. Preliminary Survey (One Week)

• A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.

• A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.

• The Governmental agencies, like revenue administration, corporation and municipal authorities and village secreteriats could be aligned for the survey.

2. Community Awareness Campaigns (One Week)

• Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.

3. Community Immersion Programme (Three Weeks)

Along with the Community Awareness Programmes, the student batch can also work with any one of the below listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to the experiential learning about the community and its dynamics. Programmes could be in consonance with the Govt. Departments.

4. Community Exit Report (One Week)

• During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks work to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that particular habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University.

Throughout the Community Service Project, a daily log-book need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
Course Structure & Syllabus for First Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2020-21 onwards)

ELECTRONICS & COMMUNICATION ENGINEERING

INDUCTION PROGRAM (3 weeks duration)

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

B. Tech – I Semester (Theory – 5, Lab – 4)

S.No	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5401	Linear Algebra and Calculus	3	0	0	3	30	70	100
2	BS	20ABS5101T	Chemistry	3	0	0	3	30	70	100
3	HS	20AHS5201T	Communicative English	3	0	0	3	30	70	100
4	ES	20AES0202T	Fundamentals of Electrical Engineering	3	0	0	3	30	70	100
5	ES	20AES0301T	Engineering Drawing	1	0	2	2	30	70	100
PRACTICAL										
6	BS	20ABS5101P	Chemistry Lab	0	0	3	1.5	30	70	100
7	HS	20AHS5201P	Communicative English Lab	0	0	3	1.5	30	70	100
8	ES	20AES0202P	Fundamentals of Electrical Engineering Lab	0	0	3	1.5	30	70	100
9	ES	20AES0301P	Engineering Graphics Lab	0	0	2	1	30	70	100
			TOTAL:	**13**	**00**	**13**	**19.5**	**270**	**630**	**900**

B. Tech – II Semester (Theory – 5, Lab – 5)

S.No	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5402	Differential Equations and Vector Calculus	3	0	0	3	30	70	100
2	BS	20ABS5601T	Applied Physics	3	0	0	3	30	70	100
3	ES	20AES0501T	C Programming & Data Structures	3	0	0	3	30	70	100
4	ES	20AES0401T	Electronic Devices & Circuits	3	0	0	3	30	70	100
5	MC	20AMC9901	Environmental Science	3	0	0	0	30	-	30

PRACTICAL										
6	BS	20ABS5601P	Applied Physics Lab	0	0	3	1.5	30	70	100
7	ES	20AES0501P	C Programming & Data Structures Lab	0	0	3	1.5	30	70	100
8	ES	20AES0401P	Electronic Devices & Circuits Lab	0	0	3	1.5	30	70	100
9	ES	20AES0302	Engineering Workshop	0	0	3	1.5	30	70	100
10	ES	20AES0402	Electronics & IT Workshop	0	0	3	1.5	30	70	100
			TOTAL:	**15**	**00**	**15**	**19.5**	**300**	**630**	**930**

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, CSE, ECE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5401	3	0	0	3	CIE	30 M
Course Title	:	LINEAR ALGEBRA AND CALCULUS					SEE	70 M

COURSE OBJECTIVES:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

Bridge Course: Limits, continuity, Types of matrices

Unit I: Matrices **(10 hrs)**

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous equations linear equations. Eigenvalues and Eigenvectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors (L3).
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

Unit II: Mean Value Theorems **(06 hrs)**

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), related problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)
- Analyze the behaviour of functions by using mean value theorems (L3)

Unit III: Multivariable calculus **(10 hrs)**

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

Unit IV: Multiple Integrals **(10 hrs)**

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates. Finding areas and volumes using double and triple integrals.

Learning Outcomes:

- At the end of this unit, the student will be able to
- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

Unit V: Beta and Gamma functions (06 hrs)

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand beta and gamma functions and its relations (L2)
- Conclude the use of special function in evaluating definite integrals (L4)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education

Course Outcomes:

At the end of the course, the student will be able to

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- Familiarize with functions of several variables which is useful in optimization (L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ECE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5101T	3	0	0	3	CIE	30 M
Course Title	:	CHEMISTRY					SEE	70 M

COURSE OBJECTIVES:

- To familiarize engineering chemistry and its applications
- To train the students on the principles and applications of electrochemistry, Spectroscopy and polymers
- To introduce instrumental methods and modern engineering materials.

Unit I: Structure and Bonding Models (10 hrs)

Planck's quantum theory, dual nature of matter, Schrodinger equation, significance of Ψ and $Ψ^2$, applications to hydrogen, molecular orbital theory – bonding in homo- and hetero-nuclear diatomic molecules – energy level diagrams of N_2, O_2, CO and NO, π-molecular orbitals of butadiene and benzene, calculation of bond order.

Learning outcomes:

At the end of this unit, the students will be able to

- **Apply** Schrodinger wave equation to hydrogen atom (L3)
- **Recall** molecular orbital theory and energy level diagrams of atoms (L1)
- **Illustrate** the molecular orbital energy level diagram of different molecular species (L2)
- **Explain** the calculation of bond order of O_2 and CO molecules (L2)
- **Discuss** the basic concept of molecular orbital theory (L3)

Unit II: Modern Engineering Materials (12 hrs)

i) **Understanding of materials:** Crystal field theory – salient features – splitting in octahedral, tetrahedral and square planar geometry. Properties of coordination compounds- oxidation state, coordination number, magnetic properties and colour.

ii) **Semiconductor materials, superconductors:** Basic concept, band diagrams for conductors, semiconductors and insulators, effect of doping on band structures.

iii) **Super capacitors:** Introduction, basic concept-classification – applications.

iv) **Nano chemistry:** Introduction, classification of nano materials, properties and applications of fullerenes, carbon nano tubes and graphene nano particles.

Learning Outcomes:

At the end of this unit, the students will be able to

- **Explain** splitting of in octahedral and tetrahedral geometry of complexes (L2).
- **Recall** applications of semiconductors, super conductors, nano materials (L1)
- **Discuss** the magnetic behaviour and colour of coordination compounds (L3).
- **Explain** the band theory of solids for conductors, semiconductors and insulators (L2)
- **Demonstrate** the application of fullerenes, carbon nano tubes and graphene nanoparticles (L2).

Unit III: Electrochemistry and Applications (12hrs)

Introduction to electrochemistry, electrodes – concepts of reference electrodes (Calomel electrode, Ag/AgCl electrode and glass electrode); Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, pH metry, potentiometry- potentiometric titrations (redox titrations), concept of conductivity- Specific,

equivalent & molar conductance and cell constant, conductivity cell, conductometric titrations (acid-base titrations).
Electrochemical sensors – potentiometric sensors (glucose potentiometric sensor), amperometric sensors (Estimation of Uric Acid (UA))
Primary cells – Zinc-air, Na-Air batteries, secondary cells – Nickel-Cadmium (NiCd),and lithium ion batteries-working of the batteries including cell reactions; fuel cells: hydrogen-oxygen, methanol fuel cells – working of the cells and applications.

Learning Outcomes:
At the end of this unit, the students will be able to

- **Apply** Nernst equation for calculating electrode and cell potentials (L3)
- **Recall** applications of various batteries (L1).
- **Explain** the theory of construction of battery and fuel cells (L2)
- **Solve** problems based on cell potential (L3)

Unit IV: Polymer Chemistry **(10 hrs)**
Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, copolymerization (stereospecific polymerization) with specific examples and mechanisms of polymer formation (addition and condensation).
Plastics: Thermoplastics and Thermosettings, Preparation, properties and applications of – PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres. Calculation of molecular Weight of polymer by weight average and number average methods, polydispersity index
Elastomers: Buna-S, Buna-N–preparation, properties and applications.
Conducting polymers: Polyacetylene, Polyaniline, Polypyrroles – mechanism of conduction and applications.

Learning Outcomes:
At the end of this unit, the students will be able to

- **Explain** the different types of polymers and their applications (L2)
- **Find** number average and weight average of polymer (L1)
- **Explain** the preparation, properties and applications of Bakelite, Nylon-6,6, and carbon fibres (L2)
- **Describe** the mechanism of conduction in conducting polymers (L2)
- **Discuss** Buna-S and Buna-N elastomers and their applications (L2)

Unit V: Instrumental Methods and Applications **(08 hrs)**
Regions of electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible, IR Spectroscopies- Principle, selection rules and applications. Solid-Liquid Chromatography–TLC, retardation factor.

Learning outcomes:
At the end of this unit, the students will be able to:

- **Explain** the different types of spectral series in electromagnetic spectrum (L2)
- **Understand** the principles of UV-Vis, IR Spectroscopy (L2)
- **Find** retention time and volumes of samples (L1)
- **Explain** the various applications of analytical instruments (L2)

Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S.Chand Publication, New Delhi 2012.

Reference Books:

1. J.D. Lee, Concise Inorganic Chemistry, 5/e, Oxford University Press, 2008.
2. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
3. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

Course Outcomes:

At the end of the course, the students will be able to:

- **Compare** the materials for construction of battery and electrochemical sensors (L2)
- **Recall** properties and applications of polymers and engineering materials (L1)
- **Explain** the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers. (L2)
- **Explain** the principles of spectrometry, TLC in separation of solid and liquid mixtures (L2)
- **Apply** the principle of Band diagrams in application of conductors and semiconductors (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE and ECE)
(Common to II Semester CSE and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AHS5201T	3	0	0	3	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH					SEE	70 M

INTRODUCTION:
The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

COURSE OBJECTIVES:
- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Unit I: On the Conduct of Life: William Hazlitt
Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Parts of Speech, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes
At the end of the module, the learners will be able to
1. understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
2. ask and answer general questions on familiar topics and introduce oneself/others
3. employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
4. recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
5. form sentences using proper grammatical structures and correct word forms

Unit II: The Brook: Alfred Tennyson
Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks. **Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.
Grammar and Vocabulary: Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes
At the end of the module, the learners will be able to
1. comprehend short talks on general topics
2. participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
3. understand the use of cohesive devices for better reading comprehension
4. write well structured paragraphs on specific topics
5. identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit III: The Death Trap: Saki
Listening: Listening for global comprehension and summarizing what is listened to.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed
Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing: Summarizing, Paragraph Writing.
Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes
At the end of the module, the learners will be able to
1. Comprehend short talks and summarize the content with clarity and precision
2. Participate in informal discussions and report what is discussed
3. Infer meanings of unfamiliar words using contextual clues
4. Write summaries based on global comprehension of reading/listening texts
5. Use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit IV: Innovation: Muhammad Yunus
Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.
Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing: Letter Writing: Official Letters/Report Writing.
Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice

Learning Outcomes
At the end of the module, the learners will be able to
1. Infer and predict about content of spoken discourse
2. Understand verbal and non-verbal features of communication and hold formal/informal conversations
3. Interpret graphic elements used in academic texts
4. Produce a coherent paragraph interpreting a figure/graph/chart/table
5. Use language appropriate for description and interpretation of graphical elements

Unit V: Politics and the English Language: George Orwell

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: Reading for comprehension.

Writing: Writing structured essays on specific topics using suitable claims and evidences.

Grammar and Vocabulary: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Learning Outcomes

At the end of the module, the learners will be able to

- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

Text Books:

1. **Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan.**

Reference Books:

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3. Raymond Murphy's *English Grammar in Use* Fourth Edition (2012) E-book
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
5. Oxford Learners Dictionary, 12th Edition, 2011
6. Norman Lewis *Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary* (2014)
7. *Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words* by David Butler.

Web links

- www.englishclub.com
- www.easyworldofenglish.com
- www.languageguide.org/english/
- www.bbc.co.uk/learningenglish
- www.eslpod.com/index.html
- www.myenglishpages.com

COURSE OUTCOMES

At the end of the course, the learners will be able to

1. **Understand** the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
2. **Apply** grammatical structures to formulate sentences and correct word forms
3. **Analyze** discourse markers to speak clearly on a specific topic in informal discussions
4. **Evaluate** reading/listening texts and to write summaries based on global comprehension of these texts.
5. **Create** a coherent paragraph interpreting a figure/graph/chart/table

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(I Semester ECE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0202T	3	0	0	3	CIA	30 M
Course Title	:	FUNDAMENTALS OF ELECTRICAL ENGINEERING					SEE	70 M

COURSE OBJECTIVES:-
To make the student learn about
1. Basic circuit components and Network theorems
2. Basic characteristics of R, L, C parameters, their Voltage and Current Relations and Various combinations of these parameters.
3. Series and parallel circuits and their sinusoidal analysis
4. Basic concepts on Transformers and various tests on transformers
5. AC and DC machines, its operation, characteristics and various tests

UNIT I: INTRODUCTION
Basic Components, Voltage and current laws, Nodal and Mesh Analysis – Single loop and multi loop circuits, single node pair and multi node pair circuits, super mesh and super node analysis, delta -Wye conversion.
Network Theorems: Linearity and Superposition, Source Transformation, Thevenin's and Norton's Equivalent Circuits, Maximum Power Transfer, Reciprocity– Problem solving.

Learning Outcomes:
- Understand the basic circuit theory concepts
- Verification of various network theorems

UNIT II: DC Transient Circuits:
Capacitors and Inductors, RL and RC circuits – Source free RL and RC circuits, Initial conditions, Response to DC, Step, and Pulse signals, Problem solving.
RLC circuits – Source free RLC series and parallel circuits, Initial conditions, Overdamped, Critical damped and under damped RLC circuits, complete response of the RLC circuits.
Unit Outcomes:
- Construction of various circuit configurations
- Determination of responses for RL, RC and RLC circuits with various excitations

UNIT III: Sinusoidal Analysis and Transformers:
Sinusoidal Analysis: Sinusoidal Steady State Analysis – Phasor diagrams for R, L, C, Concept of impedance, Instantaneous, and average power, Effective or RMS values of voltage and current – RL, RC and RLC series and parallel circuits-Problem solving.

Transformers: Single Phase Transformers- Constructional Details- Emf Equation - Operation on No Load and on Load - Phasor Diagrams-Equivalent Circuit - Losses and Efficiency-Regulation- OC and SC Tests.

Unit Outcomes:
- Apply the concepts to construct RL, RC and RLC series and parallel circuits
- Understand the basic concept of Transformers and calculation of various losses

UNIT IV: DC Machines (Elementary treatment only)
DC Generators – Constructional Features – E.M.F Equation–Methods of Excitation – Build-Up of E.M.F - Load

Characteristics of Generators- Applications

D.C Motors – Back E.M.F. –Torque Equation – Characteristics and Applications -Speed Control. Three Point Starter-Losses –Calculation of Efficiency - Swinburne's Test.

Unit Outcomes:

- Understand the basic concept on DC generators and determination of Load characteristics
- Understand the basic concept on DC motors and determination of losses and efficiency

UNIT V: AC Machines (Elementary treatment only)

Three phase Induction motor: Revolving magnetic field theory, Principle of operation, Torque equation, and Performance characteristics.

Three phase Synchronous Machines: Principle and Constructional Features of Salient Pole and Round Rotor Machines – E.M.F Equation- Voltage Regulation by Synchronous Impedance Method- Theory of Operation of Synchronous Motor.

Unit Outcomes:

- Understand the basic concept of 3-phase Induction motor and determination of performance characteristics
- Understand the basic concept of 3-phase synchronous machine and determination of emf equation

Text Books:-

1. D. P. Kothari and I. J. Nagrath, Basic Electrical Engineering, Tata McGraw Hill, 2010.
2. Charles K. Alexander and Matthew. N. O. Sadiku, Fundamentals of Electric Circuits, Mc Graw Hill, 5th Edition, 2013.

Reference Books:-

1. William Hayt and Jack E. Kemmerly, Engineering circuit analysis, Mc Graw Hill Company, 7th Edition, 2006.
2. M.E Van Valkenberg, Network Analysis, Prentice Hall (India), 3rd Edition, 1999.
3. L. S. Bobrow, Fundamentals of Electrical Engineering, Oxford University Press, 2011.
4. E. Hughes, Electrical and Electronics Technology, Pearson Education, 2010.

COURSE OUTCOMES:

After completion of the course, the student should be able to

1. Understand the basic circuit components and Network theorems
2. Analyze the basic characteristics of R, L, C parameters, their Voltage and Current Relations
3. Apply the knowledge to design Series and parallel circuits and determination of their sinusoidal response analysis
4. Understand the basic concepts on Transformers and apply the concept to perform various tests on transformers
5. Understand the basic concepts on AC and DC machines, its operation, characteristics and analyze the characteristics by conducting various tests

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE & ECE and II Semester CSE & ME)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0301T	3	0	0	3	CIE	30 M
Course Title	:	ENGINEERING DRAWING					SEE	70 M

COURSE OBJECTIVES:

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.

Unit I:

Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance -Conventions in drawing - lettering - BIS conventions.

(a) Conic sections including the rectangular hyperbola- general method only,
(b) Cycloid, epicycloids and hypocycloid c) Involutes

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the significance of engineering drawing
- Know the conventions used in the engineering drawing
- Identify the curves obtained in different conic sections
- Draw different curves such as cycloid, involute and hyperbola

Unit II:

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of projection
- Know how to draw the projections of points, lines
- Differentiate between projected length and true length
- Find the true length of the lines

Unit III:

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the procedure to draw projection of solids
- Differentiate between rotational method and auxillary view method.
- Draw the projection of solid inclined to one plain
- Draw the projection of solids inclined to both the plains

Unit IV:
Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Learning Outcomes:
At the end of this unit the student will be able to
- Understand different sectional views of regular solids
- Obtain the true shapes of the sections of prism
- Draw the sectional views of prism, cylinder, pyramid and cone

Unit V:
Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Learning Outcomes:
At the end of this unit the student will be able to
- Understand the meaning of development of surfaces
- Draw the development of regular solids such as prism, cylinder, pyramid and cone
- Obtain the development of sectional parts of regular shapes

Text Books:
1) K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2) N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:
1) Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2) Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
3) Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
4) K.C.John, Engineering Graphics, 2/e, PHI, 2013
5) Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:
After completing the course, the student will be able to
- Draw various curves applied in engineering. (l2)
- Show projections of solids and sections graphically. (l2)
- Draw the development of surfaces of solids. (l3)

Additional Sources
Youtube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ECE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5101P	0	0	3	1.5	CIE	30 M
Course Title	:	CHEMISTRY LAB					SEE	70 M

COURSE OBJECTIVES:

- Verify the fundamental concepts with experiments.

List of Experiments:

1. Conductometric titration of Strong acid vs Strong base.
2. Conductometric titration of weak acid vs Strong base.
3. Determination of cell constant and conductance of solutions.
4. Potentiometry - determination of redox potentials and EMF.
5. Acid-Base titration by pH metry.
6. Determination of Strength of an acid in Pb-Acid battery.
7. Preparation of polymer- Bakelite.
8. Verification Lambert-Beer's law.
9. Estimation of manganese by Colorimetry.
10. Separation of organic mixtures by Thin layer chromatography (TLC).
11. Identification of simple organic compounds by IR.
12. Preparation of nano materials by precipitation.
13. Estimation of Ferrous Iron by Potassium dichromate.
14. Measurement of 10Dq by spectrophotometric method.
15. Models of potential energy surfaces.

Course Outcomes:

At the end of the course, the students will be able to

- **Determine** the cell constant and conductance of solutions (L3)
- **Find** conductivity of acid and base (L1)
- **Prepare** polymer Bakelite materials (L2)
- **Measure** the strength of an acid present in secondary batteries (L3)
- **Analyse** the IR spectra of some organic compounds (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE and ECE)
(Common to II Semester CSE and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AHS5201P	0	0	3	1.5	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH LAB					SEE	70 M

COURSE OBJECTIVES:

- Students will be exposed to a variety of self instructional, learner friendly modes of language learning
- Students will learn better pronunciation through stress, intonation and rhythm
- Students will be trained to use language effectively to face interviews, group discussions, public speaking
- Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

LIST OF TOPICS

1. Phonetics
2. Reading comprehension
3. Describing objects/places/persons
4. Role Play or Conversational Practice
5. Just-A-Minute (JAM)
6. Etiquettes of Telephonic Communication
7. Information Transfer
8. Note Making and Note Taking
9. E-mail Writing
10. Group Discussions
11. Resume Writing
12. Debates
13. Oral Presentations
14. Poster Presentation
15. Interviews Skills

Suggested Software

- Orell
- Walden Infotech
- Young India Films

Reference Books

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
5. A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Web Links

- www.esl-lab.com
- www.englishmedialab.com
- www.englishinteractive.net

Course Outcomes

1. Listening and repeating the sounds of English Language
2. Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
3. Apply communication skills through various language learning activities.
4. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
5. Evaluate and exhibit acceptable etiquette essential in social and professional settings
6. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(I Semester ECE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0202T	0	0	3	1.5	CIA	30 M
Course Title	:	FUNDAMENTALS OF ELECTRICAL ENGINEERING LAB					SEE	70 M

COURSE OBJECTIVES:- The students will be able to

1. Remember, understand and apply various theorems and verify practically.
2. Understand and analyze RL, RC and RLC circuit responses for various excitations.
3. Design various configurations on AC and DC machines to determine various characteristics
4. Apply various procedures to perform tests on 1-ϕ transformer

List of Experiments: (**All experiments are compulsory**)

ELECTRIC CIRCUITS:

1. Verification of Kirchhoff's laws
2. Verification of Superposition Theorem
3. Verification of Thevenin's & Norton's Theorems
4. Response characteristics of series RL, RC and RLC circuits for Sinusoidal excitation
5. Verification of Reciprocity Theorem
6. Response characteristics of an RC/RL circuit for a pulse excitation

ELECTRICAL MACHINES:

1. Magnetization characteristics of a separately excited DC generator
2. Load characteristics of DC shunt generator
3. Load characteristics of DC shunt motor
4. Break test on 3-phase Induction motor
5. OC & SC tests on a 1-ϕ transformer
6. Predetermination of regulation of alternator by Synchronous impedance method

COURSE OUTCOMES:

The students should be able to

1. Understand various network theorems and verify practically.
2. Understand RL, RC and RLC circuit configurations and analyze their responses for various excitations.
3. Design different configurations on AC and DC machines to determine various characteristics
4. Apply various procedures to perform tests on 1-ϕ transformer

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE & ECE and II Semester CSE & ME)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0301P	3	0	0	3	CIE	30 M
Course Title	:	ENGINEERING GRAPHICS LAB					SEE	70 M

COURSE OBJECTIVES:

- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modeling.
- Instruct graphical representation of machine components.

Computer Aided Drafting:

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions.
Dimensioning principles and conventional representations.

Orthographic Projections: Systems of projections, conventions and application to orthographic projections - simple objects.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

TEXT BOOKS:

1) K. Venugopal, V.Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2) Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHI Learning, Eastern Economy editions.

REFERENCE BOOKS:

1) T. Jayapoovan, Engineering Graphics using Auto Cad, Vikas Publishing House
2) K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
3) Linkan Sagar, BPB Publications, Auto Cad 2018 Training Guide.
4) K.C.John, Engineering Graphics, 2/e, PHI, 2013
5) Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

COURSE OUTCOMES:

After completing the course, the student will be able to

- Use computers as a drafting tool. (L2)
- Draw isometric and orthographic drawings using CAD packages. (L3)

ADDITIONAL SOURCES

Youtube: http-sewor,Carleton.cag, kardos/88403/drawings.html conic sections-online, red woods.edu

B.TECH - II SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, CSE, ECE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5402	3	0	0	3	CIE	30 M
Course Title	:	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS					SEE	70 M

COURSE OBJECTIVES:

1) To enlighten the learners in the concept of differential equations and multivariable calculus.
2) To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

UNIT I: Linear differential equations of higher order (Constant Coefficients) (10 hrs)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskean, method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Mass spring system.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L3)
- Formulate and solve the higher order differential equation by analyzing physical situations (L3)

UNIT II: Partial Differential Equations (08 hrs)

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order equations using Lagrange's method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply a range of techniques to find solutions of standard PDEs (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT III: Applications of Partial Differential Equations (10 hrs)

Classification of PDE, method of separation of variables for second order equations. Applications of Partial Differential Equations: One dimensional Wave equation, One dimensional Heat equation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Calcify the PDE (L3)
- Learn the applications of PDEs(L2)

UNIT IV: Vector differentiation (06 hrs)

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply del to Scalar and vector point functions (L3)

- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT 5: Vector integration **(08 hrs)**

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes:

At the end of this unit, the student will be able to

- find the work done in moving a particle along the path over a force field (L4)
- evaluate the rates of fluid flow along and across curves (L4)
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
2. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. S L Ross , Differential Equations ,Wiley India, year 2007 edition.

Course Outcomes:

At the end of the course, the student will be able to

- Solve the differential equations related to various engineering fields (L6)
- Identify solution methods for partial differential equations that model physical processes (L3)
- Interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- Estimate the work done against a field, circulation and flux using vector calculus (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CSE and ECE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5601T	3	0	0	3	CIA	30 M
Course Title	:	APPLIED PHYSICS					SEE	70 M

COURSE OBJECTIVES:

- To make a bridge between the physics in school and engineering courses.
- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications.
- To explain the significant concepts of dielectric and magnetic materials that leads to potential applications in the emerging micro devices.
- To enlighten the concepts of Quantum Mechanics and to provide fundamentals of de'Broglie waves, quantum mechanical wave equation and its applications, the importance of free electron theory and band theory of solids.
- Evolution of band theory to distinguish materials, basic concepts and transport phenomenon of charge carriers in semiconductors. To give an impetus on the subtle mechanism of superconductors using the concept of BCS theory and their fascinating applications.

UNIT I: Wave Optics (12 hrs)

Interference- Principle of superposition – Interference of light – Conditions for sustained interference - Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates with applications.

Learning Outcomes:

The students will be able to

1. **Explain** the need of coherent sources and the conditions for sustained interference (L2)
2. **Identify** engineering applications of interference (L3)
3. **Analyze** the differences between interference and diffraction with applications (L4)
4. **Illustrate** the concept of polarization of light and its applications (L2)
5. **Classify** ordinary polarized light and extraordinary polarized light (L2)

Unit II: Lasers and Fiber optics (08 hrs)

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers.

Fiber optics: Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Propagation Losses (qualitative) – Applications.

Learning Outcomes:
The students will be able to

1. **Understand** the basic concepts of LASER light Sources (L2)
2. **Apply** the concepts to learn the types of lasers (L3)
3. **Identifies** the Engineering applications of lasers (L2)
4. **Explain** the working principle of optical fibers (L2)
5. **Classify** optical fibers based on refractive index profile and mode of propagation (L2)
6. **Identify** the applications of optical fibers in various fields (L2)

Unit III: Dielectric and Magnetic Materials (08 hrs)

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic and Ionic, Orientation polarizations (Qualitative) – Lorentz internal field – Clausius-Mossotti equation-Dielectric loss.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para & Ferro- Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Learning Outcomes:
The students will be able to

1. **Explain** the concept of dielectric constant and polarization in dielectric materials (L2)
2. **Summarize** various types of polarization of dielectrics (L2)
3. **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics(L2)
4. **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
5. **Explain** the applications of dielectric and magnetic materials (L2)
6. **Apply** the concept of magnetism to magnetic devices (L3)

Unit IV: Quantum Mechanics, Free Electron Theory and Band theory of Solids (10 hrs)

Quantum Mechanics- Dual nature of matter – Schrodinger's time independent and dependent wave equations – Significance of wave function – Particle in a one-dimensional infinite potential well.

Free Electron Theory- Classical free electron theory (Merits and demerits only) – Quantum free electron theory – Equation for electrical conductivity based on quantum free electron theory – Fermi-Dirac distribution – Density of states – Fermi energy.

Band theory of Solids- Bloch's Theorem (Qualitative) – Kronig-Penney model (Qualitative) – E vs k diagram – Classification of crystalline solids – Effective mass of electron – m^* vs k diagram – Concept of hole.

Learning Outcomes:
The students will be able to

1. **Explain** the concept of dual nature of matter (L2)
2. **Understand** the significance of wave function (L2)
3. **Interpret** the concepts of classical and quantum free electron theories (L2)
4. **Explain** the importance of K-P model
5. **Classify** the materials based on band theory (L2)
6. **Apply** the concept of effective mass of electron (L3)

Unit V: Semiconductors and Superconductors (10 hrs)

Semiconductors- Introduction – Intrinsic semiconductors – Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors – Density of charge carriers – Dependence of Fermi energy on carrier concentration and temperature – Drift and diffusion currents – Einstein's equation – Direct and indirect band gap semiconductors – Hall effect – Hall coefficient – Applications of Hall effect.

Superconductors- Introduction – Properties of superconductors – Meissner effect – Type I and Type II superconductors – BCS theory – Josephson effects (AC and DC) – High T_c superconductors – Applications of superconductors.

Learning Outcomes:
The students will be able to

1. **Classify** the energy bands of semiconductors (L2)
2. **Interpret** the direct and indirect band gap semiconductors (L2)
3. **Identify** the type of semiconductor using Hall effect (L2)
4. **Identify** applications of semiconductors in electronic devices (L2)
5. **Explain** how electrical resistivity of solids changes with temperature (L2)
6. **Classify** superconductors based on Meissner's effect (L2)
7. **Explain** Meissner's effect, BCS theory & Josephson effect in superconductors (L2)

Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering Physics – B.K. Pandey and S. Chaturvedi, Cengage Learning.

Reference Books:

1. Engineering Physics – Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018
2. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
3. Semiconductor physics and devices- Basic principle – Donald A, Neamen, Mc Graw Hill
4. Introduction to solid state physics – Charles Kittel, Wiley Publishers

COURSE OUTCOMES:

1. **Explain** the need of coherent sources and the conditions for sustained interference (L2). **Identify** the applications of interference in engineering (L3). **Analyze** the differences between interference and diffraction with applications (L4). **Illustrate** the concept of polarization of light and its applications (L2). **Classify** ordinary polarized light and extraordinary polarized light (L2).
2. **Explain** various types of emission of radiation (L2). **Identify** the role of laser in engineering applications (L3). **Describe** the construction and working principles of various types of lasers (L1). **Explain** the working principle of optical fibers (L2). **Classify** optical fibers based on refractive index profile and mode of propagation (L2). **Identify** the applications of optical fibers in medical, communication and other fields (L2). **Apply** the fiber optic concepts in various fields (L3).
3. **Explain** the concept of dielectric constant and polarization in dielectric materials (L2). **Summarize** various types of polarization of dielectrics (L2). **Interpret** Lorentz field and Claussius-Mosotti relation in dielectrics (L2). **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2). **Explain** the applications of dielectric and magnetic materials (L2). **Apply** the concept of magnetism to magnetic devices (L3).
4. **Describes** the dual nature of matter (L1). **Explains** the significance of wave function (L2). **Identify** the role of Schrodinger's time independent wave equation in studying particle in one-dimensional infinite potential well (L3). **Identify** the role of classical and quantum free electron theory in the study of electrical conductivity (L3).
5. **Classify** the energy bands of semiconductors (L2). **Outline** the properties of charge carriers (L2). **Interpret** the direct and indirect band gap semiconductors (L2). **Identify** the type of semiconductor using Hall effect (L2). **Identify** applications of semiconductors in electronic devices (L2). **Explain** how electrical resistivity of solids changes with temperature (L2). **Classify** superconductors based on Meissner's effect (L2). **Explain** Meissner's effect, BCS theory & Josephson effect in superconductors (L2).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0501T	3	0	0	3	CIE	30 M
Course Title	:	C PROGRAMMING & DATA STRUCTURES					SEE	70 M

COURSE OBJECTIVES:

- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures of C Programming Language.
- To discuss the syntax and semantics of C Programming language
- To familiarize with Stack, Queue, Linked lists, Tree and graph data structures.
- To demonstrate programming by choosing appropriate Data Structures and Features of the C language.

Unit I:

Getting Started: What is C, The C Character Set, Constants, Variables and Keywords, Types of C Constants, Rules for Constructing Integer Constants, Rules for Constructing Real Constants, Rules for Constructing Character Constants, Types of C Variables, Rules for Constructing Variable Names, C Keywords, Form of a C Program, Comments in a C Program, What is main, Variables and their Usage, printf( ) and its Purpose, Compilation and Execution, Receiving Input.

Data Types Revisited: Integers, long and short, Integers, signed and unsigned, Chars, signed and unsigned, Floats and Doubles, A Few More Issues, Storage Classes in C-Automatic Storage Class, Register Storage Class, Static Storage Class, and External Storage Class.

C Instructions: Types of Instructions, Type Declaration Instruction, Arithmetic Instructions, Integer and Float Conversions, Type Conversion in Assignments, Hierarchy of Operations, Associativity of Operators, Control Instructions.

Decision Control Instruction: Decisions! Decisions, The if Statement, The Real Thing, Multiple Statements within if, The if-else Statement, Nested if-elses, Forms of if.

Learning Outcomes:

1. Understand the basic concepts of C language (L2)
2. Learn the functionality of operators and Control Statements of C (L2)
3. Use the if control structure of the C language (L3)

Unit II:

More Complex Decision Making: Use of Logical Operators, The else if Clause, The ! Operator, Hierarchy of Operators Revisited, a Word of Caution, the Conditional Operators.

Loop Control Instruction: Loops, the while Loop, Tips and Traps, More Operators.

More Complex Repetitions: The for Loop, Nesting of Loops, Multiple Initializations in the for Loop, The break Statement, The continue Statement, The do-while Loop, The Odd Loop.

Case Control Instruction: Decisions using switch, The Tips and Traps, switch versus if-else Ladder, The goto Keyword.

Functions: What is a Function?, Why use Functions?, Passing Values between Functions, Scope Rule of Functions, Order of Passing Arguments, Using Library Functions, One Dicey Issue, Return Type of Function.

Learning Outcomes:

1. Apply the concept of Loops in various applications. (L3)
2. Design programs using modular approach (L6)

Unit III:
Recursion: Recursion, Recursion and Stack
Pointers: Call by Value and Call by Reference, an Introduction to Pointers, Pointer Notation, Back to Function Calls.
The C Preprocessor: Features of C Preprocessor, Macro Expansion, Macros with Arguments, Macros versus Functions, File Inclusion.
Arrays: What are Arrays?, A Simple Program using Array, More on Arrays, Array Initialization Array Elements in Memory, Bounds Checking, Passing Array Elements to a Function, Pointers and Arrays, Passing an Entire Array to a Function, The Real Thing.
Multidimensional Arrays: Two-Dimensional Arrays, Initializing a Two-Dimensional Array, Memory Map of a Two-Dimensional Array, Pointers and Two-Dimensional Arrays, Pointer to an Array, Passing 2-D Array to a Function, Array of Pointers, Three-Dimensional Array.

Learning Outcomes:
1. Solve problems by using Recursion (L3)
2. Understand the concept of Array (L2)
3. Use pointers to efficiently use memory (L3)

Unit IV:
Strings: What are Strings, More about Strings, Pointers and Strings
Standard Library String Functions-strlen ( ), strcpy ( ), strcat ( ), strcmp ( ).

Handling Multiple Strings: Two-Dimensional Array of Characters, Array of Pointers to Strings, Limitation of Array of Pointers to Strings.

Structures: Why use Structures? Declaring a Structure, Accessing Structure Elements, How Structure Elements are Stored? Array of Structures, Additional Features of Structures, Uses of Structures.

Console Input/output: Types of I/O, **Console I/O Functions**-Formatted Console I/O Functions, sprintf ( ) and sscanf ( ) Functions Unformatted Console I/O Functions

File Input/output: Data Organization, **File Operations**-Opening a File, Reading from a File, Trouble in Opening a File, Closing the File, Counting Characters, Tabs, Spaces, **A File-Copy Program**-Writing to a File, File Opening Modes, **String (Line) I/O in Files**-The Awkward Newline, Record I/O in Files, Text Files and Binary Files, Record I/O Revisited, Database Management, **Low-Level File I/O** -A Low-Level File-Copy Program, I/O under Windows.
Learning Outcomes:
1. Understand the concept of Strings (L2)
2. Learn Structures and Unions (L2)
3. Operate Files through C Programs (L4)
4. Manipulate strings (L3)

Unit V:
Data Structures: Linked List-Single Linked List, Double Linked List, Circular Linked List. Stacks-Using Arrays and Linked List, Stack Applications.
Queue- Arrays and Linked List, Circular Queue, Priority Queue.
Trees-Binary Trees, Binary Search Tree.
Graphs-Graphs Implementation using Arrays and Linked List, Traversal of Graphs.

Learning Outcomes:

1. Implements basic data structures such as stacks, queues and trees.(L3)
2. Apply algorithms and data structures in solving problems. (L3)
3. Design indexing structures (L6)

Text Books:

1. Yashavant Kanetkar, “Let Us C”, Fourteenth Edition, BPB Publications.
2. K R Venugopal, Sudeep R Prasad, “Mastering C”, Mc GrawHill publications
3. Jeri R. hanly, Elliot B. Koffman, Ashok Kamthane, A. Ananda Rao, “Programming in C and Data Structures”, Pearson.

Reference Books:

1. Brian W Kernighan and Dennis M Ritchie, “The C Programming Language”, Second Edition, Prentice Hall Publication.
2. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, “Fundamentals of Data Structures in C”, Computer Science Press.
3. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition 2011.
4. Richard F. Gilberg & Behrouz A. Forouzan, “Data Structures: A Pseudocode Approach with C”, Second Edition, CENGAGE Learning, 2011.

Course Outcomes:

1. Learn the concepts of C Programming language. (L2)
2. Design applications in C, using functions, arrays, pointers and structures. (L6)
3. Apply the concepts of Stacks and Queues in solving the problems. (L3)
4. Explore various operations on Linked lists. (L5)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(II Semester ECE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0401T	3	0	0	3	CIA	30 M
Course Title	:	ELECTRONIC DEVICES AND CIRCUITS					SEE	70 M

COURSE OBJECTIVES:-

- **To understand the basic principles of all semiconductor devices.**
- **To be able to solve problems related to diode circuits, and amplifier circuits.**
- **To analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers.**
- **To be able to compare the performance of BJTs and MOSFETs**
- **To design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.**

Unit I:

Review of Semiconductors: Intrinsic semiconductors, Doped Semiconductors, Current Flow in Semiconductors, PN Junction with Open Circuit, PN Junction with Applied Voltage, Capacitive Effects in PN Junction.

Diodes: Introduction, The Ideal Diode – current voltage characteristic, rectifier, diode logic gates, Terminal Characteristics of Junction Diodes– forward bias, reverse bias, and breakdown regions, Modeling the Diode Forward Characteristics- exponential model, graphical analysis and Iterative analysis using the exponential model, constant voltage drop model, the small signal model.

Learning outcomes:

1. Remember and understand the basic characteristics of semiconductor diode (L1)
2. Understand iterative and graphical analysis of simple diode circuits (L1)

Unit II:

Zener Diodes– Zener diode Characteristics, Voltage shunt regulator, Temperature Effects, Rectifier Circuits– half-wave, full-wave and bridge rectifier circuits, rectifier with a filter capacitor, C-L-C filter, Clipping and Clamping Circuits– limiter circuit, the clamped capacitor, voltage doubler, Special Diode Types– UJT, Schottky barrier diode, Varactor diode, photo diode, light emitting diode(LED).

Bipolar Junction Transistors(BJTs): Physical Operation - simplified structure and modes of operation, Operation of the npn, and pnp transistors: cutoff, active, and saturation modes, V-I Characteristics- of different configurations - graphical representation of transistor characteristics, dependence of collector current on collector voltage, the Early Effect.

Learning outcomes:

1. Understand principle of operation of Zener diode and other special semiconductor diodes (L1)
2. Understand the V-I characteristics of BJT and its different configurations (L1)
3. Analyze various applications of diode and special purpose diodes (L3)
4. Design rectifier and voltage regulator circuits (L4)

Unit III:

Bipolar Junction Transistor (BJT): BJT circuits at DC, Applying the BJT in Amplifier Design- Voltage Amplifier, Voltage Transfer Characteristic (VTC), Small-Signal Voltage Gain, determining the VTC by Graphical Analysis, Q-point, Small-signal operation and models- the trans conductance, input resistance at the base, input resistance at the emitter, Voltage gain, separating the Signal and the DC Quantities, The Hybrid-π Model, the T Model, Basic BJT Amplifier Configurations - Common-Emitter (CE) amplifier without and with emitter resistance, Common-Base (CB) amplifier, Common-Collector (CC) amplifier or Emitter Follower, Biasing in BJT Amplifier Circuits- Fixed bias, Self bias, voltage divider bias circuits, biasing using a Constant-Current Source, CE amplifier – Small signal analysis and design, Transistor breakdown and Temperature Effects.

Learning outcomes:

1. Solve problems on various biasing circuits using BJT (L2)
2. Analyze BJT based biasing circuits (L3)
3. Design an amplifier using BJT based on the given specifications (L4)

Unit IV

MOS Field-Effect Transistors (MOSFETs): Introduction, Device Structure and Physical Operation – device structure, operation with zero gate voltage, creating a channel for current flow, operation for different drain to source voltages, the P-channel MOSFET,CMOS, V-I characteristics– i_D - v_{DS} characteristics, i_D – v_{GS} characteristics, finite output resistance in saturation, characteristics of the p-Channel MOSFET, MOSFET Circuits at DC, Applying the MOSFET in Amplifier Design – voltage transfer characteristics, biasing the MOSFET to obtain linear amplification, the small signal voltage gain, graphical analysis, the Q-point.

Learning outcomes:

1. Understand principle of operation of various types of MOSFET devices (L1)
2. Understand the V-I characteristics of MOSFET devices and their configurations (L1)

Unit V

MOSFET Small Signal Operation Models – the dc bias, separating the DC analysis and the signal analysis, Small signal equivalent circuit models, the transconductance, the T equivalent circuit model, Basic MOSFET Amplifier Configurations– three basic configurations, characterizing amplifiers, common source(CS) amplifier without and with source resistance, common gate (CG) amplifier, source follower, the amplifier frequency response, Biasing in MOSFET Amplifier Circuits– biasing by fixing V_{GS} with and without source resistance, biasing using drain to gate feedback resistor, biasing using constant current source, Common Source Amplifier using MOSFETs – Small signal analysis and design, Body Effect.

Learning outcomes:

1. Solve problems on small signal equivalent of MOSFET devices (L2)
2. Analyze various biasing circuits based on different types of MOSFETs (L3)
3. Design an amplifier using BJT based on the given specifications (L4)

Text Books:

1. Adel S. Sedra and Kenneth C. Smith, “Microelectronic Circuits – Theory and Applications”, 6th Edition, Oxford Press, 2013.
2. Donald A Neamen, “Electronic Circuits – analysis and design”, 3rdEdition, McGraw Hill (India), 2019.

References:

1. J. Milliman and C Halkias, “Integrated electronics”, 2nd Edition, Tata McGraw Hill, 1991.
2. Behzad Razavi, “Microelectronics”, Second Edition, Wiley, 2013.
3. R.L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuits,” 9thEdition, Pearson, 2006.
4. Jimmie J Cathey, “Electronic Devices and Circuits,” Schaum’s outlines series, 3rd Edition, McGraw-Hill (India), 2010.

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Understand principle of operation, characteristics and applications of Semiconductor diodes, Bipolar Junction Transistor and MOSFETs.

CO2: Applying the basic principles solving the problems related to Semiconductor diodes, BJTs, and MOSFETs.

CO3: Analyze diode circuits for different applications such as rectifiers, clippers and clampers also analyze biasing circuits of BJTs, and MOSFETs.

CO4: Design of diode circuits and amplifiers using BJTs, and MOSFETs.

CO5: Compare the performance of various semiconductor devices.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CE & ECE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	20AMC9901	3	0	0	0	CIA	30 M
Course Title	:	ENVIRONMENTAL SCIENCES					SEE	--

COURSE OBJECTIVES

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life.
- To save earth from the inventions by the engineers.

UNIT I:

Multidisciplinary Nature Of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

Learning Outcomes:

- To know the importance of public awareness.
- To know about the various resources.

UNIT II:

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

(a) Forest ecosystem.
(b) Grass land ecosystem
(c) Desert ecosystem
(d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Learning Outcomes:

- To know about various echo systems and their characteristics
- To know about the biodiversity and its conservation

UNIT III:

Environmental Pollution: Definition, Cause, effects and control measures of:

(a) Air Pollution.
(b) Water pollution
(c) Soil pollution
(d) Marine pollution
(e) Noise pollution
(f) Thermal pollution
(g) Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Learning Outcomes:

- To know about the various sources of pollution.
- To know about the various sources of solid waste and preventive measures.
- To know about the different types of disasters and their managerial measures.

UNIT IV:

Social issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

Learning Outcomes:

- To know about the social issues related to environment and their protection acts.
- To know about the various sources of conservation of natural resources.
- To know about the wild life protection and forest conservation acts.

UNIT V:

Human Population And The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Learning Outcomes:

- To know about the population explosion and family welfareprogrammes.
- To identify the natural assets and related casestudies.

TEXT BOOKS:

1) Text book of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2) Palaniswamy, “Environmental Studies”, Pearson education
3) S. Azeem Unnisa, “Environmental Studies” Academic Publishing Company

4) K. Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications(India), Pvt. Ltd.

REFERENCES:

1) Deeksha Dave and E.Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2) M. Anji Reddy, “Text book of Environmental Sciences and Technology”, BS Publication.
3) J. P. Sharma, Comprehensive Environmental studies, Laxmi publications.
4) J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prentice hall of India Private limited
5) G.R.Chatwal, “A Text Book of Environmental Studies” Himalaya Pubilishing House
6) Gilbert M. Masters and Wendell P. Ela, “Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

1) Grasp multidisciplinary nature of environmental studies and various renewable and non-renewable resources.
2) Understand flow and bio-geo- chemical cycles and ecological pyramids.
3) Understand various causes of pollution and solid waste management and related preventive measures.
4) About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
5) Casus of population explosion, value education and welfare programmes.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CSE and ECE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5601P	0	0	3	1.5	CIA	30 M
Course Title	:	APPLIED PHYSICS LAB					SEE	70 M

COURSE OBJECTIVES:

- Understands the concepts of interference, diffraction and their applications.
- Understand the role of optical fiber parameters in communication.
- Recognize the importance of energy gap in the study of conductivity and Hall Effect in a semiconductor.
- Illustrates the magnetic and dielectric materials applications.
- Apply the principles of semiconductors in various electronic devices.

Note: In the following list, out of 15 experiments, any 10 experiments must be performed in a semester

List of Experiments:

1. Determine the thickness of the wire using wedge shape method

   Experimental outcomes:

   Operates optical instrument like travelling microscope. (L2)
   Estimate the thickness of the wire using wedge shape method (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)

2. Determination of the radius of curvature of the lens by Newton’s ring method

   Experimental outcomes:

   Operates optical instrument like travelling microscope. (L2)
   Estimate the radius of curvature of the lens (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
   Plots the square of the diameter of a ring with no. of rings (L3)

3. Determination of wavelength by plane diffraction grating method

   Experimental outcomes:

   Operates optical instrument like spectrometer. (L2)
   Estimate the wavelength of the given source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)

4. Determination of dispersive power of prism.

   Experimental outcomes:

   Operates optical instrument like spectrometer. (L2)
   Estimate the refractive index and dispersive power of the given prism (L2)
   Identifies the formation of spectrum due to dispersion. (L2)

5. Determination of wavelength of LASER light using diffraction grating.

   Experimental outcomes:

   Operates various instrument (L2)
   Estimate the wavelength of laser source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)

6. Determination of particle size using LASER.

   Experimental outcomes:

   Operates various instrument (L2)
   Estimate the Particles size using laser (L2)
   Identifies the application of laser (L2)

7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle

    Experimental outcomes:

    Operates various instruments and connect them as per the circuit. (L2)
    Estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)
    Identifies the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications. (L2)

8. Determination of dielectric constant by charging and discharging method.

    Experimental outcomes:

    Operates various instruments and connect them as per the circuit. (L2)
    Estimate the dielectric constant of the given substance. (L2)
    Identifies the significance of dielectric constant in various devices. (L2)

9. Determination of magnetic field along the axis of a circular coil carrying current by Stewart and Gee's method.

    Experimental outcomes:

    Operates various instruments and connect them as per the circuit. (L2)
    Estimate the magnetic field along the axis of a circular coil carrying current. (L2)
    Plots the intensity of the magnetic field of circular coil carrying current with distance (L3)

10. Measurement of magnetic susceptibility by Gouy's method

    Experimental outcomes:

    Operates various instruments and connect them as per the circuit. (L2)
    Estimate the magnetic susceptibility of the given material. (L2)
    Identifies the significance of magnetic susceptibility in various engineering applications. (L2)

11. To Study the variation of B versus H by magnetizing the magnetic material (B-H loop)

    Experimental outcomes:

    Operates various instruments and connect them as per the circuit. (L2)
    Estimate the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2)
    Classifies the soft and hard magnetic material based on B-H curve. (L2)
    Plots the magnetic field H and flux density B (L3)

12. To determine the resistivity of semiconductor by Four probe method

    Experimental outcomes:

    Operates various instruments and connect them as per the circuit. (L2)
    Estimate the resistivity of a semiconductor. (L2)
    Identifies the importance of four probe method in finding the resistivity of semiconductor. (L3)

13. To determine the energy gap of a semiconductor

    Experimental outcomes:

    Operates various instruments and connect them as per the circuit. (L2)
    Estimate the energy gap of a semiconductor. (L2)
    Illustrates the engineering applications of energy gap. (L3)
    Plots 1/T with log R (L3)

14. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall Effect.

    Experimental outcomes:

    Operates various instruments and connect them as per the circuit. (L2)
    Estimate the charge carrier concentration and mobility in a semiconductor. (L2)
    Illustrates the applications of Hall Effect. (L3)
    Plots the voltage with current and voltage with magnetic field (L3)

15. Measurement of resistance with varying temperature.

    Experimental outcomes:

    Operates various instruments and connect them as per the circuit. (L2)
    Estimate the resistance with varying temperature. (L2)
    Plots resistance R with temperature T (L3)

Course Outcomes:

The students will be able to

1. **Operate** optical instruments like microscope and spectrometer (L2)
2. **Determine** thickness of a hair/paper with the concept of interference (L2)
3. **Estimate** the wavelength of different colors using diffraction grating and resolving power (L2)
4. **Plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
5. **Evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
6. **Determine** the resistivity of the given semiconductor using four probe method (L3)
7. **Identify** the type of semiconductor i.e., n-type or p-type using hall effect (L3)
8. **Calculate** the band gap of a given semiconductor (L3)

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0501P	0	0	3	1.5	CIE	30 M
Course Title	:	C PROGRAMMING & DATA STRUCTURES LAB					SEE	70 M

COURSE OBJECTIVES:

- To illustrate the concepts of C programming language
- To discuss the syntax and semantics of C programming language.
- To demonstrate using arrays, strings, pointers and structures.
- To illustrate the use of Stacks and Queues
- To teach different operations on linked lists.
- To demonstrate Binary search tree traversal techniques.

Week 1

For the first few weeks students have to do some practice programs to understand the concepts of the C programming language

Week 2

a) Write a C program to find both the largest and smallest number in a list of integers.

b) Write a C program that uses functions to perform the following:
(i) Addition of Two Matrices (ii) Multiplication of Two Matrices

Week 3

a) Write a C program that uses functions to perform the following operations:
   (i) To insert a sub-string in to a given main string from a given position.
   (ii) To delete n characters from a given position in a given string.

Week 4

a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn‘t contain T.

b) Write a C program to count the lines, words and characters in a given text.

Week 5

a) Write a C Program to perform various arithmetic operations on pointer variables.

b) Write a C Program to demonstrate the following parameter passing mechanisms:
(i) call-by-value (ii) call-by-reference

Week 6

Write a C program that uses functions to perform the following operations:

(i) Reading a complex number
(ii) Writing a complex number
(iii) Addition of two complex numbers
(iv) Multiplication of two complex numbers
(Note: represent complex number using a structure.)

Week 7

Write C programs that implement stack (its operations) using

(i) Arrays (ii) Pointers

Week 8

Write C programs that implement Queue (its operations) using

(i) Arrays (ii) Pointers

Week 9

Write a C program that uses Stack operations to perform the following:

(i) Converting infix expression into postfix expression

(ii) Evaluating the postfix expression

Week 10

Write a C program that uses functions to perform the following operations on singly linked list.

(i) Creation (ii) Insertion (iii) Deletion (iv) Traversal

Week 11

Write a C program that uses functions to perform the following operations on Doubly linkedlist.

(i) Creation (ii) Insertion (iii) Deletion (iv) Traversal

Week 12

Write a C program that uses functions to perform the following operations on circular linkedlist.

(i) Creation (ii) Insertion (iii) Deletion (iv) Traversal

Week 13

Write a C program that uses functions to perform the following:

(i) Creating a Binary Tree of integers

(ii) Traversing the above binary tree in preorder, inorder and postorder.

Week 14

Write C programs that use both recursive and non-recursive functions

(i) To find the factorial of a given integer.

(ii) To find the GCD (greatest common divisor) of two given integers.

(iii) To solve Towers of Hanoi problem.

Week 14

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers:

(i) Linear search (ii) Binary search

Week 15

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

(i) Bubble sort (ii) Selection sort (iii) Insertion sort

Week 16 Application development

College information system – The students in groups can collect the information about the college and design a project which automates the some of the tasks like Attendance calculation, Grade calculation, etc.

TEXT BOOKS:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A. Forouzon and R.F. Gilberg, “COMPUTER SCIENCE: A Structured Programming Approach Using C”, Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg & Behrouz A. Forouzan, “Data Structures: A Pseudocode Approach with C”, Second Edition, CENGAGE Learning, 2011.

REFERENCE BOOKS:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, “C and Data Structures”, 4th Edition, Tata Mc Graw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, “Problem Solving Using C”, PHI, 2nd Edition 2009.

COURSE OUTCOMES:

1. Demonstrate basic concepts of C programming language. (L2)
2. Develop C programs using functions, arrays, structures and pointers. (L6)
3. Illustrate the concepts Stacks and Queues. (L2)
4. Design operations on Linked lists. (L6)
5. Apply various Binary tree traversal techniques. (L3)
6. Develop searching and sorting methods. (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(II Semester ECE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0401P	0	0	3	1.5	CIA	30 M
Course Title	:	ELECTRONIC DEVICES AND CIRCUITS LAB					SEE	70 M

COURSE OBJECTIVES:-

- To verify the theoretical concepts practically from all the experiments.
- To analyze the characteristics of Diodes, BJT, MOSFET, UJT.
- To design the amplifier circuits from the given specifications.
- To Model the electronic circuits using tools such as PSPICE/Multisim.

LIST OF EXPERIMENTS: (**Execute minimum of 10 experiments**)
Note: ***All the experiments shall be implemented using both Hardware and Software*.**

1. Verification of Volt- Ampere characteristics of a PN junction diode and find static, dynamic and reverse resistances of the diode from the graphs obtained.
2. Design a full wave rectifier for the given specifications with and without filters, and verify the given specifications experimentally. Vary the load and find ripple factor. Draw suitable graphs.
3. Verify various clipping and clamper circuits using PN junction diode and draw the suitable graphs.
4. Design a Zener diode-based ***voltage regulator*** against variations of supply and load. Verify the same from the experiment.
5. Verification of the input and output characteristics of BJT in **Common Emitter** configuration experimentally and find required ***h – parameters*** from the graphs.
6. Study and draw the input and output characteristics of BJT in **Common Base** configuration experimentally, and determine required ***h – parameters*** from the graphs.
7. Study and draw the ***output*** and ***transfer*** characteristics of MOSFET (Enhance mode) in Common Source Configuration experimentally. Find ***Threshold voltage*** (V_T), g_m, **& *K*** from the graphs.
8. Study and draw the ***output*** and ***transfer*** characteristics of MOSFET (Depletion mode) or JFET in Common Source Configuration experimentally. Find I_{DSS}, g_m, & V_P from the graphs.
9. Study and draw the Volt Ampere characteristics of UJT and determine η, I_P, I_v, V_P, &V_V from the experiment.
10. Design and analysis of voltage- divider bias/self-bias circuit using BJT.
11. Design and analysis of voltage- divider bias/self-bias circuit using JFET.
12. Design and analysis of self-bias circuit using MOSFET.
13. Design a suitable circuit for switch using CMOSFET/JFET/BJT.
14. Design a small signal amplifier using MOSFET (common source) for the given specifications. Draw the frequency response and find the bandwidth.
15. Design a small signal amplifier using BJT(common emitter) for the given specifications. Draw the frequency response and find the bandwidth.

Tools / Equipment Required: Software Tool like Multisim / Pspice or Equivalent, DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

COURSE OUTCOMES:

After the completion of the course students will able to
CO1: Understand the basic characteristics and applications of basic electronic devices. (L1)
CO2: Observe the characteristics of electronic devices by plotting graphs. (L2)
CO3: Analyze the Characteristics of UJT, BJT, MOSFET. (L3)
CO4: Design MOSFET / BJT based amplifiers for the given specifications. (L4)
CO5: Simulate all circuits in PSPICE /Multisim. (L5)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0302	0	0	3	1.5	CIE	30 M
Course Title	:	ENGINEERING WORKSHOP					SEE	70 M

COURSE OBJECTIVES:

- To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills.

LIST OF EXPERIMENTS

Trade I: Wood Working

Familiarity with different types of woods and tools used in wood working and make following joints

(a) Half – Lap joint (b) Mortise and Tenon joint (c) Corner Dovetail joint or Bridle joint

Trade II: Sheet Metal Working

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

(a) Tapered tray (b) Conical funnel (c) Elbow pipe (d) Brazing

Trade III: Fitting

Familiarity with different types of tools used in fitting and do the following fitting exercises.

(a) V-fit (b) Dovetail fit (c) Semi-circular fit

(d) Bicycle tyre puncture and change of two wheeler tyre.

Trade IV: Electrical Wiring

Familiarities with different types of basic electrical circuits and make the following connections

(a) Parallel and series (b) Two way switch (c) Godown lighting

(d) Tube light (e) Three phase motor (f) Soldering of wires

COURSE OUTCOMES:

After completion of this lab the student will be able to

- Apply wood working skills in real world applications. (l3)
- Build different objects with metal sheets in real world applications. (l3)
- Apply fitting operations in various applications. (l3)
- Apply different types of basic electric circuit connections. (l3)
- Use soldering and brazing techniques. (l2)

Note: In each section a minimum of three exercises are to be carried out.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(II Semester ECE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0402	0	0	3	1.5	CIA	30 M
Course Title	:	ELECTRONICS & IT WORKSHOP					SEE	70 M

COURSE OBJECTIVES:-

1. To introduce electronic components, measuring instruments and tools used in electronic workshop.
2. To equip with the knowledge of understanding data sheets of electronic components.
3. To give practical experience on soldering the electronic components on a PCB.
4. To introduce EDA tools.
5. To know about the internal parts of a computer, assembling a computer from the parts, preparing a computer for use by installing the operating system
6. To provide training on Productivity tools like word processors, spreadsheets, presentations.
7. To provide knowledge in understanding working of various communication systems.

List of Exercises / Experiments:

1. Familiarization of commonly used Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
   - Provide some exercises so that electronics hardware tools and instruments are learned to be used by the students
2. Familiarization of Electronic Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
   - Provide some exercises so that electronic measuring instruments are learned to be used by the students
3. Electronic Components: Familiarization/Identification of electronic components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, color coding, package, symbol, cost etc.
4. Testing of electronic components like Resistor, Capacitor, Diode, Transistor, ICs etc.
   - Compare values of components like resistors, inductors, capacitors etc with the measured values by using electronic instruments
5. Study of Cathode Ray Oscilloscope (CRO)
   - Find the Amplitude and Frequency of a signal
   - Measure the Unknown Frequency & Phase difference of signals using Lissajous figures
6. Interpret data sheets of discrete components and IC's.
   - Write important specifications/ratings of components & ICs and submit it in the form of a report
7. Introduction to EDA Tools: MULTISIM/PSPICE/TINA schematic capture tool, learning of basic functions of creating a new project, getting and placing parts, connecting placed parts, simulating the schematic, plotting and analyzing the results.
   - Provide some exercise so that students are familiarized in using EDA tools
8. Assembling and Testing of simple electronic circuits on breadboards; identifying the components and its location on the PCB, soldering of the components, testing the assembled circuit for correct functionality.
9. Familiarization with Computer Hardware & Operating System:

- Identify the internal parts of a computer, and its peripherals. Represent the same in the form of diagrams including Block diagram of a computer. Write specifications for each part of a computer including peripherals and specification of Desktop computer. Submit it in the form of a report.
- Disassemble and assemble the PC back to working condition. Students should be able to trouble shoot the computer and identify working and non-working parts. Student should identify the problem correctly by various methods available (eg: beeps).

Students should record the process of assembling and troubleshooting a computer.

- Install Operating system on the computer. Students should record the entire installation process.

10. Familiarization with Office Tools
    - Word Processor: Able to create documents using the word processor tool. Students should be able to prepare project cover pages, content sheet and chapter pages at the end of the task using the features studied.
    - Spreadsheet: Able to create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells.
    - Presentations: creating, opening, saving and running the presentations, Selecting the style for slides, formatting the slides with different fonts, colors, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyper-linking, running the slide show, setting the timing for slide show.
11. Familiarization of PA system with different microphones, loud speakers, mixer etc. Represent the same in the form of diagrams, write specifications and submit it in the form of a report.
12. Understand working of various Communication Systems like Television, Satellite Transmitter & Receiver, Radio Receiver, Mobile Phone. Prepare demo boards/charts of various communication systems.

COURSE OUTCOMES:

After the completion of the course students will able to

1. Identify discrete components and ICs (L3)
2. Assemble simple electronic circuits over a PCB (L3)
3. Testing of various components (L4)
4. Interpret specifications (ratings) of the component (L5)
5. Demonstrate disassembling and assembling a Personal Computer and make the computer ready to use (L2)
6. Make use of Office tools for preparing documents, spread sheets and presentations (L3)
7. Demonstrate working of various communication systems (L2)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	20ABS5403	3	0	0	3	CIA	30 M
Course Title	:	COMPLEX VARIABLES AND TRANSFORMS					SEE	70 M

COURSE OBJECTIVES: -

This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables. The student develops the idea of using continuous/discrete transforms.

Unit I:

Complex Variable – Differentiation:Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy- Riemann equations, analytic functions (exponential, trigonometric, logarithm), harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson Method-Conformal mappings-standard and special transformations (sin z, ez, cos z, z2) Mobius transformations (bilinear) and their properties.

Unit II:

Complex Variable – Integration:Line integral-Contour integration, Cauchy's integral theorem, Cauchy Integral formula, Liouville's theorem (without proof) and Maximum-Modulus theorem (without proof); power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi-circle with f(z) not having poles on real axis).

Unit III:

Laplace Transforms: Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

Unit IV

Fourier series: Determination of Fourier coefficients (Euler's) – Dirichlet conditions for the existence of Fourier series– functions having discontinuity-Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions- typical wave forms - Parseval's formula- Complex form of Fourier series

Unit V

Fourier transforms & Z Transforms:Fourier integral theorem (without proof) – Fourier sine and cosine integrals-complex form of Fourier integral. Fourier transform – Fourier sine and cosine transforms – Properties – Inverse transforms – convolution theorem.

Z-transform – Inverse z-transform – Properties – Damping rule – Shifting rule – Initial and final value theorems. Convolution theorem – Solution of difference equations by z-transforms.

Text Books:

Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.

Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

References:
Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Understand the analyticity of complex functions and conformal mappings.

CO2: Apply Cauchy's integral formula and Cauchy's integral theorem to evaluate improper integrals along contours.

CO3: Understand the usage of Laplace transforms, Fourier transforms and z transforms.

CO4: Evaluate the Fourier series expansion of periodic functions

CO5: Understand the use of Fourier transforms and apply z transforms to solve difference equations.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	20APC0401T	3	0	0	3	CIA	30 M
Course Title	:	NETWORKS, SIGNALS AND SYSTEMS					SEE	70 M

COURSE OBJECTIVES: -

- Able to understand the importance of two port and network functions
- To realize the practical applications of resonance circuits
- Able to synthesize the passive networks
- To know different types of Signals and Systems and their properties
- To apply and analyze the properties of Signals using Fourier series, Fourier transform, and Laplace transform
- To understand the response of LTI systems for various types of analog signals given as input.
- Able to simulate various Signals and Systems and verify their properties

Unit I:

Two Port Networks and Network functions: Two Port Networks: Two port network parameters - Z, Y, ABCD and h-parameters, Relationship between parameter sets, Interconnection of two port networks, Characteristic impedance, Image transfer constant, Image and Iterative impedances.

Network functions: Driving point and transfer functions using transformed variables, Concept of poles and zeros and their location on the complex S-plane.

Unit II:

Resonance and Network Synthesis: Resonance: Definition of Q – Factor, Bandwidth of series and parallel resonant circuits, Impedance variation with frequency, Application of resonant circuits, Illustrative problems.

Network Synthesis: Realizability concept, Hurwitz property, Properties of positive -real functions, Synthesis of R-L, R-C and L-C driving point functions, Foster and Causer forms.

Unit III:

Signals & Systems and Fourier series: Signals & Systems: Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Analogy between vectors and signals-Orthogonality, mean square error,

Fourier series: Trigonometric & Exponential forms of Fourier series, Properties, Concept of discrete spectrum, Illustrative Problems.

Unit IV:

Fourier Transform and Laplace Transform: Fourier Transform: Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform. Statement and proof of sampling theorem of low pass signals, Illustrative Problems.

Laplace Transform: Definition, ROC, Properties, Inverse Laplace transforms, the s-plane and BIBO stability, Transfer functions, System Response to standard signals, Solution of differential equations with initial conditions, Illustrative Problems.

Unit V:

Signal Transmission through Linear Systems: Linear system, impulse response, Response of a linear system for different input signals, linear time-invariant (LTI) system, linear time variant (LTV) system, Transfer function of a LTI system. Filter characteristics of linear systems. Distortion less transmission through a system, Signal bandwidth, System bandwidth, Ideal LPF, HPF and BPF characteristics, Causality and Paley-Wiener criterion for physical realization, Relationship between bandwidth and rise time, Energy and Power spectral densities, Illustrative Problems.

Text Books:

A.V. Oppenheim, A.S. Willsky and S.H. Nawab, “Signals and Systems”, PHI, 2nd Edition, 2009.

William Hayt and Jack E Kemmerly, J. D. Philips, and S. M. Durbin, “Engineering Circuit Analysis”, McGraw Hill, 9th edition, November 2020.

John D. Ryder, Networks Lines and Fields, 2nd edition, Pearson, 2015.

M. E. Van Valkenburg, “Introduction to Modern Network Synthesis”, 1966.

References:

Simon Haykin and Van Veen, “Signals & Systems”, Wiley, 2nd Edition, 2005.

M. E. Van Valkenburg, “Network Analysis”, Pearson, April 2019.

BP Lathi, “Principles of Linear Systems and Signals”, Oxford University Press, 2nd Edition, 2015.

Matthew N.O. Sadiku and Warsame H. Ali, “Signals and Systems A primer with MATLAB”, CRC Press, 2016.

Hwei Hsu, “Schaum's Outline of Signals and Systems”, Fourth Edition, TMH, 2019.

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Understand the importance of two port and network functions, response of LTI systems when applied with various analog signals, understand the basic importance of resonant circuits and their applications.

CO2: Apply the basic knowledge and properties of Fourier series, Fourier transform and Laplace transform to solve for a particular response in a given network, also able to solve problems in R, L, and C based circuits.

CO3: Analyze the properties of Signals using Fourier series, Fourier transform, and Laplace transform, also to analyze the response of LTI systems for various types of analog signals given as input.

CO4: Synthesize various passive R-L, R-C, and L-C networks using Foster and Cauer forms.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	20AES0404T	3	0	0	3	CIA	30 M
Course Title	:	DIGITAL LOGIC DESIGN					SEE	70 M

COURSE OBJECTIVES: -

- To discuss different simplification methods for minimizing Boolean functions
- To learn simplification of Boolean functions and their realization using logic gates.
- To gain knowledge on Verilog fundamentals, compilers, simulators and synthesis tools.
- To understand and design various combinational logic circuits.
- To study the design of sequential logic circuits in synchronous and asynchronous modes.
- To introduce programmable logic devices and to realize switching functions using them.

Unit I:

Boolean Algebra, Minimization Methods and VHDL: Boolean Algebra and Minimization Methods: Review of Boolean Algebra and De Morgan's Theorem, SOP & POS forms, Canonical forms, Introduction to Logic Gates, Ex-OR, Ex-NOR operations, Minimization of Switching Functions: Karnaugh map method, Quine –McCluskey Tabular Minimization Method. Logic function realization: AND-OR, OR-AND and NAND/NOR realizations.

The Verilog Hardware Description Language: Design flow, program structure, libraries and packages. Structural design elements, data flow design elements, behavioral design elements.

Unit II:

Combinational Design: Binary Adders, Subtractors and BCD adder, Code converters - Binary to Gray, Gray to Binary, BCD to excess3, BCD to Seven Segment display.

Decoders (3 to 8, octal to decimal), Encoders, Priority Encoders, Multiplexers, Demultiplexers, Comparators, Implementations of Logic Functions using Decoders and Multiplexers and their HDL models, HDL modeling of code converters. Multi-level implementation of multiplexer, demultiplexers, decoder, encoder.

Unit III:

Sequential Logic Design: Latches, Flipflops, S-R, D, T, JK and Master-Slave JK FF, Edge triggered FF, flipflop conversions, set up and hold times, Ripple and Synchronous counters, Shift registers, and their HDL models.

Unit IV:

Finite State Machines and Programmable Logic Devices: Finite state machines: Introduction to FSM, Moore and Mealy sequence detector and its HDL model.

Programmable Logic Devices: ROM, Programmable Logic Devices (PLDs).

Unit V:

CMOS Logic, BIPOLAR Logic and Interfacing: CMOS LOGIC: Introduction to logic families, CMOS logic, CMOS logic families;

BIPOLAR LOGIC AND INTERFACING: Bipolar logic, Transistor logic, TTL families, CMOS/TTL interfacing, low voltage CMOS logic and interfacing, Emitter coupled logic, Comparison of logic families.

Text Books:

Morris Mano, “Digital Design” PHI, 4th Edition,2006.

. R. Padmanabhan, B Bala Tripura Sundari, Design Through Verilog HDL, Wiley 2009.

References:

Thomas L. Floyd, “Digital Fundamentals”, Pearson, 11th edition, 2015.

ZainalabdienNavabi, Verliog Digital System Design,TMH, 2nd Edition.

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Apply basic laws & De Morgan’s theorems to simplify Boolean expressions (L3).

CO2: Compare K- Map & Q-M methods of minimizing logic functions (L5).

CO3: Learn the Hardware Description Language (Verilog)

CO4: Design and analyze various combinational and sequential circuits.

CO5: Describe functional differences between different types of memories and PLDs

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	20APC0402T	3	0	0	3	CIA	30 M
Course Title	:	ANALOG CIRCUITS					SEE	70 M

COURSE OBJECTIVES: -

- To review analysis & design of single stage amplifiers using BJT & MOSFETs at low and high frequencies.
- To discuss cascading of single stage amplifiers.
- To explain effect of negative feedback on amplifier characteristics.
- To teach basic principles for analyzing RC & LC oscillator circuits.
- To introduce different types of large small amplifiers and tuned amplifiers.

Unit I:

Multistage and Differential Amplifiers: Introduction – Recap of Small Signal Amplifiers, Multistage Amplifiers, Cascade amplifier,

Darlington pair, the MOS Differential Pair, Small-Signal Operation of the MOS Differential Pair, The BJT Differential Pair, and other Nonideal Characteristics of the Differential Amplifier.

Unit II:

Frequency Response: Low-Frequency Response of the CS and CE Amplifiers, Internal Capacitive Effects and the High- Frequency Model of the MOSFET and the BJT, High-Frequency Response of the CS and CE Amplifiers, High-Frequency Response of the CG and Cascade Amplifiers, High-Frequency Response of the Source and Emitter Followers, High-Frequency Response of Differential Amplifiers and Multistage amplifiers.

Unit III:

Feedback Amplifiers: Feedback Amplifiers: Introduction, The General Feedback Structure, Some Properties of Negative Feedback, The Four Basic Feedback Topologies, The Feedback Voltage Amplifier (Series—Shunt), The Feedback Transconductance Amplifier (Series—Series), The Feedback Trans-Resistance Amplifier (Shunt—Shunt), The Feedback Current Amplifier (Shunt—Series), Summary.

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Unit IV:

Power Amplifiers: Introduction, Classification of Output Stages, Class A Output Stage, Class B Output Stage, Class AB Output Stage, CMOS Class AB Output Stages, Power BJTs, Variations on the Class AB Configuration, MOS Power Transistors.

Unit V:

Tuned Amplifiers and Multivibrators: Tuned Amplifiers: Basic Principle, Use of Transformers, Single Tuned Amplifiers, Amplifiers with multiple Tuned Circuits, Stagger Tuned Amplifiers.

Oscillators: General Considerations, Phase Shift Oscillator, Wien-Bridge Oscillator, LC Oscillators, Relaxation Oscillator, Crystal Oscillators, Illustrative Problems.

Text Books:

Adel. S. Sedra and Kenneth C. Smith, “Micro Electronic Circuits,” 6th Edition, Oxford University Press, 2011.

J. Millman, C Chalkias, “Integrated Electronics”, 4thEdition, McGraw Hill Education (India) Private Ltd., 2015.

Millman and Taub, “Pulse, Digital and Switching Waveforms”, 3rd Edition, Tata McGraw- Hill Education, 2011.

References:

Behzad Razavi, “Fundamentals of Micro Electronics”, Wiley, 2010.

Donald A Neamen, “Electronic Circuits – Analysis and Design,” 3rdEdition, McGraw Hill (India), 2019.

Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuits Theory”, 9th Edition, Pearson/Prentice Hall, 2006.

K.Lal Kishore, “Electronic Circuit Analysis”, 2ndEdition, B S Publications, 2008.

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Design multistage amplifier circuits using BJT & MOSFETs.

CO2: Choose particular type of single stage amplifier.

CO3: Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillator circuits

CO4: Classify power and tuned amplifiers.

CO5: Evaluate efficiency of large signal amplifiers and voltage regulators

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Humanity Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	20AHS5202	3	0	0	3	CIA	30 M
Course Title	:	MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS					SEE	70 M

COURSE OBJECTIVES: -

- To inculcate the basic knowledge of micro economics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Unit I:

Managerial Economics: Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

Unit II:

Production and Cost Analysis: Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and long run Production Function- Isoquants and Isocosts, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale. Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)- Managerial significance and limitations of Break-Even Analysis.

Unit III:

Business Organizations and Markets: Introduction – Nature, meaning, significance, functions and advantages. Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies.

Unit IV:

Capital Budgeting: Introduction – Nature, meaning, significance, functions and advantages. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR)
Method (sample problems).

Unit V:

Financial Accounting and Analysis: Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions- Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Text Books:

Varshney& Maheshwari: Managerial Economics, Sultan Chand, 2013.
Arya Sri: Business Economics and Financial Analysis, 4/e, MGH, 2019.

References:

Ahuja Hl Managerial economics Schand,3/e,2013
S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013.
Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.
Dominick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Define the concepts related to Managerial Economics, financial accounting and management.

CO2: Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets.

CO3: Apply the Concept of Production cost and revenues for effective Business decision.

CO4: Analyze how to invest their capital and maximize returns.

CO5: Evaluate the capital budgeting techniques Develop the accounting statements and evaluate the financial performance of business entity.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Humanity Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	20AHS5203	3	0	0	3	CIA	30 M
Course Title	:	ORGANISATIONAL BEHAVIOUR					SEE	70 M

COURSE OBJECTIVES: -

- To inculcate the basic knowledge of micro economics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy
- To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.
- To provide fundamental skills on accounting and to explain the process of preparing financial statements.

Unit I:

Introduction to Organizational Behavior: Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective

-Understanding Individual Behavior –Attitude -Perception - Learning – Personality

Unit II:

Motivation and Leading: Theories of Motivation- Maslow's Hierarchy of Needs - Hertzberg's Two Factor Theory - Vroom's theory of expectancy – Mc Cleland's theory of needs–Mc Gregor's theory X and theory Y– Adam's equity theory – Locke's goal setting theory– Alderfer's ERG theory

Unit III:

Organizational Culture: Introduction – Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader- Conflict Management -Evaluating Leader- Women and Corporate leadership

Unit IV:

Group Dynamics: Introduction – Meaning, scope, definition, Nature- Types of groups - Determinants of group behavior- Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization– Conflict resolution.

Unit V:

Organizational Change and Development: Introduction –Nature, Meaning, scope, definition and functions- Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management –Managerial implications of organization's change and development.

Text Books:

Luthans, Fred, OrganizationalBehavior, McGraw-Hill, 12 Th edition 2011
P Subba Ran, OrganizationalBehavior, Himalia Publishing House 2017.

References:

McShane, Organizational Behavior, TMH 2009
Nelson, OrganizationalBehavior, Thomson, 2009.
Robbins, P. Stephen, Timothy A. Judge, OrganizationalBehavior, Pearson 2009.
Awathappa, OrganizationalBehavior, Himalaya, 2009.

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Define the Organizational Behavior, its nature and scope.
CO2: Understand the nature and concept of Organizational behavior.
CO3: Apply theories of motivation to analyze the performance problems.
CO4: Analyze the different theories of leadership.
CO5: Evaluate group dynamics.
CO6: Evaluate group dynamics Develop as powerful leader.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Humanity Sciences	L	T	P	C	Exam	3 Hrs.
Course Code	:	20AHS5204	3	0	0	3	CIA	30 M
Course Title	:	BUSINESS ENVIRONMENT					SEE	70 M

COURSE OBJECTIVES: -

- To make the student to understand about the business environment
- To enable them in knowing the importance of fiscal and monitory policy
- To facilitate them in understanding the export policy of the country
- To Impart knowledge about the functioning and role of WTO
- To Encourage the student in knowing the structure of stock markets.

Unit I:
Overview of Business Environment: Introduction – meaning Nature, Scope, significance, functions and advantages. Types-Internal &External, Micro and Macro. Competitive structure of industries - Environmental analysis- advantages & limitations of environmental analysis& Characteristics of business

Unit II:
Fiscal & Monetary Policy: Introduction – Nature, meaning, significance, functions and advantages. Public Revenues - Public Expenditure - Evaluation of recent fiscal policy of GOI. Highlights of Budget- Monetary Policy - Demand and Supply of Money –RBI -Objectives of monetary and credit policy - Recent trends- Role of Finance Commission.

Unit III:
India’s Trade Policy: Introduction – Nature, meaning, significance, functions and advantages. Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank -Balance of Payments– Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

Unit IV:
World Trade Organization: Introduction – Nature, significance, functions and advantages. Organization and Structure - Role and functions of WTO in promoting world trade - GATT - Agreements in the Uruguay Round –TRIPS, TRIMS - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

Unit V:
Money Markets and Capital Markets: Introduction – Nature, meaning, significance, functions and advantages. Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI – Stock Exchanges - Investor protection and role of SEBI, Introduction to international finance.

Text Books:

Francis Cherunilam (2009), International Business: Text and Cases, Prentice Hall of India.

K. Aswathappa, Essentials of Business Environment: Texts and Cases & Exercises 13th Revised Edition.HPH2016.

References:

K. V. Sivayya, V. B. M Das (2009), Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.

Sundaram, Black (2009), International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.

Chari. S. N (2009), International Business, Wiley India.

4.E. Bhattacharya (2009), International Business, Excel Publications, New Delhi

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Define Business Environment and its Importance.

CO2: Understand various types of business environment.

CO3: Apply the knowledge of Money markets in future investment.

CO4: Analyze India's Trade Policy.

CO5: Evaluate fiscal and monitory policy Develop a personal synthesis and approach for identifying business opportunities.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	20APC0401P	0	0	3	1.5	CIA	30 M
Course Title	:	NETWORKS, AND SIMULATION LAB					SEE	70 M

COURSE OBJECTIVES: -

- Able to understand how to use the laboratory equipment/Software while conducting the experiments/developing the code for given experiment.
- Calculate the bandwidth, quality factor in case of series and parallel resonant circuits by plotting graphs.
- Able to analyze the properties of Signals using Fourier series, Fourier transform, and Laplace transform, also to analyze the response of LTI systems through simulations using MATLAB/equivalent software.
- Able to Design/Simulate R-C, R-L, L-C, R-L-C series and R-L-C parallel resonant circuits and verify their important parameters experimentally.

LIST OF EXPERIMENTS:
Hardware Lab:

1. Conduct experiment to find /measure characteristic, image, and iterative impedances of a resistive network.
2. Find the Z/Y parameters for a given network and verify the same experimentally.
3. Find the h- parameters for a given circuit and verify the same experimentally.
4. Design a series resonant circuit for a given resonant frequency and verify its resonant frequency, bandwidth and quality factor experimentally.
5. Design a parallel resonant circuit for a given resonant frequency and verify its resonant frequency, bandwidth and quality factor experimentally.
6. Realize the transfer functions/network functions of R-C/R-L/L-C using Foster/Cauer forms in the laboratory.
7. Software Lab (using MATLAB or Equivalent):
8. Write a program to generate various Signals and Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc function.
9. Perform operations on Signals and Sequences: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
10. Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings- Plot the discrete spectrum of the signal.
11. Write a program to find Fourier transform of a given signal. Plot its amplitude and phase spectrum.

12. Write a program to verify Linearity and Time Invariance properties of a given Continuous System.
13. Write a program to find magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
14. Generate a Random Signal with signaling rate 10kbits/s. Plot the same for a time period of 0.2 sec.
15. To plot pole-zero diagram in S-plane of given signal/sequence and verify its stability.

References:

Stephen J. Chapman, "MATLAB Programming for Engineers", Cengage, November 2012.

Online Learning Resources/Virtual Labs:

https://www.vlab.co.in/

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Understand how to use the laboratory equipment while conducting the experiments/developing the code for given experiment.

CO2: Observe the various impedances for passive networks, resonant/impedance curves for both series and parallel resonant circuits by plotting graphs.

CO3: Analyze the properties of Signals using Fourier series, Fourier transform, and Laplace transform, also to analyze the response of LTI systems through simulations using MATLAB/equivalent software.

CO4: Design/Simulate R-C, R-L, L-C, R-L-C series and R-L-C parallel resonant circuits and verify their important parameters experimentally.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	20AES0404P	0	0	3	1.5	CIA	30 M
Course Title	:	DIGITAL DESIGN LAB					SEE	70 M

COURSE OBJECTIVES: -

- To get the knowledge about functionality of various digital circuits (logic gates, adders, subtractors, converters, multiplexers and comparators.)
- To use computer-aided design tools for development of complex digital logic circuits
- To understand the functionality of various Digital ICs.

LIST OF EXPERIMENTS:

Note: List of Experiments: (Any 4 Experiments are to be conducted)

1. Realization of Boolean Expressions using Gates
2. Design and realization of logic gates using universal gates
3. Generation of clock using NAND / NOR gates
4. Design a 4 – bit Adder / Subtractor
5. Design and realization of a 4 – bit Gray to Binary and Binary to Gray Converter
6. Design and realization of 8x1 MUX using 2x1 MUX
7. Design and realization of 4-bit comparator

Note: List of Experiments: (Any 8 Experiments are to be conducted)

1. Write a Verilog code to Simulate and synthesize the following in Gate level, Data flow and Behavioral Modeling styles.
2. Logic Gates.
3. Adders and Subtractors.
4. Multiplexers and De-multiplexers.
5. Encoders, Decoders, Comparator.
6. Implementation of logic function using Multiplexers and Decoders.
7. Arithmetic and Logic Unit.
8. Flip-Flops.
9. Up, Down and UP/Down Counters.
10. Sequence Detector using Mealy and Moore type state machines.

Online learning resources/Virtual Labs: https://www.vlab.co.in/

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Understand the functionality of various digital circuits.

CO2: Use computer-aided design tools for development of digital logic circuits.

CO3:Learn the functionality of various Digital ICs.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Professional Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	20APC0402P	0	0	3	1.5	CIA	30 M
Course Title	:	ANALOG CIRCUITS LAB					SEE	70 M

COURSE OBJECTIVES: -

- To review analysis & design of single stage amplifiers using BJT & MOSFETs at low and high frequencies.
- To understand the characteristics of Differential amplifiers, feedback and power amplifiers.
- To examine the response of tuned amplifiers and multivibrators
- To categorize different oscillator circuits based on the application
- To design the electronic circuits for the given specifications and for a given application.

LIST OF EXPERIMENTS:

Note: Note: Student has to perform at least 12 experiments.

1. Darlington pair.
2. Two stage RC coupled Amplifier.
3. CE – CC multistage Amplifier
4. Cascade Amplifier.
5. Differential Amplifier
6. Voltage – Series feedback amplifier
7. Current– Shunt feedback amplifier
8. Class A power amplifier
9. Class AB amplifier
10. RC phase shift oscillator
11. LC Oscillator
12. Single Tuned amplifier

Online learning resources/Virtual Labs: https://www.vlab.co.in/

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Know about the usage of equipment/components/software tools used to conduct the experiments in analog circuits.

CO2: Conduct the experiment based on the knowledge acquired in the theory about various analog circuits using BJT/MOSFETs to find the important parameters of the circuit (viz. Voltage gain, Current gain, bandwidth, input and output impedances etc.) experimentally.

CO3: Analyze the given analog circuit to find required important metrics of it theoretically.

CO4: Draw the relevant graphs between important metrics of the system from the observed measurements.

CO5: Compare the experimental results with that of theoretical ones and infer the conclusions.

CO6: Design the circuit for the given specifications

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Skill Course	L	T	P	C	Exam	3 Hrs.
Course Code	:	20ASC0501	1	0	2	2	CIA	30 M
Course Title	:	Application Development with Python					SEE	70 M

COURSE OBJECTIVES: -

- To learn the basic concepts of software engineering and life cycle models
- To explore the importance of Databases in application Development
- Acquire programming skills in core Python
- To understand the importance of Object-oriented Programming.

Module 1. Basic concepts in software engineering and software project management
Basic concepts: abstraction versus decomposition, the evolution of software engineering techniques, Software development life cycle
Software project management: project planning and project scheduling
Task:
1. Identifying the Requirements from Problem Statements
Module 2. Basic Concepts of Databases
Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Relational Databases, Data Definition Language (DDL) Statements: (Create table, alter table, Drop table), Data Manipulation Language (DML) Statements
Task:
Implement Data Definition Language (DDL) Statements: (Create table, alter table, Drop table)
Implement Data Manipulation Language (DML) Statements
Module 3. Python Programming:
Introduction to Python: Features of Python, Data types, Operators, Input and output, Control Statements, Looping statements
Python Data Structures: Lists, Dictionaries, Tuples.
Strings: Creating strings and basic operations on strings, string testing methods.
Functions: Defining a function- Calling a function- Types of functions-Function Arguments-Anonymous functions- Global and local variables
OOPS Concepts; Classes and objects- Attributes- Inheritance- Overloading- Overriding- Data hiding

Modules and Packages: Standard Modules-Importing own module as well as external modules Understanding Packages Powerful Lambda function in python Programming using functions, modules and external packages

Working with Data in Python: Printing on screen- Reading data from keyboard- Opening and closing file- Reading and writing files- Functions-Loading Data with Pandas-NumPy

Tasks:

1.OPERATORS

a.Read a list of numbers and write a program to check whether a particular element is present or not using membership operators.

b.Read your name and age and write a program to display the year in which you will turn 100 years old.

c.Read radius and height of a cone and write a program to find the volume of a cone.

d.Write a program to compute distance between two points taking input from the user (Hint: use Pythagorean theorem)

2.CONTROL STRUCTURES

a.Read your email id and write a program to display the no of vowels, consonants, digits and white spaces in it using if…elseif…else statement.

b.Write a program to create and display a dictionary by storing the antonyms of words. Find the antonym of a particular word given by the user from the dictionary using while loop.

c.Write a Program to find the sum of a Series 1/1! + 2/2! + 3/3! + 4/4! +……. + n/n! (Input: n = 5, Output: 2.70833)

d.In number theory, an abundant number or excessive number is a number for which the sum of its proper divisors is greater than the number itself. Write a program to find out, if the given number is abundant. (Input: 12, Sum of divisors of 12 = 1 + 2 + 3 + 4 + 6 = 16, sum of divisors 16 > original number 12)

3: LIST

a.Read a list of numbers and print the numbers divisible by x but not by y (Assume x = 4 and y = 5).

b.Read a list of numbers and print the sum of odd integers and even integers from the list. (Ex: [23, 10, 15, 14, 63], odd numbers sum = 101, even numbers sum = 24)

c.Read a list of numbers and print numbers present in odd index position. (Ex: [10, 25, 30, 47, 56, 84, 96], The numbers in odd index position: 25 47 84).

d.Read a list of numbers and remove the duplicate numbers from it. (Ex: Enter a list with duplicate elements: 10 20 40 10 50 30 20 10 80, The unique list is: [10, 20, 30, 40, 50, 80])

4: TUPLE

a.Given a list of tuples. Write a program to find tuples which have all elements divisible by K from a list of tuples. test list = [(6, 24, 12), (60, 12, 6), (12, 18, 21)], K = 6, Output: [(6, 24, 12), (60, 12, 6)]

b.Given a list of tuples. Write a program to filter all uppercase character's tuples from given list of tuples. (Input: test list = [("GFG", "IS", "BEST"), ("GFg", "AVERAGE"), ("GfG",), ("Gfg", "CS")], Output : [(„GFG‟, „IS‟, „BEST‟)]).

c.Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input: tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output: 3)

5: SET

a.Write a program to generate and print a dictionary that contains a number (between 1 and n) in the form (x, x*x).

b.Write a program to perform union, intersection and difference using Set A and Set B.

c.Write a program to count number of vowels using sets in given string (Input : "Hello World", Output: No. of vowels : 3)

d.Write a program to form concatenated string by taking uncommon characters from two strings using set concept (Input: S1 = "aacdb", S2 = "gafd", Output: "cbgf").

6: DICTIONARY

a. Write a program to do the following operations:
i.Create a empty dictionary with dict() method
ii.Add elements one at a time
iii.Update existing key's value
iv.Access an element using a key and also get () method
v.Deleting a key value using del () method
b. Write a program to create a dictionary and apply the following methods:
i. pop () method
ii. pop item () method
iii. clear () method
c. Given a dictionary, write a program to find the sum of all items in the dictionary.
d. Write a program to merge two dictionaries using update () method.

7: STRINGS

a.Given a string, write a program to check if the string is symmetrical and palindrome or not. A string is said to be symmetrical if both the halves of the string are the same and a string is said to be a palindrome string if one half of the string is the reverse of the other half or if a string appears same when read forward or backward.
b.Write a program to read a string and count the number of vowel letters and print all letters except 'e' and 's'.
c.Write a program to read a line of text and remove the initial word from given text. (Hint: Use split () method, Input: India is my country. Output: is my country)
d.Write a program to read a string and count how many times each letter appears. (Histogram).

8: USER DEFINED FUNCTIONS

a.A generator is a function that produces a sequence of results instead of a single value. Write a generator function for Fibonacci numbers up to n.
b.Write a function merge_dict (dict1, dict2) to merge two Python dictionaries.
c.Write a fact () function to compute the factorial of a given positive number.
d.Given a list of n elements, write a linear search () function to search a given element x in a list.

9: BUILT-IN FUNCTIONS

a.Write a program to demonstrate the working of built-in statistical functions mean (), mode (), median () by importing statistics library.
b.Write a program to demonstrate the working of built-in trigonometric functions sin (), cos (), tan (), hypot (), degrees (), radians () by importing math module.
c.Write a program to demonstrate the working of built-in Logarithmic and Power functions exp (), log (), log2(), log10(), pow () by importing math module.
d.Write a program to demonstrate the working of built-in numeric functions ceil (), floor (), fabs (), factorial (), gcd() by importing math module.

10. CLASS AND OBJECTS

a. Write a program to create a Bank Account class. Your class should support the following methods for
i)Deposit
ii)Withdraw
iii)Get Balance
iv)PinChange
b. Create a SavingsAccount class that behaves just like a BankAccount, but also has an interest rate

and a method that increases the balance by the appropriate amount of interest (Hint:use Inheritance).
c. Write a program to create an employee class and store the employee's name, id, age, and salary using the constructor. Display the employee details by invoking employee info() method and also using dictionary (dict).
d. Access modifiers in Python are used to modify the default scope of variables. Write a program to demonstrate the 3 types of access modifiers: public, private and protected.

11. FILE HANDLING

a.Write a program to read a filename from the user, open the file (say firstFile.txt) and then perform the following operations:
i.Count the sentences in the file.
ii.Count the words in the file.
iii.Count the characters in the file.
b.Create a new file (Hello.txt) and copy the text to another file called target.txt. The target.txt file should store only lower-case alphabets and display the number of lines copied.
c.Write a Python program to store N student's records containing name, roll number and branch. Print the given branch student's details only.

References:

Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.
RamezElmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013.
3
Reema Thareja, "Python Programming - Using Problem Solving Approach", Oxford Press, 1st Edition, 2017.
Larry Lutz, "Python for Beginners: Step-By-Step Guide to Learning Python Programming", CreateSpace Independent Publishing Platform, First edition, 2018.

COURSE OUTCOMES:

After the completion of the course students will able to
CO1: Identify the issues in software requirements specification and enable to write SRS documents for software development problems.
CO2: Explore the use of Object-oriented concepts to solve Real-life problems.
CO3: Design database for any real-world problem.
CO4: Solve mathematical problems using Python programming language.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(III Semester ECE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	
Course Code	:	20AMC9902	3	0	0	0	CIA	30 M
Course Title	:	UNIVERSAL HUMAN VALUES					SEE	

COURSE OBJECTIVES: -

- Development of a holistic perspective based on self-exploration about themselves (human being), family, society and nature/existence.
- Understanding (or developing clarity) of the harmony in the human being, family, society and nature/existence
- Strengthening of self-reflection.
- Development of commitment and courage to act.

Unit I:

Course Introduction - Need, Basic Guidelines, Content and Process for Value Education: Purpose and motivation for the course, recapitulation from Universal Human Values-I
Self-Exploration–what is it? - Its content and process; ‘Natural Acceptance’ and Experiential Validation- as the process for self-exploration
Continuous Happiness and Prosperity- A look at basic Human Aspirations
Right understanding, Relationship and Physical Facility- the basic requirements for fulfilment of aspirations of every human being with their correct priority
Understanding Happiness and Prosperity correctly- A critical appraisal of the current scenario Method to fulfil the above human aspirations: understanding and living in harmony at various levels.
Include practice sessions to discuss natural acceptance in human being as the innate acceptance for living with responsibility (living in relationship, harmony and co-existence) rather than as arbitrariness in choice based on liking-disliking.

Unit II:

Understanding Harmony in the Human Being - Harmony in Myself!Understanding human being as a co-existence of the sentient ‘I’ and the material ‘Body’ Understanding the needs of Self (‘I’) and ‘Body’ - happiness and physical facility Understanding the Body as an instrument of ‘I’ (I being the doer, seer and enjoyer) Understanding the characteristics and activities of ‘I’ and harmony in ‘I’
Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
Programs to ensure Sanyam and Health.
Include practice sessions to discuss the role others have played in making material goods available to me. Identifying from one’s own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with disease

Unit III:

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship: Understanding values in human-human relationship; meaning of Justice (nine universal values in relationships) and program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
Understanding the meaning of Trust; Difference between intention and competence

Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship

Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals

Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real life examples, teacher-student relationship, goal of education etc. Gratitude as a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Unit IV:

Understanding Harmony in the Nature and Existence - Whole existence as Coexistence: Understanding the harmony in the Nature

Interconnectedness and mutual fulfilment among the four orders of nature- recyclability and self-regulation in nature

Understanding Existence as Co-existence of mutually interacting units in all- pervasive space Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human being as cause of imbalance in nature (film "Home" can be used), pollution, depletion of resources and role of technology etc

Unit V:

Implications of the above Holistic Understanding of Harmony on Professional Ethics: Natural acceptance of human values Definitiveness of Ethical Human Conduct

Basis for Humanistic Education, Humanistic Constitution and Humanistic Universal Order

Competence in professional ethics: a. Ability to utilize the professional competence for augmenting universal human order b. Ability to identify the scope and characteristics of people friendly and eco-friendly production systems, c. Ability to identify and develop appropriate technologies and management patterns for above production systems.

Case studies of typical holistic technologies, management models and production systems Strategy for transition from the present state to Universal Human Order:

a.At the level of individual: as socially and ecologically responsible engineers, technologists and managers

b.At the level of society: as mutually enriching institutions and organizations Sum up.

Include practice Exercises and Case Studies will be taken up in Practice (tutorial) Sessions e.g. To discuss the conduct as an engineer or scientist etc.

Text Books:

R R Gaur, R Asthana, G P Bagaria, "A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1

R R Gaur, R Asthana, G P Bagaria, "Teachers' Manual for A Foundation Course in Human Values and Professional Ethics", 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2.

References:

Jeevan Vidya: EkParichaya, A Nagaraj, Jeevan Vidya Prakashan, Amar kantak, 1999.

A. N. Tripathi, "Human Values", New Age Intl. Publishers, New Delhi, 2004. The Story of Stuff (Book).

Mohandas Karamchand Gandhi "The Story of My Experiments with Truth"

E. FSchumacher. "Small is Beautiful" Slow is Beautiful –Cecile Andrews

J C Kumarappa “Economy of Permanence”.

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Students are expected to become more aware of themselves, and their surroundings (family, society, nature).

CO2: They would become more responsible in life, and in handling problems with sustainable solutions, while keeping human relationships and human nature in mind.

CO3: They would have better critical ability.

CO4: They would also become sensitive to their commitment towards what they have understood (human values, human relationship and human society

CO5: It is hoped that they would be able to apply what they have learnt to their own self in different day- to-day settings in real life, at least a beginning would be made in this direction.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

DEPARTMENT OF MECHANICAL ENGINEERING

COURSE STRUCTURE AND DETAILED SYLLABUS

REGULATION: RU20

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

RAYALASEEMA UNIVERSITY,

Pasupula, Kurnool District, Andhra Pradesh 518002

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

Course Structure & Syllabus for First Year Regular B.Tech. Degree Program

(Effective for the batches admitted from 2020-21 onwards)

MECHANICAL ENGINEERING

INDUCTION PROGRAM (3 weeks duration)

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

B. Tech – I Semester (Theory – 4, Lab – 5)

S.No	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5401	Linear Algebra and Calculus	3	0	0	3	30	70	100
2	BS	20ABS5602T	Engineering Physics	3	0	0	3	30	70	100
3	ES	20AES0201T	Basic Electrical and Electronics Engineering	3	0	0	3	30	70	100
4	ES	20AES0501T	C-Programming & Data Structures	3	0	0	3	30	70	100
PRACTICAL										
5	BS	20ABS5602P	Engineering Physics Lab	0	0	3	1.5	30	70	100
6	ES	20AES0201P	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5	30	70	100
7	ES	20AES0501P	C-Programming & Data Structures Lab	0	0	3	1.5	30	70	100
8	ES	20AES0302	Engineering Workshop	0	0	3	1.5	30	70	100
9	ES	20AES0502	IT Workshop	0	0	3	1.5	30	70	100
			TOTAL:	**12**	**00**	**15**	**19.5**	**270**	**630**	**900**

B. Tech – II Semester (Theory – 6, Lab – 4)

S.No	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5402	Differential Equations and Vector Calculus	3	0	0	3	30	70	100
2	BS	20ABS5102T	Engineering Chemistry	3	0	0	3	30	70	100
3	HS	20AHS5201T	Communicative English	3	0	0	3	30	70	100
4	ES	20AES0301T	Engineering Drawing	1	0	2	2	30	70	100
5	ES	20AES0303T	Material Science & Engineering	3	0	0	3	30	70	100
6	MC	20AMC9902	Universal Human Values	3	0	0	0	30	-	30
PRACTICAL										
7	BS	20ABS5102P	Engineering Chemistry Lab	0	0	3	1.5	30	70	100
8	HS	20AHS5201P	Communicative English Lab	0	0	3	1.5	30	70	100
9	ES	20AES0301P	Engineering Graphics Lab	0	0	2	1	30	70	100
10	ES	20AES0303P	Material Science & Engineering Lab	0	0	3	1.5	30	70	100
			TOTAL:	**16**	**00**	**13**	**19.5**	**300**	**630**	**930**

B. Tech – III Semester (Theory – 6, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5404	Complex variables, Transforms & PDE	3	0	0	3	30	70	100
2	PC	20APC0301T	Fluid Mechanics & Hydraulic Machines	3	0	0	3	30	70	100
3	PC	20APC0302T	Manufacturing Processes	3	0	0	3	30	70	100
4	PC	20APC0303	Thermodynamics	3	0	0	3	30	70	100
5	ES	20AES0304T	Mechanics of Materials	3	0	0	3	30	70	100
6	MC	20AMC9901	Environmental Sciences	3	0	0	0	50	--	50
PRACTICAL										
7	PC	20APC0301P	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	1.5	30	70	100
8	PC	20APC0302P	Manufacturing Processes Lab	0	0	3	1.5	30	70	100
9	ES	20AES0304P	Mechanics of Materials Lab	0	0	3	1.5	30	70	100
10	SC	20ASC0501	Application Development with Python	1	0	2	2	30	70	100
			TOTAL:	**19**	**0**	**11**	**21.5**	**320**	**630**	**950**

B. Tech – IV Semester (Theory –6, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5408	Numerical Methods and Probability Theory	3	0	0	3	30	70	100
2	PC	20APC0304T	Applied Thermodynamics	3	0	0	3	30	70	100
3	PC	20APC0306	Kinematics of Machinery	3	0	0	3	30	70	100
4	PC	20APC0307T	Manufacturing Technology	3	0	0	3	30	70	100
5	HS	20AHS5202	Managerial Economics & Financial Analysis	3	0	0	3	30	70	100
6	MC	20AMC9903	Biology For Engineers	3	0	0	0	50	--	50
PRACTICAL										
7	PC	20APC0304P	Applied Thermodynamics Lab	0	0	3	1.5	30	70	100
8	PC	20APC0307P	Manufacturing Technology Lab	0	0	3	1.5	30	70	100
9	PC	20APC0305	Computer Aided Machine Drawing	0	0	3	1.5	30	70	100
10	SC	20ASC9901	Soft skills	1	0	2	2	30	70	100
11	--	--	NSS/NCC/NSO Activities	0	0	2	0	--	--	--
			TOTAL:	**19**	**0**	**20**	**21.5**	**320**	**630**	**950**
Mandatory Community Service Internship for 6 weeks duration during Summer Vacation										

Note:

1. Eligible and interested students can register either for Honors or for a Minor in IV Semester as per the guidelines issued by the University
2. Students shall register for NCC/NSS/NSO activities and will be required to participate in an activity for two hours in a week during fourth semester.
3. Lateral entry students shall undergo a bridge course in Mathematics during third semeste

DETAILED SYLLABUS

B.TECH - I SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, CSE, ECE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5401	3	0	0	3	CIE	30 M
Course Title	:	LINEAR ALGEBRA AND CALCULUS					SEE	70 M

COURSE OBJECTIVES:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

Bridge Course: Limits, continuity, Types of matrices

Unit I: Matrices **(10 hrs)**

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous equations linear equations. Eigenvalues and Eigenvectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors (L3).
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

Unit II: Mean Value Theorems **(06 hrs)**

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), related problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)
- Analyze the behaviour of functions by using mean value theorems (L3)

Unit III: Multivariable calculus **(10 hrs)**

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

Unit IV: Multiple Integrals **(10 hrs)**

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates. Finding areas and volumes using double and triple integrals.

Learning Outcomes:

- At the end of this unit, the student will be able to
- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

Unit V: Beta and Gamma functions **(06 hrs)**

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand beta and gamma functions and its relations (L2)
- Conclude the use of special function in evaluating definite integrals (L4)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education

Course Outcomes:

At the end of the course, the student will be able to

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- Familiarize with functions of several variables which is useful in optimization (L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5602T	3	0	0	3	CIA	30 M
Course Title	:	ENGINEERING PHYSICS					SEE	70 M

COURSE OBJECTIVES:

- To make a bridge between the physics in school and engineering courses.
- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications.
- To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications.
- Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nano materials, their properties and applications in modern emerging technologies are elicited.
- To familiarize the concepts of theoretical acoustics to practical use in engineering field. To explain the significance of ultrasound and its application in NDT for diversified engineering application.
- To enlighten the periodic arrangement of atoms in crystals, Bragg's law and to provide fundamentals related to structural analysis through laue and powder diffraction methods.

UNIT I: Wave Optics (12 hrs)

Interference- Principle of superposition – Interference of light – Conditions for sustained interference - Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates with applications.

Learning Outcomes:

The students will be able to

1. **Explain** the need of coherent sources and the conditions for sustained interference (L2)
2. **Identify** engineering applications of interference (L3)
3. **Analyze** the differences between interference and diffraction with applications (L4)
4. **Illustrate** the concept of polarization of light and its applications (L2)
5. **Classify** ordinary polarized light and extraordinary polarized light (L2)

Unit II: Lasers and Fiber optics (08 hrs)

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers.

Fiber optics: Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Propagation Losses (qualitative) – Applications.

Learning Outcomes:

The students will be able to

1. **Understand** the basic concepts of LASER light Sources (L2)
2. **Apply** the concepts to learn the types of lasers (L3)
3. **Identifies** the Engineering applications of lasers (L2)
4. **Explain** the working principle of optical fibers (L2)
5. **Classify** optical fibers based on refractive index profile and mode of propagation (L2)
6. **Identify** the applications of optical fibers in various fields (L2)

Unit III: Engineering Materials (08 hrs)

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic and Ionic, Orientation polarizations (Qualitative) – Lorentz internal field – Clausius-Mossotti equation-Dielectric loss.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para & Ferro – Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Nanomaterials- Introduction – Surface area and quantum confinement – Physical properties: electrical and magnetic properties – Synthesis of nanomaterials: Top-down: Ball Milling – Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.

Learning Outcomes:

The students will be able to

1. **Explain** the concept of dielectric constant and polarization in dielectric materials (L2)
2. **Summarize** various types of polarization of dielectrics (L2)
3. **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics(L2)
4. **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
5. **Explain** the applications of dielectric and magnetic materials (L2)
6. **Apply** the concept of magnetism to magnetic devices (L3)
7. **Identify** the nano size dependent properties of nanomaterials (L2)
8. **Illustrate** the methods for the synthesis and characterization of nanomaterials (L2)
9. **Apply** the basic properties of nanomaterials in various Engineering branches (L3).

Unit IV: Acoustics and Ultrasonics (10 hrs)

Acoustics- Introduction – Requirements of acoustically good auditorium – Reverberation – Reverberation time – Sabine's formula (Derivation using growth and decay method) – Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedies.

Ultrasonics: Introduction – Properties – Production by magnetostriction and piezoelectric methods – Detection – Acoustic grating – Non Destructive Testing – Pulse echo system through transmission and reflection modes – Applications.

Learning Outcomes:

The students will be able to

1. **Explain** how sound is propagated in buildings (L2)
2. **Analyze** acoustic properties of typically used materials in buildings (L4)
3. **Recognize** sound level disruptors and their use in architectural acoustics (L2)
4. **Identify** the use of ultrasonics in different fields (L3)

Unit-V: Crystallography and X-ray diffraction (08 hrs)

Crystallography- Space lattice, Basis, unit cell and lattice parameters – Bravais Lattice – Crystal systems – Packing fraction – Coordination number – Packing fraction of SC, BCC & FCC – Miller indices – Separation between successive (hkl) planes.

X-Ray Diffraction- Bragg's law – Bragg's X-ray diffractometer – Crystal structure determination by Powder method.

Learning Outcomes:

The students will be able to

- **Classify** various crystal systems (L2)
- **Identify** different planes in the crystal structure (L3)
- **Analyze** the crystalline structure by Bragg's X-ray diffractometer (L4)
- **Apply** powder method to measure the crystallinity of a solid (L4)

Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press.

Reference Books:

1. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
2. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
3. Engineering Physics – M.R. Srinivasan, New Age Publications
4. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers

COURSE OUTCOMES:

1. **Explain** the need of coherent sources and the conditions for sustained interference (L2). **Identify** applications of interference in engineering (L3). **Analyze** the differences between interference and diffraction with applications (L4). **Illustrate** the concept of polarization of light and its applications (L2). **Classify** ordinary polarized light and extraordinary polarized light (L2) The different realms of physics and their applications in both scientific and technological systems are achieved through the study of wave optics.
2. **Explain** various types of emission of radiation (L2). **Identify** the role of laser in engineering applications (L3). **Describe** the construction and working principles of various types of lasers (L1). **Explain** the working principle of optical fibers (L2). **Classify** optical fibers based on refractive index profile and mode of propagation (L2). **Identify** the applications of optical fibers in medical, communication and other fields (L2). **Apply** the fiber optic concepts in various fields (L3).

3. **Explain** the concept of dielectric constant and polarization in dielectric materials (L2). **Summarize** various types of polarization of dielectrics (L2). **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics (L2). **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2). **Explain** the applications of dielectric and magnetic materials (L2). **Apply** the concept of magnetism to magnetic devices (L3)
4. **Explain** sound waves and its propagation /interaction with construction material in design of buildings (L2). **Analyze** acoustic parameters of typically used materials in buildings (L4). **Recognize** sound level disruptors and their application in architectural acoustics (L2). **Identify** the use of ultrasonics in diversified fields of engineering (L3).
5. **Interpret** various crystal systems (L2) and **Analyze** the characterization of materials by XRD (L4). **Identify** the important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction technique is focused (L3). **Explain** the structure of the crystals by Laue and Powder techniques (L2).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, CSE and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0201T	3	0	0	3	CIA	30 M
Course Title	:	BASIC ELECTRICAL & ELECTRONICS ENGG.					SEE	70 M

PART-A: BASIC ELECTRICAL ENGINEERING

COURSE OBJECTIVES:-

- To introduce basics of electric circuits.
- To teach DC and AC electrical circuit analysis.
- To explain working principles of transformers and electrical machines.
- To impart knowledge on Power system generation, transmission and distribution

UNIT I: DC & AC Circuits

Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power – power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits, Resonance.

Learning Outcomes

At the end of this unit, the student will be able to

- Recall Kirchoff laws
- Analyze simple electric circuits with DC excitation
- Apply network theorems to simple circuits
- Analyze single phase AC circuits consisting of series RL - RC - RLC combinations

UNIT II: DC & AC Machines:

Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC tests on transformer - Principle and operation of 3-phase AC machines [Elementary treatment only]

Learning Outcomes

At the end of this unit, the student will be able to

- Explain principle and operation of DC Generator & Motor.
- Perform speed control of DC Motor
- Explain operation of transformer and induction motor.
- Explain construction & working of induction motor - DC motor

UNIT III: Basics of Power Systems

Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

Learning Outcomes

At the end of this unit, the student will be able to

- Understand working operation of various generating stations
- Explain the types of Transmission and Distribution systems

Text Books:

1. D. P. Kothari and I. J. Nagrath - “Basic Electrical Engineering” - Tata McGraw Hill - 2010.
2. V.K. Mehta & Rohit Mehta, “Principles of Power System” – S.Chand – 2018.

References:

1. L. S. Bobrow - “Fundamentals of Electrical Engineering” - Oxford University Press - 2011.
2. E. Hughes - “Electrical and Electronics Technology” - Pearson - 2010.
3. C.L. Wadhwa – “Generation Distribution and Utilization of Electrical Energy”, 3rd Edition, New Age International Publications.

Course Outcomes:

The student should be able to

- Apply concepts of KVL/KCL in solving DC circuits
- Understand and choose correct rating of a transformer for a specific application
- Illustrate working principles of DC Motor
- Identify t ype of electrical machine based on their operation
- Understand the basics of Power generation, Transmission and Distribution

PART-B: ELECTRONICS ENGINEERING

COURSE OBJECTIVES:-

- **Understand principles and terminology of electronics.**
- **Familiar with the theory, construction, and operation of electronic devices.**
- **Learn about biasing of BJTs and FETs.**
- **Design and construct amplifiers.**
- **Understand the concept & principles of logic devices.**

Unit I:

Diodes and Applications: Semiconductor Diode, Diode as a Switch& Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Operation and Applications of Zener Diode, LED, Photo Diode.

Transistor Characteristics: Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Biasing of Transistor Configuration; Field Effect Transistor (FET) – Construction, Characteristics of Junction FET, Concepts of Small Signal Amplifiers –CE & CC Amplifiers.

Learning outcomes:

1. Remember and understand the basic characteristics of semiconductor diode. (L1)
2. Understand principle of operation of Zener diode and other special semiconductor diodes. (L1)
3. Analyze BJT based biasing circuits. (L3)
4. Design an amplifier using BJT based on the given specifications. (L4)

Unit II:

Operational Amplifiers and Applications: Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; Op-Amp Applications - Inverting, Non-Inverting, Summing and Difference Amplifiers, Voltage Follower, Comparator, Differentiator, Integrator.

Learning outcomes:

1. Describe operation of Op-Amp based linear application circuits, converters, amplifiers and non-linear circuits. (L2)
2. Analyze Op-Amp based comparator, differentiator and integrator circuits. (L3)

Unit III:

Digital Electronics: Logic Gates, Simple combinational circuits–Half and Full Adders, BCD Adder. Latches and Flip-Flops (S-R, JK and D), Shift Registers and Counters. Introduction to Microcontrollers and their applications (Block diagram approach only).

Learning outcomes:

1. Explain the functionality of logic gates. (L2)
2. Apply basic laws and De Morgan's theorems to simplify Boolean expressions. (L3)
3. Analyze standard combinational and sequential circuits. (L4)
4. Distinguish between 8085 & 8086 microprocessors also summarize features of a microprocessor. (L5)

Text Books:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices &Circuit Theory, Pearson Education,2007.
2. Ramakanth A. Gayakwad, Op-Amps & Linear ICs, 4thEdition, Pearson, 2017.
3. R. P. Jain, Modern Digital Electronics,3rd Edition, Tata Mcgraw Hill,2003.
4. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, 2nd Edition, Pearson, 2012.

Reference Books:

1. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India,2002.
2. R. S. Sedha, A Text Book of Electronic Devices and Circuits, S.Chand& Co,2010.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Explain the theory, construction, and operation of electronic devices.

CO2: Apply the concept of science and mathematics to explain the working of diodes and its applications, working of transistor and its characteristics.

CO3: Design and analyze small signal amplifier circuits applying the biasing techniques.

CO4: Solve problems of various digital logic gates and circuits.

CO5: Correlate the fundamental concepts to various Real life applications of today.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0501T	3	0	0	3	CIE	30 M
Course Title	:	C PROGRAMMING & DATA STRUCTURES					SEE	70 M

COURSE OBJECTIVES:

- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures of C Programming Language.
- To discuss the syntax and semantics of C Programming language
- To familiarize with Stack, Queue, Linked lists, Tree and graph data structures.
- To demonstrate programming by choosing appropriate Data Structures and Features of the C language.

Unit I:

Getting Started: What is C, The C Character Set, Constants, Variables and Keywords, Types of C Constants, Rules for Constructing Integer Constants, Rules for Constructing Real Constants, Rules for Constructing Character Constants, Types of C Variables, Rules for Constructing Variable Names, C Keywords, Form of a C Program, Comments in a C Program, What is main, Variables and their Usage, printf( ) and its Purpose, Compilation and Execution, Receiving Input.

Data Types Revisited: Integers, long and short, Integers, signed and unsigned, Chars, signed and unsigned, Floats and Doubles, A Few More Issues, Storage Classes in C-Automatic Storage Class, Register Storage Class, Static Storage Class, and External Storage Class.

C Instructions: Types of Instructions, Type Declaration Instruction, Arithmetic Instructions, Integer and Float Conversions, Type Conversion in Assignments, Hierarchy of Operations, Associativity of Operators, Control Instructions.

Decision Control Instruction: Decisions! Decisions, The if Statement, The Real Thing, Multiple Statements within if, The if-else Statement, Nested if-elses, Forms of if.

Learning Outcomes:

1. Understand the basic concepts of C language (L2)
2. Learn the functionality of operators and Control Statements of C (L2)
3. Use the if control structure of the C language (L3)

Unit II:

More Complex Decision Making: Use of Logical Operators, The else if Clause, The ! Operator, Hierarchy of Operators Revisited, a Word of Caution, the Conditional Operators.

Loop Control Instruction: Loops, the while Loop, Tips and Traps, More Operators.

More Complex Repetitions: The for Loop, Nesting of Loops, Multiple Initializations in the for Loop, The break Statement, The continue Statement, The do-while Loop, The Odd Loop.

Case Control Instruction: Decisions using switch, The Tips and Traps, switch versus if-else Ladder, The goto Keyword.

Functions: What is a Function?, Why use Functions?, Passing Values between Functions, Scope Rule of Functions, Order of Passing Arguments, Using Library Functions, One Dicey Issue, Return Type of Function.

Learning Outcomes:

1. Apply the concept of Loops in various applications. (L3)
2. Design programs using modular approach (L6)

Unit III:

Recursion: Recursion, Recursion and Stack

Pointers: Call by Value and Call by Reference, an Introduction to Pointers, Pointer Notation, Back to Function Calls.

The C Preprocessor: Features of C Preprocessor, Macro Expansion, Macros with Arguments, Macros versus Functions, File Inclusion.

Arrays: What are Arrays?, A Simple Program using Array, More on Arrays, Array Initialization Array Elements in Memory, Bounds Checking, Passing Array Elements to a Function, Pointers and Arrays, Passing an Entire Array to a Function, The Real Thing.

Multidimensional Arrays: Two-Dimensional Arrays, Initializing a Two-Dimensional Array, Memory Map of a Two-Dimensional Array, Pointers and Two-Dimensional Arrays, Pointer to an Array, Passing 2-D Array to a Function, Array of Pointers, Three-Dimensional Array.

Learning Outcomes:

1. Solve problems by using Recursion (L3)
2. Understand the concept of Array (L2)
3. Use pointers to efficiently use memory (L3)

Unit IV:

Strings: What are Strings, More about Strings, Pointers and Strings

Standard Library String Functions-strlen ( ), strcpy ( ), strcat ( ), strcmp ( ).

Handling Multiple Strings: Two-Dimensional Array of Characters, Array of Pointers to Strings, Limitation of Array of Pointers to Strings.

Structures: Why use Structures? Declaring a Structure, Accessing Structure Elements, How Structure Elements are Stored? Array of Structures, Additional Features of Structures, Uses of Structures.

Console Input/output: Types of I/O, **Console I/O Functions**-Formatted Console I/O Functions, sprintf ( ) and sscanf ( ) Functions Unformatted Console I/O Functions

File Input/output: Data Organization, **File Operations**-Opening a File, Reading from a File, Trouble in Opening a File, Closing the File, Counting Characters, Tabs, Spaces, **A File-Copy Program**-Writing to a File, File Opening Modes, **String (Line) I/O in Files**-The Awkward Newline, Record I/O in Files, Text Files and Binary Files, Record I/O Revisited, Database Management, **Low-Level File I/O** -A Low-Level File-Copy Program, I/O under Windows.

Learning Outcomes:

1. Understand the concept of Strings (L2)
2. Learn Structures and Unions (L2)
3. Operate Files through C Programs (L4)
4. Manipulate strings (L3)

Unit V:

Data Structures: Linked List-Single Linked List, Double Linked List, Circular Linked List. Stacks-Using Arrays and Linked List, Stack Applications.

Queue- Arrays and Linked List, Circular Queue, Priority Queue.

Trees-Binary Trees, Binary Search Tree.

Graphs-Graphs Implementation using Arrays and Linked List, Traversal of Graphs.

Learning Outcomes:

1. Implements basic data structures such as stacks, queues and trees.(L3)
2. Apply algorithms and data structures in solving problems. (L3)
3. Design indexing structures (L6)

Text Books:

1. Yashavant Kanetkar, "Let Us C", Fourteenth Edition, BPB Publications.
2. K R Venugopal, Sudeep R Prasad, "Mastering C", Mc GrawHill publications
3. Jeri R. hanly, Elliot B. Koffman, Ashok Kamthane, A. Ananda Rao, "Programming in C and Data Structures", Pearson.

Reference Books:

1. Brian W Kernighan and Dennis M Ritchie, "The C Programming Language", Second Edition, Prentice Hall Publication.
2. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Computer Science Press.
3. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition 2011.
4. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Course Outcomes:

1. Learn the concepts of C Programming language. (L2)
2. Design applications in C, using functions, arrays, pointers and structures. (L6)
3. Apply the concepts of Stacks and Queues in solving the problems. (L3)
4. Explore various operations on Linked lists. (L5)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5602PL	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING PHYSICS LAB					SEE	70 M

COURSE OBJECTIVES:

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Illustrates the magnetic and dielectric materials applications.
- Identifies the various sensor applications.

Note: - In the following list of experiments, out of 15 experiments any 10 experiments must be performed in a semester.

List of Engineering Physics Experiments

1. Determine the thickness of the wire using wedge shape method
   Experimental outcomes:
   Operates optical instrument like travelling microscope. (L2)
   Estimate the thickness of the wire using wedge shape method (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
2. Determination of the radius of curvature of the lens by Newton's ring method
   Experimental outcomes:
   Operates optical instrument like travelling microscope. (L2)
   Estimate the radius of curvature of the lens (L2)
   Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
   Plots the square of the diameter of a ring with no. of rings (L3)
3. Determination of wavelength by plane diffraction grating method
   Experimental outcomes:
   Operates optical instrument like spectrometer. (L2)
   Estimate the wavelength of the given source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)
4. Determination of dispersive power of prism.
   Experimental outcomes:
   Operates optical instrument like spectrometer. (L2)
   Estimate the refractive index and dispersive power of the given prism (L2)
   Identifies the formation of spectrum due to dispersion. (L2)
5. Determination of wavelength of LASER light using diffraction grating.
   Experimental outcomes:
   Operates various instrument (L2)
   Estimate the wavelength of laser source (L2)
   Identifies the formation of grating spectrum due diffraction. (L2)
6. Determination of particle size using LASER.
   Experimental outcomes:
   Operates various instrument (L2)

Estimate the Particles size using laser (L2)
Identifies the application of laser (L2)

7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle
   Experimental outcomes:
   Operates various instruments and connect them as per the circuit. (L2)
   Estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)
   Identifies the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications. (L2)
8. Determination of dielectric constant by charging and discharging method.
   Experimental outcomes:
   Operates various instruments and connect them as per the circuit. (L2)
   Estimate the dielectric constant of the given substance. (L2)
   Identifies the significance of dielectric constant in various devices. (L2)
9. To determine the magnetic field along the axis of a circular coil carrying current –Stewart Gee's method.
   Experimental outcomes:
   Operates various instruments and connect them as per the circuit. (L2)
   Estimate the magnetic field along the axis of a circular coil carrying current. (L2)
   Plots the intensity of the magnetic field of circular coil carrying current with distance (L3)
10. Measurement of magnetic susceptibility by Gouy's method
    Experimental outcomes:
    Operates various instruments and connect them as per the circuit. (L2)
    Estimate the magnetic susceptibility of the given material. (L2)
    Identifies the significance of magnetic susceptibility in various engineering applications. (L2)
11. To Study the variation of B versus H by magnetizing the magnetic material (B-H loop)
    Experimental outcomes:
    Operates various instruments and connect them as per the circuit. (L2)
    Estimate the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2)
    Classifies the soft and hard magnetic material based on B-H curve. (L2)
    Plots the magnetic field H and flux density B (L3)
12. Determination of ultrasonic velocity in liquid (Acoustic grating)
    Experimental outcomes:
    Operates various instruments. (L2)
    Estimate the velocity of ultrasonic waves in liquids. (L2)
    Illustrates the basic applications of ultrasonics. (L3)
13. Determination of Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)
    Experimental outcomes:
    Operates various instruments. (L2)
    Estimate the rigidity modules of a given wire (L2)
    Plots length of the pendulum (l) with time period T^2 (L3)
14. Sonometer: Verification of the three laws of stretched strings
    Experimental outcomes:
    Operates various instruments. (L2)
    Estimate the linear density of a given wire (L2)
    Identify the frequency of tuning fork (L3)
15. Determination of spring constant of springs using Coupled Oscillator
    Experimental outcomes:

Operates various instruments. (L2)
Estimate the coupling constant of a coupled oscillator (L2)
Plots the coupling distance (D) with coupling constant (C) (L3)
Apply the concept of oscillatory motion to molecules of a solid, multi vibrator etc.

Course Outcomes:

The students will be able to

1. **Operate** various optical instruments (L2)
2. **Estimate** wavelength of laser and particles size using laser(L2)
3. **Evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
4. **Estimate** the susceptibility and related magnetic parameters of magnetic materials (L2)
5. **Plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
6. **Determine** magnetic susceptibility of the material and its losses by B-H curve (L3)
7. **Apply** the concepts of ultrasonics by acoustic grating (L2)

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, CSE and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0201P	3	0	0	3	CIA	30 M
Course Title	:	BASIC ELECTRICAL & ELECTRONICS ENGG. LAB					SEE	70 M

PART-A: BASIC ELECTRICAL ENGINEERING LAB

COURSE OBJECTIVES:-

- To Verify Kirchoff's laws and Superposition theorem
- To learn performance characteristics of DC Machines.
- To perform various tests on 1- Phase Transformer.
- To Study the I – V Characteristics of Solar PV Cell

LIST OF EXPERIMENTS: -

1. Verification of Kirchhoff laws.
2. Verification of Superposition Theorem.
3. Magnetization characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Load test on 1-Phase Transformer.
7. I – V Characteristics of Solar PV cell
8. Brake test on DC Shunt Motor.

COURSE OUTCOMES:

After completing the course, the student will be able to

- Understand Kirchoff's Laws & Superposition theorem.
- Analyze the various characteristics on DC Machines by conducting various tests.
- Analyze I – V Characteristics of PV Cell
- Apply the knowledge to perform various tests on 1-phase transformer

PART-B: ELECTRONICS ENGINEERING LAB

COURSE OBJECTIVES:-

- To verify the theoretical concepts practically from all the experiments.
- To analyze the characteristics of Diodes, BJT, MOSFET, UJT.
- To design the amplifier circuits from the given specifications.
- Exposed to linear and digital integrated circuits.

LIST OF EXPERIMENTS: (**Execute Six experiments**).

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Full Wave Rectifier with & without filter.
4. Wave Shaping Circuits. (Clippers & Clampers)
5. Input & Output characteristics of Transistor in CB / CE configuration.
6. Frequency response of CE amplifier.
7. Inverting and Non-inverting amplifiers using Op-Amps.

8. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
9. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

COURSE OUTCOMES:

CO1: Learn the characteristics of basic electronic devices like PN junction diode, Zener diode & BJT.

CO2: Analyze the application of diode as rectifiers, clippers and clampers.

CO3: Learn the fundamental principles of amplifier circuits and need of Bias in Amplifier circuits.

CO4: Learn the basics of linear integrated circuits and understand characteristics of operational amplifier.

CO5: Learn about available digital ICs and verify truth tables of Logic gates and Flipflops.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0501P	0	0	3	1.5	CIE	30 M
Course Title	:	C PROGRAMMING & DATA STRUCTURES LAB					SEE	70 M

COURSE OBJECTIVES:

- To illustrate the concepts of C programming language
- To discuss the syntax and semantics of C programming language.
- To demonstrate using arrays, strings, pointers and structures.
- To illustrate the use of Stacks and Queues
- To teach different operations on linked lists.
- To demonstrate Binary search tree traversal techniques.

Week 1

For the first few weeks students have to do some practice programs to understand the concepts of the C programming language

Week 2

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
   (i) Addition of Two Matrices (ii) Multiplication of Two Matrices

Week 3

a) Write a C program that uses functions to perform the following operations:
   (i) To insert a sub-string in to a given main string from a given position.
   (ii) To delete n characters from a given position in a given string.

Week 4

a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn‘t contain T.
b) Write a C program to count the lines, words and characters in a given text.

Week 5

a) Write a C Program to perform various arithmetic operations on pointer variables.
b) Write a C Program to demonstrate the following parameter passing mechanisms:
   (i) call-by-value (ii) call-by-reference

Week 6

Write a C program that uses functions to perform the following operations:

(i) Reading a complex number
(ii) Writing a complex number
(iii) Addition of two complex numbers
(iv) Multiplication of two complex numbers
   (Note: represent complex number using a structure.)

Week 7

Write C programs that implement stack (its operations) using

(i) Arrays (ii) Pointers

Week 8

Write C programs that implement Queue (its operations) using

(i) Arrays (ii) Pointers

Week 9

Write a C program that uses Stack operations to perform the following:

(i) Converting infix expression into postfix expression

(ii) Evaluating the postfix expression

Week 10

Write a C program that uses functions to perform the following operations on singly linked list.

(i) Creation (ii) Insertion (iii) Deletion (iv) Traversal

Week 11

Write a C program that uses functions to perform the following operations on Doubly linkedlist.

(i) Creation (ii) Insertion (iii) Deletion (iv) Traversal

Week 12

Write a C program that uses functions to perform the following operations on circular linkedlist.

(i) Creation (ii) Insertion (iii) Deletion (iv) Traversal

Week 13

Write a C program that uses functions to perform the following:

(i) Creating a Binary Tree of integers

(ii) Traversing the above binary tree in preorder, inorder and postorder.

Week 14

Write C programs that use both recursive and non-recursive functions

(i) To find the factorial of a given integer.

(ii) To find the GCD (greatest common divisor) of two given integers.

(iii) To solve Towers of Hanoi problem.

Week 14

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers:

(i) Linear search (ii) Binary search

Week 15

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

(i) Bubble sort (ii) Selection sort (iii) Insertion sort

Week 16 Application development

College information system – The students in groups can collect the information about the college and design a project which automates the some of the tasks like Attendance calculation, Grade calculation, etc.

TEXT BOOKS:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

REFERENCE BOOKS:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

COURSE OUTCOMES:

1. Demonstrate basic concepts of C programming language. (L2)
2. Develop C programs using functions, arrays, structures and pointers. (L6)
3. Illustrate the concepts Stacks and Queues. (L2)
4. Design operations on Linked lists. (L6)
5. Apply various Binary tree traversal techniques. (L3)
6. Develop searching and sorting methods. (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0302	0	0	3	1.5	CIE	30 M
Course Title	:	ENGINEERING WORKSHOP					SEE	70 M

COURSE OBJECTIVES:

- To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills.

LIST OF EXPERIMENTS

Trade I: Wood Working

Familiarity with different types of woods and tools used in wood working and make following joints

(a) Half – Lap joint (b) Mortise and Tenon joint (c) Corner Dovetail joint or Bridle joint

Trade II: Sheet Metal Working

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

(a) Tapered tray (b) Conical funnel (c) Elbow pipe (d) Brazing

Trade III: Fitting

Familiarity with different types of tools used in fitting and do the following fitting exercises.

(a) V-fit (b) Dovetail fit (c) Semi-circular fit

(d) Bicycle tyre puncture and change of two wheeler tyre.

Trade IV: Electrical Wiring

Familiarities with different types of basic electrical circuits and make the following connections

(a) Parallel and series (b) Two way switch (c) Godown lighting

(d) Tube light (e) Three phase motor (f) Soldering of wires

COURSE OUTCOMES:

After completion of this lab the student will be able to

- Apply wood working skills in real world applications. (l3)
- Build different objects with metal sheets in real world applications. (l3)
- Apply fitting operations in various applications. (l3)
- Apply different types of basic electric circuit connections. (l3)
- Use soldering and brazing techniques. (l2)

Note: In each section a minimum of three exercises are to be carried out.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0502	0	0	3	1.5	CIE	30 M
Course Title	:	IT WORKSHOP					SEE	70 M

COURSE OBJECTIVES:

- To make the students know about the internal parts of a computer, assembling and dissembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, and Presentations
- To demonstrate Networking of computers and use Internet facility for Browsing and Searching
- To illustrate the need for security while using applications and devices.

Preparing your Computer

Task 1:

Learn about Computer: Identify the internal parts of a computer, and its peripherals, Represent the same in the form of diagrams including Block diagram of a computer, Write specifications for each part of a computer including peripherals and specification of a Desktop computer.

Task 2:

Assembling a Computer: Disassemble and assemble the PC back to working condition, Trouble shoot the computer and identify working and non-working parts, Identify the problem correctly by various methods like beeps.

Task 3:

Install Operating system and Applications: Install Linux on the computer, Install another operating system and make the system dual boot or multi boot, Install operating systems using Virtual machine.
Access the computing resources like CD/DVD drives, Pen drives, Printers, Speakers, Microphone, etc.
Install device drivers and install application programs.

Networking and Internet

Task 4:

Networking: Connect two computers directly using a cable or wireless connectivity and share information, Connect two or more computers using switch/hub and share information, Phuscally connect computers using crimpling activity, logical configuration, etc.

Task 5:

Browsing Internet: Access the Internet for Browsing, Search the Internet for required information, Create e-mail account, send and receive email, Get acquaintance with applications like Facebook, skype, etc.

Task 6:

Antivirus: Download freely available Antivirus software, install it and use it to check for threats to the computer being used, Submit information about the features of the antivirus used, installation process, virus definitions, virus engine, etc. Configure the computer for high security.

Productivity tools

Task 7:

Word Processor: Create documents using the word processor tool, Inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc.
Prepare project cover pages, content sheet, and chapter pages.

Task 8:

Presentations: Creating, opening, saving, and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show.

Task 9:

Spreadsheet: Create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells.

Applications

Task 10:

Database management system: Install a Database management system, configure users, do some administration tasks.

Task 11:

Language Translators

Install different Natural language translators in a Computer/Mobile. Use them to convert text between different languages.
Use Voice to access applications and make them perform different tasks like calling users, etc.

Task 12:

Sharing

Install applications github, dropbox, google forms, google docs and use them to share information and work on a common project. It is a Team task.

Task 13:

IDE

Install applications like Vscode, and Eclipse and use the integrated development environment of those applications and perform tasks like editing, compiling, executing, etc.

Task 14:

Cyber Security

Practice the following Cyber Security related tasks

- Cyber Hygiene Practices of Personal digital devices
- Cyber Hygiene Practices for Home
- Cyber Hygiene Practices for Remote working and Learning
  Websource: Cyber Hygiene Practices - ISEA (infosecawareness.in)

References:

1. Peter Norton , Introduction to Computers, McGraw Hill
2. Joan Lambert, Joyce Cox, MOS study guide for word, Excel, Powerpoint & Outlook Exams, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Rusen , Networking your computers and devices, PHI
5. Bigelows , Trouble shooting, Maintaining & Repairing PCs, TMH
6. Major reference is Websites like Google.com, dropbox.com, github.com and others.

Course Outcomes:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use. (L6)
- Prepare the Documents using Word processors and Prepare spread sheets for calculations using excel. (L3)
- Design Slide presentations using the presentation tool. (L6)
- Interconnect two or more computers for information sharing. (L4)
- Access the Internet and Browse it to obtain the required information. (L4)
- Analyze the vulnerabilities of the devices, and apply security features (L4)

B.TECH - II SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CE, CSE, ECE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5402	3	0	0	3	CIE	30 M
Course Title	:	DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS					SEE	70 M

COURSE OBJECTIVES:

1) To enlighten the learners in the concept of differential equations and multivariable calculus.
2) To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

UNIT I: Linear differential equations of higher order (Constant Coefficients) (10 hrs)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskean, method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Mass spring system.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L3)
- Formulate and solve the higher order differential equation by analyzing physical situations (L3)

UNIT II: Partial Differential Equations (08 hrs)

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order equations using Lagrange's method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply a range of techniques to find solutions of standard PDEs (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT III: Applications of Partial Differential Equations (10 hrs)

Classification of PDE, method of separation of variables for second order equations. Applications of Partial Differential Equations: One dimensional Wave equation, One dimensional Heat equation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Calcify the PDE (L3)
- Learn the applications of PDEs(L2)

UNIT IV: Vector differentiation (06 hrs)

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply del to Scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT 5: Vector integration **(08 hrs)**

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes:

At the end of this unit, the student will be able to

- find the work done in moving a particle along the path over a force field (L4)
- evaluate the rates of fluid flow along and across curves (L4)
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

Text Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

Reference Books:

1. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
2. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. S L Ross , Differential Equations ,Wiley India, year 2007 edition.

Course Outcomes:

At the end of the course, the student will be able to

- Solve the differential equations related to various engineering fields (L6)
- Identify solution methods for partial differential equations that model physical processes (L3)
- Interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- Estimate the work done against a field, circulation and flux using vector calculus (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CE & ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5102T	3	0	0	3	CIE	30 M
Course Title	:	ENGINEERING CHEMISTRY					SEE	70 M

COURSE OBJECTIVES:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.

Unit I: Water Technology: **(08 hrs)**

Introduction: Hardness of water and units, Estimation of hardness of water by EDTA Method - Estimation of dissolved oxygen by Winkler's method - Boiler troubles – Priming, foaming, scale and sludge, Caustic embrittlement, Municipal water treatment – specifications for drinking water, Bureau of Indian Standards (BIS) and World Health Organization (WHO) standards, ion-exchange processes – desalination of brackish water - Reverse Osmosis (RO) and electrodialysis.

Learning outcomes:

The student will be able to

- **List** the differences between temporary and permanent hardness of water (L1)
- **Explain** the principles of reverse osmosis and electrodialysis. (L2)
- **Compare** quality of drinking water with BIS and WHO standards. (L2)
- **Illustrate** problems associated with hard water - scale and sludge**.** (L2)
- **Explain** the working principles of different Industrial water treatment processes (L2)

Unit II: Electrochemistry and Applications: **(10 hrs)**

Electrodes – concepts, Electrochemical Cell, Nernst Equation, Cell Potential Calculations.

Primary cells – Zinc-air, Na-air batteries, Secondary cells – Nickel-Cadmium (Ni-Cd),and Lithium ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry corrosion, Pilling Bedworth rule and Factors affecting the corrosion**,** cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

Learning Outcomes:

At the end of this unit, the students will be able to

- **Apply** Nernst equation for calculating electrode and cell potentials (L3)
- **Recall** working and importance of batteries(L1)
- **Apply** Pilling Bedworth rule for corrosion and corrosion prevention (L3)
- **Demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
- **Compare** primary and secondary batteries and their applications (L2)

Unit III: Polymers and Fuel Chemistry (10 hrs)

Polymers: Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth and coordination polymerization.

Plastics: Thermoplastics and Thermo-setting plastics - Preparation, properties and applications of poly styrene, PVC and Bakelite. Calculation of molecular Weight of polymer by weight average and number average methods, Poly Dispersity Index.

Elastomers: Preparation, properties and applications of Buna-S, Buna-N, Thiokol, Calculation of Molecular Wt of Polymer by Weight Average and Number Average methods, Poly Dispersity Index.

Fuels: Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal.

Liquid Fuels: Refining of Petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values, cracking of oils; alternative fuels- propane, methanol and ethanol, bio-fuels(Coal gas, Biogas).

Learning Outcomes:

At the end of this unit, the students will be able to

- **Explain** different types of polymers and their applications (L2)
- **Find** various alternate fuels and its importance(L1)
- **Solve** the numerical problems based on Calorific value(L3)
- **Select** suitable fuels for IC engines (L3)
- **Explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)

Unit IV: Advanced Engineering Materials (10 hrs)

Composites: Definition, Constituents, Classification - Particle, Fibre and Structural reinforced composites, properties and Engineering applications.

Refractories: Classification, Properties, Factors affecting the refractory materials (Refractoriness, Refractory under load, Porosity, Refractive index, Dimensional stability) and Applications.

Lubricants: Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials: Portland Cement, Rapid Hardening Cement, Quick Setting Cement, Constituents, phases and reactivity of clinker, Setting and Hardening of cement.

Learning Outcomes:

At the end of this unit, the students will be able to

- **Explain** the constituents of Composites and its classification (L2)
- **Recall** properties of refractories and lubricants (L1)
- **Identify** the factors affecting the refractory material(L3)
- **Illustrate** the functions and properties of lubricants (L2)
- **Demonstrate** the phases and reactivity of concrete formation (L2)
- **Identify** the constituents of Portland cement (L3)
- **Enumerate** the reactions at setting and hardening of the cement (L3)

Unit V: Surface Chemistry and Applications (10 hrs)

Introduction to surface chemistry, colloids, micelle formation, synthesis of colloids (Chemical methods - double decomposition, reduction, hydrolysis and oxidation; electrical disintegration or Bredig's Arc method), chemical and electrochemical methods (sol-gel method, Thermally activated chemical vapor deposition method)of preparation of nano metals and metal oxides, stabilization of colloids and nano materials by stabilizing agents, solid-gas interface, solid-liquid interface, adsorption isotherm- Langmuir, Freundlich, BET equation (no derivation) applications of colloids and nano materials – catalysis, medicine, sensors.

Learning Outcomes:

At the end of this unit, the students will be able to

- **Summarize** the concepts of colloids, micelle and nanomaterials (L2)
- **Explain** the synthesis of colloids with examples (L2)
- **Select** suitable methods for synthesis of Nanometals (L1)
- **Outline** the preparation of nanomaterials and metal oxides (L2)
- **Identify** the application of colloids and nanomaterials in medicine, sensors and catalysis (L2)

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S.Chand Publication, New Delhi 2012.

Reference Books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992.
3. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
4. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

COURSE OUTCOMES:

At the end of the course the students will be able to:

1. **Demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
2. **Explain** the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers. (L2)
3. **Finding** important properties of various engineering materials, polymers, colloids and its applications(L1)
4. **Explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)
5. **Explain** the setting and hardening of cement and concrete phase (L2)
6. **Summarize** the concepts of colloids, micelle and nano materials (L2).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE and ECE)

(Common to II Semester CSE and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AHS5201T	3	0	0	3	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH					SEE	70 M

INTRODUCTION:

The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

COURSE OBJECTIVES:

- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Unit I: On the Conduct of Life: William Hazlitt

Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.

Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Parts of Speech, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes

At the end of the module, the learners will be able to

1. understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
2. ask and answer general questions on familiar topics and introduce oneself/others
3. employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information
4. recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs

5. form sentences using proper grammatical structures and correct word forms

Unit II: The Brook: Alfred Tennyson

Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.

Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks.

Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.

Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.

Grammar and Vocabulary: Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes

At the end of the module, the learners will be able to

1. comprehend short talks on general topics
2. participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
3. understand the use of cohesive devices for better reading comprehension
4. write well structured paragraphs on specific topics
5. identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit III: The Death Trap: Saki

Listening: Listening for global comprehension and summarizing what is listened to.

Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed

Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.

Writing: Summarizing, Paragraph Writing.

Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes

At the end of the module, the learners will be able to

1. Comprehend short talks and summarize the content with clarity and precision
2. Participate in informal discussions and report what is discussed
3. Infer meanings of unfamiliar words using contextual clues
4. Write summaries based on global comprehension of reading/listening texts
5. Use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit IV: Innovation: Muhammad Yunus

Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.

Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.

Writing: Letter Writing: Official Letters/Report Writing.

Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice

Learning Outcomes

At the end of the module, the learners will be able to

1. Infer and predict about content of spoken discourse
2. Understand verbal and non-verbal features of communication and hold formal/informal conversations
3. Interpret graphic elements used in academic texts
4. Produce a coherent paragraph interpreting a figure/graph/chart/table
5. Use language appropriate for description and interpretation of graphical elements

Unit V: Politics and the English Language: George Orwell

Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.

Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.

Reading: Reading for comprehension.

Writing: Writing structured essays on specific topics using suitable claims and evidences.

Grammar and Vocabulary: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Learning Outcomes

At the end of the module, the learners will be able to

- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

Text Books:

1. **Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan.**

Reference Books:

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3. Raymond Murphy's *English Grammar in Use* Fourth Edition (2012) E-book
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
5. Oxford Learners Dictionary, 12th Edition, 2011
6. Norman Lewis *Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary* (2014)
7. *Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words* by David Butler.

Web links

- www.englishclub.com
- www.easyworldofenglish.com
- www.languageguide.org/english/
- www.bbc.co.uk/learningenglish
- www.eslpod.com/index.html

- www.myenglishpages.com

COURSE OUTCOMES

At the end of the course, the learners will be able to

1. **Understand** the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
2. **Apply** grammatical structures to formulate sentences and correct word forms
3. **Analyze** discourse markers to speak clearly on a specific topic in informal discussions
4. **Evaluate** reading/listening texts and to write summaries based on global comprehension of these texts.
5. **Create** a coherent paragraph interpreting a figure/graph/chart/table

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE & ECE and II Semester CSE & ME)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0301T	3	0	0	3	CIE	30 M
Course Title	:	ENGINEERING DRAWING					SEE	70 M

COURSE OBJECTIVES:

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.

Unit I:

Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance - Conventions in drawing - lettering - BIS conventions.

(a) Conic sections including the rectangular hyperbola- general method only,

(b) Cycloid, epicycloids and hypocycloid c) Involutes

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the significance of engineering drawing
- Know the conventions used in the engineering drawing
- Identify the curves obtained in different conic sections
- Draw different curves such as cycloid, involute and hyperbola

Unit II:

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of projection
- Know how to draw the projections of points, lines
- Differentiate between projected length and true length
- Find the true length of the lines

Unit III:

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the procedure to draw projection of solids
- Differentiate between rotational method and auxillary view method.
- Draw the projection of solid inclined to one plain

- Draw the projection of solids inclined to both the plains

Unit IV:

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand different sectional views of regular solids
- Obtain the true shapes of the sections of prism
- Draw the sectional views of prism, cylinder, pyramid and cone

Unit V:

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of development of surfaces
- Draw the development of regular solids such as prism, cylinder, pyramid and cone
- Obtain the development of sectional parts of regular shapes

Text Books:

1) K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2) N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1) Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2) Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
3) Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
4) K.C.John, Engineering Graphics, 2/e, PHI, 2013
5) Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

After completing the course, the student will be able to

- Draw various curves applied in engineering. (l2)
- Show projections of solids and sections graphically. (l2)
- Draw the development of surfaces of solids. (l3)

Additional Sources

Youtube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(II Semester Mechanical Engineering)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0303T	3	0	0	3	CIE	30 M
Course Title	:	MATERIAL SCIENCE & ENGINEERING					SEE	70 M

COURSE OBJECTIVES:

- To teach the principles of physical metallurgy, i.e. crystallography of metals, constitution of alloys, phase diagrams.
- Expose commercially important metals and alloys (both ferrous and non ferrous) with engineering constraints.
- Explain the methods to change the properties of materials through heat treatment processes
- Familiarize properties and applications of ceramics, polymers and composite materials.
- Demonstrate the fundamental properties of nano-materials and their applications.

UNIT I:

Structure of Metals: Crystal Structures: Unit cells, Metallic crystal structures, Imperfection in solids: Point, Line, interstitial and volume defects; dislocation strengthening mechanisms and slip systems, critically resolved shear stress.

Constitution of Alloys: Necessity of Alloying, substitutional and interstitial solid solutions- Phase diagrams: Interpretation of binary phase diagrams and microstructure development; eutectic, peritectic, peritectoid and monotectic reactions. Iron-Iron-carbide diagram and microstructural aspects of ferrite, cementite, austenite, ledeburite, and cast iron.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the importance of material science in engineering.(l2)
- Recall the definitions and terminology of crystallography. (l1)
- Distinguish metals and alloys. (l4)
- Make use of the principles of construction of binary phase diagrams. (l3)
- Identify various invariant reactions in binary phase diagrams. (l3)
- Know the concept of metallography in studying the microstructures of metals and alloys. (l2)

UNIT II

Steels: Extraction of Steels, Plain carbon steels, use and limitations of plain carbon steels. AISI& BIS classification of steels.

Classification of alloys steels. Microstructure, properties and applications of alloy steels-stainless steels and tool steels.

Cast irons: Microstructure, properties and applications of white cast iron, malleable cast iron, grey cast iron, nodular cast iron and alloy cast irons.

Learning Outcomes: At the end of this unit the student will be able to

- Classify various types of steels, their properties and applications. (l2)
- Identify various types of cast irons, their properties and applications. (l3)
- Compare steels and cast irons and their limitations in applications. (l3)

UNIT III:

Heat Treatment of Steels: Annealing, tempering, normalizing and hardening, isothermal transformation diagrams for Fe-Fe_3C alloys and microstructure development. Continuous cooling curves and interpretation of final microstructures and properties- austempering, martempering, case hardening - carburizing, nitriding, cyaniding, carbo-nitriding, flame and induction hardening, and vacuum and plasma hardening

Learning Outcomes: At the end of this unit the student will be able to

- Understand the importance of iron - iron carbide phase diagram. (l2)
- Know the influence of heat treatment in modification of properties of steels. (l2)
- Develop a heat treatment cycle based on properties required. (l3)
- Comprehend the principles of surface hardening methods. (l2)

UNIT IV:

Non-ferrous Metals and Alloys: Microstructure, properties and applications of copper, aluminium, titanium, nickel and their alloys. Study of Al-Cu phase diagram

Learning Outcomes: At the end of this unit the student will be able to

- Understand the importance of non-ferrous metals and alloys in engineering applications. (l2)
- Demonstrate various properties and applications of non-ferrous alloys. (l4)
- Differentiate between hardening of ferrous and non-ferrous alloys. (l4)

UNIT V:

Ceramics, Polymers and Composites: Structure, properties and applications of ceramics, polymers and composites. Introduction to super alloys and nanomaterials, Smart materials, Recyclable Materials.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the properties of ceramics and their applications. (l2)
- Summarize the properties of polymers and composites and their use. (l2)
- Interpret the properties of nano materials and their applications. (l2)
- Identify the difference between the micro and nano scale materials and their uses. (L3)

Text Book(s)

1. V. Raghavan, Material Science and Engineering, 5/e, Prentice Hall of India, 2004.
2. R. Balasubramaniam, Callister's Material Science and Engineering, 2/e, Wiley India, 2014.

References

1. Y. Lakhtin, Engineering Physical Metallurgy, University Press of the Pacific, 2000.
2. S.H.Avner, Introduction to Physical Metallurgy, 2/e, Tata McGraw- Hill, 1997.
3. L.H.Van Vlack, Elements of Material Science and Engineering, 6/e, Pearson Education, 2008.
4. George E.Dieter, Mechanical Metallurgy, 3/e, McGraw-Hill, 2013.

COURSE OUTCOMES:

After completing the course, the student will be able to

- Explain the principles of binary phases. (l2)

- Select steels and cast irons for a given application. (l3)
- Apply heat treatment to different applications. (l3)
- Utilize nonferrous metals and alloys in engineering. (l3)
- Choose composites for various applications. (l3)
- Assess the properties of nano-scale materials and their applications. (l2)
- Differentiate between hardening of ferrous and non-ferrous alloys. (L4)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CSE and ME)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	20AMC9902	3	0	0	0	CIA	30 M
Course Title	:	UNIVERSAL HUMAN VALUES					SEE	--

INTRODUCTION

This course discusses the role of human values in one's family. It, very briefly, touches issues related to their role in the society and the nature, which needs to be discussed at length in one more semester for which the foundation course names as Universal Human Values is designed which, may be covered in their I-I or I-II Semester.

In the Induction Program, students would get an initial exposure to human values through Universal Human Values-I. This exposure is to be augmented by this compulsory full semester foundation course.

COURSE OBJECTIVES

1. Exposure to the value of life, society and harmony
2. Leading towards holistic perspective based on self-exploration about themselves (human being), family, and society and nature/existence.
3. Bringing transition from the present state to Universal Human Order
4. Instill commitment and courage to act.
5. Know about appropriate technologies and management patterns

UNIT I: Course Introduction - Need, Basic Guidelines, Content and Process for Value Education

Universal Human Values-I - Self-Exploration - content and process; 'Natural Acceptance' and Experiential Validation - self-exploration - Continuous Happiness and Prosperity - Human Aspirations - current scenario - Method to fulfill the above human aspirations: understanding and living in harmony at various levels.

UNIT II: Understanding Harmony in the Human Being - Harmony in Myself!

Human being as a co-existence of the sentient 'I' and the material 'Body' - the needs - happiness and physical facility -the Body as an instrument of 'I' - the characteristics and activities of 'I' and harmony in 'I' - the harmony of I with the Body

UNIT III: Understanding Harmony in the Family and Society- Harmony in Human- Human Relationship

Values in human relationship; meaning of Justice; Trust and Respect; Difference between intention and competence; the other salient values in relationship - the harmony in the society: Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals - Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

UNIT IV: Understanding Harmony in the Nature and Existence - Whole existence as Coexistence

The harmony in the Nature - Interconnectedness and mutual fulfillment among the four orders of nature- recyclability and self-regulation in nature - Understanding Existence as Co-existence of mutually interacting units in all- pervasive space - Holistic perception of harmony at all levels of existence.

UNIT V: Implications of the above Holistic Understanding of Harmony on Professional Ethics
Humanistic Education - Competence in professional ethics: professional competence - people friendly and eco-friendly production systems - appropriate technologies and management patterns for above production systems. Individuals as socially and ecologically responsible engineers, technologists and managers

TEXT BOOKS:

1. *A Foundation Course in Human Values and Professional Ethics*, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. Teachers' Manual for *A Foundation Course in Human Values and Professional Ethics*, R.R. Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

REFERENCE BOOKS:

1. JeevanVidya: EkParichaya, ANagaraj, JeevanVidyaPrakashan, Amarkantak, 1999
2. HumanValues, A.N.Tripathi, New Age Intl.Publishers, NewDelhi,2004.
3. The Story of Stuff (Book).
4. Economy of Permanence - J C Kumarappa 8. Bharat Mein Angreji Raj – Pandit Sunderlal 9. Rediscovering India – by Dharampal
5. Hind Swaraj or Indian Home Rule - by Mohandas K.Gandhi
6. India Wins Freedom - Maulana Abdul Kalam Azad 12. Vivekananda - Romain Rolland(English)

Relevant CDs, Movies, Documentaries & Other Literature:

1. Value Education website, http://www.uptu.ac.in
2. Story of Stuff, http://www.storyofstuff.com
3. Al Gore, An Inconvenient Truth, Paramount Classics, USA
4. Charle Chaplin, Modern Times, United Artists, USA
5. IIT Delhi, Modern Technology – the Untold Story

COURSE OUTCOMES:
By the end of the course the student will be able to:

1. Define terms like Natural Acceptance, Happiness and Prosperity
2. Understand awareness of oneself, and ones surroundings (family, society, Nature)
3. Apply what they have learnt to their own self in different day-to-day Settings in real life
4. Relate human values with human relationship and human society.
5. Justify the need for universal human values and harmonious existence.
6. Develop as socially and ecologically responsible engineers.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CE & ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5102P	0	0	3	1.5	CIE	30 M
Course Title	:	ENGINEERING CHEMISTRY LAB					SEE	70 M

COURSE OBJECTIVES:

1. To Verify the fundamental concepts with experiments

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of dissolved oxygen by Winklers method.
3. Estimation of Copper by EDTA method.
4. Determination of Strength of an acid in Pb-Acid battery.
5. Estimation of Ferrous Iron by Potassium dichromate.
6. Preparation of a polymer- Bakelite.
7. Determination of percentage of Iron in Cement sample by colorimetry.
8. Estimation of Calcium in port land Cement.
9. Preparation of nano materials by precipitation.
10. Adsorption of acetic acid by charcoal.
11. Determination of percentage moisture content in a coal sample.
12. Determination of Viscosity of lubricating oil by Redwood Viscometer 1.
13. Determination of Viscosity of lubricating oil by Redwood Viscometer 2.
14. Determination of Calorific value of gases by Junker's gas Calorimeter.

Course Outcomes:

At the end of the course, the students will be able to:

1. **Determine** the cell constant and conductance of solutions (L3)
2. **Prepare** advanced polymer materials (L2)
3. **Determine** the physical properties like surface tension, adsorption and viscosity (L3)
4. **Estimate** the Iron and Calcium in cement (L3)
5. **Calculate** the hardness of water (L4)
6. **Find** calorific values of various fuels, hardness of water samples (L1)

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RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE and ECE)

(Common to II Semester CSE and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AHS5201P	0	0	3	1.5	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH LAB					SEE	70 M

COURSE OBJECTIVES:

- Students will be exposed to a variety of self instructional, learner friendly modes of language learning
- Students will learn better pronunciation through stress, intonation and rhythm
- Students will be trained to use language effectively to face interviews, group discussions, public speaking
- Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

LIST OF TOPICS

1. Phonetics
2. Reading comprehension
3. Describing objects/places/persons
4. Role Play or Conversational Practice
5. Just-A-Minute (JAM)
6. Etiquettes of Telephonic Communication
7. Information Transfer
8. Note Making and Note Taking
9. E-mail Writing
10. Group Discussions
11. Resume Writing
12. Debates
13. Oral Presentations
14. Poster Presentation
15. Interviews Skills

Suggested Software

- Orell
- Walden Infotech
- Young India Films

Reference Books

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
5. A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Web Links

- **www.esl-lab.com**
- **www.englishmedialab.com**
- **www.englishinteractive.net**

Course Outcomes

1. Listening and repeating the sounds of English Language
2. Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
3. Apply communication skills through various language learning activities.
4. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
5. Evaluate and exhibit acceptable etiquette essential in social and professional settings
6. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE & ECE and II Semester CSE & ME)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0301P	3	0	0	3	CIE	30 M
Course Title	:	ENGINEERING GRAPHICS LAB					SEE	70 M

COURSE OBJECTIVES:

- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modeling.
- Instruct graphical representation of machine components.

Computer Aided Drafting:

Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions.
Dimensioning principles and conventional representations.

Orthographic Projections: Systems of projections, conventions and application to orthographic projections - simple objects.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

TEXT BOOKS:

1) K. Venugopal, V.Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2) Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHI Learning, Eastern Economy editions.

REFERENCE BOOKS:

1) T. Jayapoovan, Engineering Graphics using Auto Cad, Vikas Publishing House
2) K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
3) Linkan Sagar, BPB Publications, Auto Cad 2018 Training Guide.
4) K.C.John, Engineering Graphics, 2/e, PHI, 2013
5) Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

COURSE OUTCOMES:

After completing the course, the student will be able to

- Use computers as a drafting tool. (L2)
- Draw isometric and orthographic drawings using CAD packages. (L3)

ADDITIONAL SOURCES

Youtube: http-sewor,Carleton.cag, kardos/88403/drawings.html conic sections-online, red woods.edu

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(II Semester Mechanical Engineering)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0303P	0	0	3	1.5	CIE	30 M
Course Title	:	MATERIAL SCIENCE & ENGINEERING LAB					SEE	70 M

COURSE OBJECTIVES:

- To understand the microstructure and hardness of engineering materials.
- To explain grain boundaries and grain sizes of different engineering materials.

LIST OF EXPERIMENTS:

1. Metallography sample preparation
2. Microstructure of pure metals – Iron, copper and aluminum as per ASTM standards
3. Microstructure of low carbon steel, mild steel and high carbon microstructure of cast irons.
4. Microstructure of non-ferrous alloys – aluminum, copper, titanium, nickel and their alloys.
5. Hardenability of steels by Jominy End Quench Test.
6. Microstructure of heat treated steels.
7. Hardness of various untreated and treated steels.
8. Microstructure of ceramics, polymeric materials.
9. Microstructure of super alloy and nano-materials.
10. Hardness of ceramics, super alloys, nano-materials and polymeric materials (one sample on each)

COURSE OUTCOMES:

The student is able to

- Differentiate various microstructures of ferrous and non-ferrous metals and alloys. (l4)
- Visualize grains and grain boundaries. (l3)
- Importance of hardening of steels. (l2)
- Evaluate hardness of treated and untreated steels. (l4)
- Differentiate hardness of super alloys, ceramics and polymeric materials.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

Course Structure for Four Year Regular B.Tech. Degree Program

(Effective for the batches admitted from 2020-21 onwards)

DEPARTMENT OF MECHANICAL ENGINEERING

B. Tech – III Semester (Theory – 6, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5404	Complex variables, Transforms & PDE	3	0	0	3	30	70	100
2	PC	20APC0301T	Fluid Mechanics & Hydraulic Machines	3	0	0	3	30	70	100
3	PC	20APC0302T	Manufacturing Processes	3	0	0	3	30	70	100
4	PC	20APC0303	Thermodynamics	3	0	0	3	30	70	100
5	ES	20AES0304T	Mechanics of Materials	3	0	0	3	30	70	100
6	MC	20AMC9901	Environmental Sciences	3	0	0	0	50	--	50
PRACTICAL										
7	PC	20APC0301P	Fluid Mechanics & Hydraulic Machines Lab	0	0	3	1.5	30	70	100
8	PC	20APC0302P	Manufacturing Processes Lab	0	0	3	1.5	30	70	100
9	ES	20AES0304P	Mechanics of Materials Lab	0	0	3	1.5	30	70	100
10	SC	20ASC0501	Application Development with Python	1	0	2	2	30	70	100
			TOTAL:	**19**	**0**	**11**	**21.5**	**320**	**630**	**950**

B. Tech – IV Semester (Theory –6, Lab – 4)

S. No.	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5408	Numerical Methods and Probability Theory	3	0	0	3	30	70	100
2	PC	20APC0304T	Applied Thermodynamics	3	0	0	3	30	70	100
3	PC	20APC0306	Kinematics of Machinery	3	0	0	3	30	70	100
4	PC	20APC0307T	Manufacturing Technology	3	0	0	3	30	70	100
5	HS	20AHS5202	Managerial Economics & Financial Analysis	3	0	0	3	30	70	100
6	MC	20AMC9903	Biology For Engineers	3	0	0	0	50	--	50
PRACTICAL										
7	PC	20APC0304P	Applied Thermodynamics Lab	0	0	3	1.5	30	70	100
8	PC	20APC0307P	Manufacturing Technology Lab	0	0	3	1.5	30	70	100
9	PC	20APC0305	Computer Aided Machine Drawing	0	0	3	1.5	30	70	100
10	SC	20ASC9901	Soft skills	1	0	2	2	30	70	100
11	--	--	NSS/NCC/NSO Activities	0	0	2	0	--	--	--
			TOTAL:	**19**	**0**	**20**	**21.5**	**320**	**630**	**950**
Mandatory Community Service Internship for 6 weeks duration during Summer Vacation										

Note:

4. Eligible and interested students can register either for Honors or for a Minor in IV Semester as per the guidelines issued by the University
5. Students shall register for NCC/NSS/NSO activities and will be required to participate in an activity for two hours in a week during fourth semester.
6. Lateral entry students shall undergo a bridge course in Mathematics during third semeste

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	BASIC SCIENCES	L	T	P	C	Exam	3Hrs
Course Code	:	20ABS5404	3	0	0	3	CIE	30M
Course Title	:	**COMPLEX VARIABLES, TRANSFORMS & PDE**					SEE	70M
Pre-requisite	:	Functions, Differentiations and Integration						

Course Objectives:

This course aims at providing the student to acquire the knowledge on the calculus of functions of complex variables. The aim is to analyze the solutions of partial differential equations.

UNIT – I **9 Hrs**

Complex Variable – Differentiation:

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations, analytic functions (exponential, trigonometric, logarithm), harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method- Conformal mappings-standard transformations (e^z,1/z,kz) Mobius transformations (bilinear) and their properties.

UNIT – II **9 Hrs**

Complex Variable – Integration:

Line integral-Contour integration, Cauchy's integral theorem, Cauchy Integral formula, Liouville's theorem (without proof) and Maximum-Modulus theorem (without proof); power series expansions: Taylor's series, zeros of analytic functions, singularities, Laurent's series; Residues, Cauchy Residue theorem (without proof), Evaluation of definite integral involving sine and cosine, Evaluation of certain improper integrals (around unit circle, semi circle with f(z) not having poles on real axis).

UNIT – III **9 Hrs**

Laplace Transforms

Definition-Laplace transform of standard functions-existence of Laplace Transform – Inverse transform – First shifting Theorem, Transforms of derivatives and integrals – Unit step function – Second shifting theorem – Dirac's delta function – Convolution theorem – Laplace transform of Periodic function. Differentiation and integration of transform – solving Initial value problems to ordinary differential equations with constant coefficients using Laplace transforms.

UNIT – IV **8 Hrs**

Fourier series

Determination of Fourier coefficients (Euler's) – Dirichlet conditions for the existence of Fourier series – functions having discontinuity-Fourier series of Even and odd functions – Fourier series in an arbitrary interval – Half-range Fourier sine and cosine expansions- typical wave forms - Parseval's formula- Complex form of Fourier series.

UNIT – V **9 Hrs**

Partial Differential Equations & Applications

Solution of second order PDEs by Method of separation of variables – Solutions of one dimensional wave equation, one dimensional heat equation under initial and boundary conditions. Steady state two dimensional heat equations (Laplace equations).

Textbooks:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India

Reference Books:

1. Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
2. Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

Course Outcomes (CO): Student will be able to

- Understand the analyticity of complex functions and conformal mappings.
- Apply cauchy's integral formula and cauchy's integral theorem to evaluate improper integrals along contours.
- Understand the usage of lap lace transforms.
- Evaluate the fourier series expansion of periodic functions.
- Formulate/solve/classify the solutions of partial differential equations and also find the solution of one-dimensional wave equation and heat equation.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

CourseCategory	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20APC0301T	3	0	0	3	CIE	30M
Course Title	:	**FLUID MECHANICS AND HYDRAULIC MACHINES (Common to Civil & Mechanical)**					SEE	70M
Pre-requisite	:	Physics, Chemistry						

Course Objectives:

- To impart ability to solve engineering problems in fluid mechanics
- To explain basics of statics, kinematics and dynamics of fluids and various measuring techniques of hydrostatic forces on objects.
- To enable the students measure quantities of fluid flowing in pipes, tanks and channels
- To Introduce concepts of uniform and non-uniform flows through open channel.
- To impart knowledge on design of turbines and pumps.

UNIT – I

Introduction to Fluid Statics

Distinction between a fluid and a solid - characteristics of fluids - Fluid Pressure: Pressure at a point, Pascal's law, pressure variation with temperature, density and altitude. Piezometer, U-Tube Manometer, Single Column Manometer, U Tube Differential Manometer. pressure gauges, Hydrostatic pressure and force: horizontal, vertical and inclined surfaces. Buoyancy and stability of floating bodies.

UNIT – II

Fluid kinematics and Dynamics

Classification of fluid flow - Stream line, path line, streak line and stream tube; stream function, velocity potential function. One, two and three - dimensional continuity equations in Cartesian coordinates.

Fluid Dynamics: Surface and body forces; Equations of motion - Euler's equation; Bernoulli's equation – derivation; Energy Principle; Practical applications of Bernoulli's equation: Venturimeter, orifice meter and Pitot tube; Momentum principle; Forces exerted by fluid flow on pipe bend; Vortex Flow – Free and Forced; Definitions of Reynolds Number, Froude Number, Mach Number, Weber Number and Euler Number

UNIT – III

Analysis Of Pipe Flow

Energy losses in pipelines; Darcy – Weisbach equation; Minor losses in pipelines; Hydraulic Grade Line and Total Energy Line; Concept of equivalent length – Pipes in Parallel and Series. Laminar Flow- Laminar flow through: circular pipes, annulus and parallel plates. Stoke's law, Measurement of viscosity. Reynolds experiment, Transition from laminar to turbulent flow. Resistance to flow of fluid in smooth and rough pipes-Moody's diagram – Introduction to boundary layer theory.

UNIT – IV

Flow in Open Channels

Open Channel Flow-Comparison between open channel flow and pipe flow, geometrical parameters of a channel, classification of open channels, classification of open channel flow, Velocity Distribution of channel section. Uniform Flow-Continuity Equation, Energy Equation and Momentum Equation, Characteristics of uniform flow, Chezy's formula, Manning's formula. Computation of Uniform flow. Specific energy, critical flow, discharge curve, Specific force, Specific depth, and Critical depth. Measurement of Discharge and Velocity – Broad Crested Weir. Gradually Varied Flow Dynamic Equation of Gradually Varied Flow. Hydraulic Jump and classification - Elements and characteristics- Energy dissipation.

UNIT – V

Hydraulic Machines

Impact of Jets- Hydrodynamic force of jets on stationary and moving flat, inclined and curved vanes - velocity triangles at inlet and outlet - Work done and efficiency - Hydraulic Turbines: Classification of turbines; pelton wheel and its design. Francis turbine and its design - efficiency - Draft tube: theory

- characteristic curves of hydraulic turbines - Cavitation - Working principles of a centrifugal pump, work done by impeller; heads, losses and efficiencies; minimum starting speed; Priming; specific speed; limitation of suction lift, net positive suction head (NPSH); Performance and characteristic curves; Cavitation effects; Multistage centrifugal pumps; troubles and remedies – Introduction to Reciprocating Pump

Textbooks:

1. P. M. Modi and S. M. Seth, “Hydraulics and Fluid Mechanics”, Standard Book House
2. K. Subrahmanya, “Theory and Applications of Fluid Mechanics”, Tata McGraw Hill

Reference Books:

1. R. K. Bansal, A text of “Fluid Mechanics and Hydraulic Machines”, Laxmi Publications (P) Ltd., New Delhi.
2. K. Subramanya, Open channel Flow, Tata McGraw Hill.
3. N. Narayana Pillai, Principles of “Fluid Mechanics and Fluid Machines”, Universities Press Pvt Ltd, Hyderabad. 3rd Edition 2009.
4. C. S. P. Ojha, R. Berndtsson and P. N. Chadramouli, “Fluid Mechanics and Machinery”, Oxford University Press, 2010.
5. Banga& Sharma, “Hydraulic Machines”, Khanna Publishers.

Course Outcomes (CO):

- Familiarize basic terms used in fluid mechanics
- Understand the principles of fluid statics, kinematics and dynamics
- Understand flow characteristics and classify the flows and estimate various losses in flow through channels
- Analyze characteristics for uniform and non-uniform flows in open channels.
- Design different types of turbines, centrifugal and multistage pumps.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20APC0302T	3	0	0	3	CIE	30M
Course Title	:	**MANUFACTURING PROCESSES**					SEE	70M
Pre-requisite	:	NIL						

Course Objectives:

- To introduce the students to working principle of different metal casting processes and gating system.
- To impart knowledge on plastic deformation, cold and hot working process, working of a rolling mill and types, extrusion processes.
- To teach principles of forging, tools and dies, working of forging processes.
- To develop fundamental understanding on classification of the welding processes, working of different types of welding processes and welding defects.
- To impart knowledge on manufacturing methods of plastics, ceramics and powder metallurgy.

To introduce the basic concepts of Unconventional Machining Processes.

UNIT – I **8 Hrs**

Casting Processes

Introduction: Importance and selection of manufacturing processes.

Introduction to casting process, process steps; pattern and design of gating system; Solidification of casting: Concept, solidification of pure metal and alloy; Special casting processes: Shell casting, investment casting, die casting, centrifugal casting, casting defects and remedies

UNIT – II **8 Hrs**

Metal Forming & Forging

Introduction, nature of plastic deformation, hot and cold working of metals, mechanics of metal forming; Rolling: Principle, types of rolling mill and products, roll passes, forces in rolling and power requirements; Extrusion: Basic extrusion process and its characteristics, hot extrusion and cold extrusion, wire drawing, tube drawing.

Principles of forging, tools and dies. Types: Smith forging, drop forging, forging hammers, rotary forging and forging defects. Sheet metal forming: Mechanics of sheet metal working, blanking, piercing, bending, stamping.

UNIT – III **8 Hrs**

Metal Joining Processes

Classification of welding processes, types of welds and welded joints and V-I characteristics, arc welding, weld bead geometry, submerged arc welding, gas tungsten arc welding, gas metal arc welding, applications, advantages and disadvantages of the above processes, Plasma Arc welding, Laser Beam Welding, Electron Beam Welding and Friction Stir Welding. Heat affected zones in welding; soldering and brazing: Types and their applications, Welding defects: causes and remedies.

UNIT – IV **8 Hrs**

Plastic Processing, Ceramics and Powder Metallurgy

Plastics: Types, properties and their applications, processing of plastics, extrusion of plastics, transfer molding and compression molding, injection molding, thermoforming, rotational molding, and blow molding

Ceramics: Classification of ceramic materials, properties and their application, ceramic powder preparation; Processing of ceramic parts: Pressing, casting, sintering; Secondary processing of ceramics: Coatings, finishing.

Powder Metallurgy: Principle, manufacture of powders, steps involved.

UNIT – V **10 Hrs**

Unconventional Machining Processes

principle and processes parameters of Electrical discharge machining (EDM), electro-chemical machining (ECM), Laser beam machining (LBM), plasma arc machining (PAM), electron beam machining, Abrasive jet machining (AJM), water jet machining (WJM), and ultrasonic machining(UM)

Textbooks:

Rao P.N., Manufacturing Technology – Volume I, 5/e, McGraw-Hill Education, 2018.

1. Kalpakjain S and Schmid S.R., Manufacturing Engineering and Technology, 7/e, Pearson, 2018.

Reference Books:

1. Introduction to Physical Metallurgy by Sidney H.Avner
2. Millek P. Groover, Fundamentals of Modern Manufacturing: Materials, Processes and Systems, 4/e, John Wiley and Sons Inc, 2010.
3. Sharma P.C., A Text book of Production Technology, 8/e, S Chand Publishing, 2014.

Course Outcomes (CO):

At the end of the course, the student will be able to

- Demonstrate different metal casting processes and gating systems. (L2)
- Classify working of various welding processes. (L2)
- Evaluate the forces and power requirements in rolling process. (L5)
- Apply the principles of various forging operations. (L3)
- Outline the manufacturing methods of plastics, ceramics and powder metallurgy. (L1)
- Identify different unconventional processes and their applications. (L3)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20APC0303	3	0	0	3	CIE	30M
Course Title	:	**THERMODYNAMICS**					SEE	70M
Pre-requisite	:	NIL						

Course Objectives:

- To introduce the concepts of heat, work, energy and governing rules for conversion of one form to other.
- To explain relationships between properties of matter and basic laws of thermodynamics.
- To teach the concept of entropy for identifying the disorder and feasibility of a thermodynamic process.
- To introduce the concept of available energy for maximum work conversion.
- To impart knowledge on steam properties.
- To provide fundamental concepts of air standard cycles used in IC engines and gas turbines.

UNIT – I **10 Hrs**

First law of Thermodynamics

Introduction: Basic Concepts: Macroscopic and microscopic viewpoints, definitions of thermodynamic terms, quasi – static process, point and path function, forms of energy, ideal gas and real gas, Zeroth law of thermodynamics and Temperature measurement.

Joule's experiment - first law of thermodynamics, corollaries-perpetual motion machines of first kind, first law applied to non-flow and flow process- limitations of first law of thermodynamics

UNIT – II **8 Hrs**

Second Law of Thermodynamics

Kelvin - Planck statement and Clausius statement and their equivalence, corollaries - perpetual motion machines of second kind - reversibility and irreversibility, cause of irreversibility - Carnot cycle, heat engine, heat pump and refrigerator, Carnot theorem, Carnot efficiency.

UNIT – III **8 Hrs**

Entropy, Availability and Irreversibility

Clausius inequality - Concept of Entropy- entropy equation for different processes and systems. Definition of exergy and anergy, expressions for availability and irreversibility. Availability in steady flow, non-flow processes and irreversibility. Maxwell relations, TdS equations difference in heat capacities, ratio of heat capacities.

UNIT – IV **8 Hrs**

Properties of Steam and use of Steam Tables

Pure Substances, P-V-T surfaces, T-s and h-s diagram, Mollier chart, dryness fraction, property tables, analysis of steam undergoing various thermodynamic processes using Mollier chart– steam calorimetry. Energy equation, Joule Thompson coefficient Clausius - Clapeyron equation

UNIT – V **8 Hrs**

Air Standard Cycles

Otto, Diesel and dual cycles, P-V and T -S diagrams - description and efficiencies, mean effective pressures. Brayton Cycle - Comparison of Otto, Diesel and dual cycles, Comparison of Brayton and Otto Cycles.

Textbooks:

P.K.Nag, Engineering Thermodynamics, 5/e, Tata McGraw Hill, 2013.

1. Yunus A. Cengel, Michaela A. Boles, Thermodynamics, 7/e, Tata McGraw Hill, 2011.

Reference Books:

1. J.B.Jones and G.A.Hawkins, Introduction to Thermodynamics, 2/e, John Wiley & Sons, 2012.

Moran, Michael J. and Howard N. Shapiro, Fundamentals of Engineering Thermodynamics, 3/e, Wiley, 2015

2. R.K. Rajput, S.Chand& Co., Thermal Engineering, 6/e, Laxmi publications, 2010

Course Outcomes (CO):

After completing the course, the student will be able to:

- Understand the importance of thermodynamic properties related to conversion of heat energy into work. (L1)
- Apply the laws of thermodynamics to boilers, heat pumps, refrigerators, heat engines, compressors and nozzles. (L3)
- Utilize steam properties to design steam based components. (L4)
- Analyze thermodynamic relations and air standard cycles. (L5)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	ENGINEERING SCIENCE	L	T	P	C	Exam	3Hrs
Course Code	:	20AES0304T	3	0	0	3	CIE	30M
Course Title	:	**MECHANICS OF MATERIALS**					SEE	70M
Pre-requisite	:	NIL						

Course Objectives:

- Understand the basics of stresses and strains
- Draw the shear force and bending moment drawings of various beams.
- Understand the Behaviour of members and Torsional forces
- Understand the Behaviour of cylinders
- Understand the stresses developing in curved beams.

UNIT – I

Analysis of stress and strain

Types of external loads - self weight - internal stresses - normal and shear stresses - strain - Hooke's law - Poisson's ratio - relationship between elastic constants - stress strain diagrams working stress - elongation of bars of constant and varying sections - Stress on inclined planes for axial and biaxial stress fields - principal stresses - Mohr's circle of stress - principal strains - strain rosette – principal stress/strain problem as an eigen value problem

UNIT – II

Bending moment and shear force

Different types of beams - shear force and bending moment diagrams for simply supported, overhanging and cantilever beams - relationship connecting intensity of loading, shearing force and bending moment - shear force and bending moment diagrams for statically determinate plane frames

UNIT – III

Torsion and Springs

Torsion formulation stresses and deformation in circular and hollows shafts – Stepped shafts–

Deflection in shafts fixed at the both ends – Stresses in helical springs – Deflection of helical springs, carriage springs.

UNIT – IV

Thin Cylinders, Spheres and Thick Cylinders

Stresses in thin cylindrical shell due to internal pressure circumferential and longitudinal stresses and deformation in thin cylinders – spherical shells subjected to internal pressure –Deformation in spherical shells – Lame's theory – Application of theories of failure.

UNIT – V

Bending of curved bars & Unsymmetrical Bending

Stresses in bars of small initial curvature, Winkler-Bach theory, Stresses in bars of large initial curvature, Deflection of Crane hooks, Chain links, circular rings, stresses in circular rings.

Introduction to unsymmetrical bending, Stresses and deflection in unsymmetrical bending, Shear centre for angle, Channel and I-sections.

Textbooks:

1. Mechanics of Material – J. M. Gere and S. P. Timoshenko – CBS publisher
2. Popov, E.P., Mechanics of Materials, Prentice Hall India, New Delhi, 2002.

Reference Books :

1. Advanced Mechanics of Materials–A. P. Boresi and O. M. Sidebottom–John Wiley & Sons
2. Strength of Materials – R. K. Rajput – S. Chand & Company
3. Beer, F.P.,Johnston, E.R. and DeWolf, J.T.,Mechanics of Materials, 3rd ed., Tata McGraw-Hill
4. Strength of Material – Dr. Sadhu Singh – Khanna Publishers
5. Strength of Material, Vol. I and II – S. P. Timoshenko – EWP Press

Course Outcomes (CO):

- Evaluate stresses and strains
- To draw the SF and BM diagrams for various beams under different loading conditions
- Determine the resistance and deformation in machine members subjected to torsional loads and springs.
- Analyze and design thin, thick cylinders.
- Analysis of stresses in curved bars.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

CourseCategory	:	MANDATORY COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20AMC9901	3	0	0	3	CIE	50M
Course Title	:	**ENVIRONMENTAL SCIENCES (Common to All Branches of Engineering**					SEE	
Pre-requisite	:	NIL						

Course Objectives:

- To make the students to get awareness on environment
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life
- To save earth from the inventions by the engineers.

UNIT – I **8 Hrs**

Multidisciplinary Nature Of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources : Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

UNIT – II **12 Hrs**

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

a. Forest ecosystem.
b. Grassland ecosystem
c. Desert ecosystem
d. Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity And Its Conservation : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity

UNIT – III **8 Hrs**

Environmental Pollution: Definition, Cause, effects and control measures of :

a. Air Pollution.
b. Water pollution
c. Soil pollution
d. Marine pollution
e. Noise pollution

f. Thermal pollution
g. Nuclear hazards

Solid Waste Management: Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

UNIT – IV **10 Hrs**

Social Issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

UNIT – V **8 Hrs**

Human Population And The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain– Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Textbooks:

1. Text book of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, “Environmental Studies”, Pearson education
3. S.Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. K.Raghavan Nambiar, “Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd.

Reference Books:

1. Deeksha Dave and E.Sai Baba Reddy, “Textbook of Environmental Science”, Cengage Publications.
2. M.Anji Reddy, “Text book of Environmental Sciences and Technology”, BS Publication.
3. J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.
4. J. Glynn Henry and Gary W. Heinke, “Environmental Sciences and Engineering”, Prentice hall of India Private limited
5. G.R.Chatwal, “A Text Book of Environmental Studies” Himalaya Publishing House
6. Gilbert M. Masters and Wendell P. Ela, “Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

Course Outcomes (CO):

At the end of the course, the student will be able to

- Grasp multidisciplinary nature of environmental studies and various renewable and nonrenewable resources.
- Understand flow and bio-geo- chemical cycles and ecological pyramids.
- Understand various causes of pollution and solid waste management and related preventive measures.
- About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
- Casus of population explosion, value education and welfare programmes

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20APC0301P	0	0	3	1.5	CIE	30M
Course Title	:	**FLUID MECHANICS AND HYDRAULIC MACHINES LAB (Common to Civil & Mechanical)**					SEE	70M
Pre-requisite	:	NIL						

Course Objectives:

By performing this laboratory, the student will be able to know the fluid flow measurements by considering different types flow measurement devices and working principles of various pumps and motors.

List of Experiments:

1. Verification of Bernoulli's equation.
2. Calibration of Venturi meter.
3. Calibration of Orifice meter
4. Determination of Coefficient of discharge for a small orifice by constant head method.
5. Determination of Coefficient of discharge for a small orifice by variable head method.
6. Determination of Coefficient of discharge for an external mouth piece by Constant head method.
7. Determination of Coefficient of discharge for an external mouth piece by variable head method.
8. Calibration of contracted Rectangular Notch.
9. Calibration of contracted Triangular Notch. Determination of friction factor
10. Determination of loss of head in a sudden contraction.
11. Determination of loss of head in a sudden Expansion.
12. Performance test on Impulse turbines
13. Performance test on reaction turbines (Francis and Kaplan Turbines)

Impact of jet

14. Performance test on centrifugal pumps, determination of operating point and efficiency

References:

1. Fluid Mechanics & Hydraulic Machines A Lab Manual by Ts Desmukh (Author), Laxmi Publications (P) Ltd

Fluid Mechanics & Machinery Laboratory Manual by N Kumara Swamy (Author), Charotar Books Distributors

2. Lab. Manual of Fluid Mechanics & Machines by Gupta, Chandra (Author), cbspd (Publisher)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20APC0302P	0	0	3	1.5	CIE	30M
Course Title	:	**MANUFACTURING PROCESSES LAB**					SEE	70M
Pre-requisite	:	NIL						

Course Objectives:

- Acquire practical knowledge on Metal Casting, Welding, Press Working and unconventional machining Processes

List of Experiments:

1. **METAL CASTING**
   a) Gating Design and pouring time and solidification time calculations.
   b) Sand Properties Testing – Exercise for Strength and Permeability.
   C) Molding, Melting and Casting for ferrous/ non ferrous materials.
2. **WELDING**
   a) TIG Welding.
   b) MIG Welding.
   c) Friction stir welding.
   d) Any other Special Welding Processes.
3. **MECHANICAL PRESS WORKING**
   a) Press Tool: Blanking and Piercing operation with Simple, Compound and Combination dies.
   b) Closed die forging, Deep Drawing and Extrusion operations.
4. **UN CONVENTIONAL MANUFACTUNRING PROCESSES**
   a) Electro Discharge Machining (EDM) / Wire cut EDM
   b) Plasma arc cutting / Abrasive jet machining (AJM)
   c) Additive manufacturing with reverse engineering

Course Outcomes (CO):

At the end of the lab, the student will be able to
Fabricate different types of components using various manufacturing techniques. (L6)

- Adapt unconventional manufacturing methods. (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	ENGINEERING SCIENCE	L	T	P	C	Exam	3Hrs
Course Code	:	20AES0304P	0	0	3	1.5	CIE	30M
Course Title	:	**MECHANICS OF MATERIALS LAB**					SEE	70M
Pre-requisite	:	NIL						

Course Objectives:

By performing this laboratory, the student will be able to know the structural behavior of various materials

List of Experiments:

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test.
5. Vickers Hardness Test
6. Rockwell Hardness Test
7. Brinell Hardness Test
8. Compression test on Open coiled springs
9. Tension test on Closely coiled springs
10. Compression test on wood/ concrete
11. Izod Impact test on metals
12. Charpy Impact test on metals
13. Shear test on metals
14. Direct Shear Test on Timber Specimen
15. Use of electrical resistance strain gauges.
16. Continuous beam – deflection test.

Note : Any 12 of the above equipments

References:

1. Strength of Materials Lab Manual by Anand Jayakumar A , Notion Press

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(III Semester Mechanical Engineering)

Course Category	:	SKILL ORIENTATION COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20ASC0501	1	0	2	2	CIE	30M
Course Title	:	**APPLICATION DEVELOPMENT WITH PYTHON**					SEE	70M
Pre-requisite	:	NIL						

Course Objectives:

1. To learn the basic concepts of software engineering and life cycle models
2. To explore the importance of Databases in application Development
3. Acquire programming skills in core Python
4. To understand the importance of Object-oriented Programming

Module 1. Basic concepts in software engineering and software project management

Basic concepts: abstraction versus decomposition, the evolution of software engineering techniques, Software development life cycle

Software project management: project planning and project scheduling

Task:

1. Identifying the Requirements from Problem Statements

Module 2. Basic Concepts of Databases

Database systems applications, Purpose of Database Systems, view of Data, Database Languages, Relational Databases, Data Definition Language(DDL) Statements: (Create table, Alter table, Drop table), Data Manipulation Language(DML) Statements

Task:

1. Implement Data Definition Language(DDL) Statements: (Create table, Alter table, Drop table)
2. Implement Data Manipulation Language(DML) Statements

Module 3. Python Programming:

Introduction to Python: Features of Python, Data types, Operators, Input and output, Control Statements, Looping statements

Python Data Structures: Lists, Dictionaries, Tuples.

Strings: Creating strings and basic operations on strings, string testing methods.

Functions: Defining a function- Calling a function- Types of functions-Function Arguments- Anonymous functions- Global and local variables

OOPS Concepts; Classes and objects- Attributes- Inheritance- Overloading- Overriding- Data hiding

Modules and Packages: Standard modules-Importing own module as well as external modules Understanding Packages Powerful Lamda function in python Programming using functions, modules and external packages

Working with Data in Python: Printing on screen- Reading data from keyboard- Opening and closing file- Reading and writing files- Functions-Loading Data with Pandas-Numpy

Tasks:

1. OPERATORS

a) Read a list of numbers and write a program to check whether a particular element is present or not using membership operators.
b) Read your name and age and write a program to display the year in which you will turn 100 years old.
c) Read radius and height of a cone and write a program to find the volume of a cone.
d) Write a program to compute distance between two points taking input from the user (Hint: use Pythagorean theorem)

2. CONTROL STRUCTURES

a) Read your email id and write a program to display the no of vowels, consonants, digits and white spaces in it using if…elif…else statement.
b) Write a program to create and display a dictionary by storing the antonyms of words. Find the antonym of a particular word given by the user from the dictionary using while loop.
c) Write a Program to find the sum of a Series 1/1! + 2/2! + 3/3! + 4/4! +…….+ n/n!. (Input :n = 5,
Output : 2.70833)
d) In number theory, an abundant number or excessive number is a number for which the sum of its proper divisors is greater than the number itself. Write a program to find out, if the given number is abundant. (Input: 12, Sum of divisors of 12 = 1 + 2 + 3 + 4 + 6 = 16, sum of divisors 16 > original number 12)

3: LIST

a) Read a list of numbers and print the numbers divisible by x but not by y
(Assume x = 4 and y = 5).
b) Read a list of numbers and print the sum of odd integers and even integers from the list.(Ex: [23, 10, 15, 14, 63], odd numbers sum = 101, even numbers sum = 24)
c) Read a list of numbers and print numbers present in odd index position. (Ex: [10, 25, 30, 47, 56, 84, 96], The numbers in odd index position: 25 47 84).
d) Read a list of numbers and remove the duplicate numbers from it. (Ex: Enter a list with duplicate elements: 10 20 40 10 50 30 20 10 80, The unique list is: [10, 20, 30, 40, 50, 80])

4: TUPLE

a) Given a list of tuples. Write a program to find tuples which have all elements divisible by K from a list of tuples. test_list = [(6, 24, 12), (60, 12, 6), (12, 18, 21)], K = 6, Output : [(6, 24, 12), (60, 12, 6)]
b) Given a list of tuples. Write a program to filter all uppercase characters tuples from given list of tuples. (Input: test_list = [("GFG", "IS", "BEST"), ("GFg", "AVERAGE"), ("GfG",), ("Gfg", "CS")], Output : [(„GFG", „IS", „BEST")]).
c) Given a tuple and a list as input, write a program to count the occurrences of all items of the list in the tuple. (Input : tuple = ('a', 'a', 'c', 'b', 'd'), list = ['a', 'b'], Output : 3)

5: SET

a) Write a program to generate and print a dictionary that contains a number (between 1 and n) in the form (x, x*x).
b) Write a program to perform union, intersection and difference using Set A and Set B.
c) Write a program to count number of vowels using sets in given string (Input : "Hello World", Output:
No. of vowels : 3)
d) Write a program to form concatenated string by taking uncommon characters from two strings using set concept (Input : S1 = "aacdb", S2 = "gafd", Output : "cbgf").

6: DICTIONARY

a) Write a program to do the following operations:

i. Create a empty dictionary with dict() method
ii. Add elements one at a time
iii. Update existing key" s value
iv. Access an element using a key and also get() method
v. Deleting a key value using del() method

b) Write a program to create a dictionary and apply the following methods:
   i. pop() method
   ii. clear() method

c) Given a dictionary, write a program to find the sum of all items in the dictionary.

d) Write a program to merge two dictionaries using update() method.

7: STRINGS

a) Given a string, write a program to check if the string is symmetrical and palindrome or not. A string is said to be symmetrical if both the halves of the string are the same and a string is said to be a palindrome string if one half of the string is the reverse of the other half or if a string appears same when read forward or backward.

b) Write a program to read a string and count the number of vowel letters and print all letters except 'e' and 's'.

c) Write a program to read a line of text and remove the initial word from given text. (Hint: Use split() method, Input : India is my country. Output : is my country)

d) Write a program to read a string and count how many times each letter appears. (Histogram).

8: USER DEFINED FUNCTIONS

a) A generator is a function that produces a sequence of results instead of a single value. Write a generator function for Fibonacci numbers up to n.

b) Write a function merge_dict(dict1, dict2) to merge two Python dictionaries.

c) Write a fact() function to compute the factorial of a given positive number.

d) Given a list of n elements, write a linear_search() function to search a given element x in a list.

9: BUILT-IN FUNCTIONS

a) Write a program to demonstrate the working of built-in statistical functions mean(), mode(), median() by importing statistics library.

b) Write a program to demonstrate the working of built-in trignometric functions sin(), cos(), tan(), hypot(), degrees(), radians() by importing math module.

c) Write a program to demonstrate the working of built-in Logarithmic and Power functions exp(), log(), log2(), log10(), pow() by importing math module.

d) Write a program to demonstrate the working of built-in numeric functions ceil(), floor(), fabs(), factorial(), gcd() by importing math module.

CLASS AND OBJECTS

a) Write a program to create a Bank Account class. Your class should support the following methods for
   i. Deposit
   ii. Withdraw
   iii. Get Balance
   iv. Pin Change

b) Create a SavingsAccount class that behaves just like a BankAccount, but also has an interest rate and a method that increases the balance by the appropriate amount of interest (Hint:use Inheritance).

c) Write a program to create an employee class and store the employee name, id, age, and salary using the constructor. Display the employee details by invoking employee_info() method and also using dictionary (dict).

d) Access modifiers in Python are used to modify the default scope of variables. Write a program to demonstrate the 3 types of access modifiers: public, private and protected.

FILE HANDLING

a) . Write a program to read a filename from the user, open the file (say firstFile.txt) and then perform the following operations:

Count the sentences in the file.

Count the words in the file.

Count the characters in the file.

b) Create a new file (Hello.txt) and copy the text to other file called target.txt. The target.txt file should store only lower case alphabets and display the number of lines copied.

c) Write a Python program to store N student" s records containing name, roll number and branch. Print the given branch student" s details only.

References:

- Rajib Mall, "Fundamentals of Software Engineering", 5th Edition, PHI, 2018.
- Ramez Elmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013. 3.Reema Thareja, "Python Programming - Using Problem Solving Approach", Oxford Press, 1st Edition, 2017.
- 4. Larry Lutz, "Python for Beginners: Step-By-Step Guide to Learning Python Programming",
- CreateSpace Independent Publishing Platform, First edition, 2018

Course Outcomes (CO):

Students should be able to

1. Identify the issues in software requirements specification and enable to write SRS documents for software development problems
2. Explore the use of Object oriented concepts to solve Real-life problems

Design database for any real-world problem

3. Solve mathematical problems using Python programming language

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<table>
<tr><td>Course Category</td><td>:</td><td>BASIC SCIENCES</td><td>L</td><td>T</td><td>P</td><td>C</td><td>Exam</td><td>3Hrs</td></tr>
<tr><td>Course Code</td><td>:</td><td>20ABS5408</td><td>3</td><td>0</td><td>0</td><td>3</td><td>CIE</td><td>30M</td></tr>
<tr><td>Course Title</td><td>:</td><td colspan="5">NUMERICAL METHODS & PROBABILITY THEORY
(Common to EEE, MECH)</td><td>SEE</td><td>70M</td></tr>
<tr><td>Pre-requisite</td><td>:</td><td colspan="7">Basic Equations and Basic Probability</td></tr>
</table>

Course Objectives:

This course aims at providing the student with the knowledge on various numerical methods for solving equations, interpolating the polynomials, evaluation of integral equations and solution of differential equations. The theory of Probability and random variables.

UNIT – I

8Hrs

Solution of Algebraic & Transcendental Equations:

Introduction-Bisection method-Iterative method-Regula falsi method-Newton Raphson method System of Algebraic equations: Gauss Jordan method-Gauss Siedal method.

UNIT – II

8Hrs

Interpolation

Newton's interpolation formulae- forward, backward and divided difference formula ,Lagrange's formulae, Stirling's formula, Bessel's formula.

UNIT – III

9Hrs

Numerical Integration & Solution of Initial value problems to Ordinary differential equations

Numerical Integration: Trapezoidal rule – Simpson's 1/3 Rule – Simpson's 3/8 Rule Numerical solution of Ordinary Differential equations: Solution by Taylor's series-Picard's Method of successive Approximations-Modified Euler's Method-Runge-Kutta Methods.

UNIT – IV

9Hrs

Probability theory:

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.Moment generation function.

UNIT – V

9Hrs

Random variables & Distributions:

Probability distribution - Binomial, Poisson approximation to the binomial distribution and normal distribution-their properties-Uniform distribution-exponential distribution

Textbooks:

1. Higher Engineering Mathematics, B.S.Grewal, Khanna publishers.
2. Probability and Statistics for Engineers and Scientists, Ronald E. Walpole,PNIE.
3. Advanced Engineering Mathematics, by Erwin Kreyszig, Wiley India.

Reference Books:

1 Higher Engineering Mathematics, by B.V.Ramana, Mc Graw Hill publishers.
2 Advanced Engineering Mathematics, by Alan Jeffrey, Elsevier.

Course Outcomes (CO): Student will be able to

- Apply numerical methods to solve algebraic and transcendental equations
- Derive interpolating polynomials using interpolation formulae
- Solve differential and integral equations numerically
- Apply probability theory to find the chances of happening of events.
- Understand various probability distributions and calculate their statistical constants.

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Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20APC0304T	3	0	0	3	CIE	30M
Course Title	:	**Applied Thermodynamics**					SEE	70M
Pre-requisite	:	**NIL**						

Course Objectives:

- To introduce students to the Working Principles of IC engines.
- To teach combustion process in SI and CI engines.
- To impart knowledge on different types of compressors.
- To familiarize concepts of thermodynamic cycles used in steam power plants and gas turbines
- To impart knowledge on the working of nozzles, turbines, refrigeration and air conditioning.

UNIT – I **10 Hrs**

IC Engines

Working and classification of IC engines, comparison of two stroke and four stroke engines, comparison of SI and CI Engines.

Testing and Performance of IC Engines: Methods of testing IC Engines, performance analysis of IC Engines.

Combustion in IC Engines: SI engine: stages of combustion, normal combustion, abnormal combustion, variables effecting ignition lag, Flame propagation and knocking. CI engine: stages of combustion, normal combustion, abnormal combustion, variables effecting delay period and knocking

UNIT – II **8 Hrs**

Air compressors

Reciprocating Compressor: Single stage reciprocating compressors, work required, effect of clearance in compressors, volumetric efficiency, multi stage compressor, effect of inter cooling in multi stage compressors, compressor performance.

Rotary Compressor: Working principle of a rolling piston type compressor (fixed vane type), multi vane type compressors, characteristics of rotary vane type compressor, working principle of centrifugal and axial flow compressors.

UNIT – III **8 Hrs**

Vapour & Gas Power Cycles

Vapour power cycle, simple Rankine cycle, mean temp of heat addition, thermodynamic variables effecting efficiency, Rankine cycle – reheating and regeneration.

Simple gas turbine plant, Brayton cycle, closed cycle and open cycle for gas turbines, condition for optimum pressure ratio, actual cycle. Methods to improve performance: regeneration, inter cooling and reheating.

UNIT – IV **8 Hrs**

Nozzles & Steam Turbines

Type of nozzles - gas and steam nozzles. Compressible flow through nozzle- condition for maximum discharge - Nozzle efficiency - Super saturation.

Steam Turbines - impulse turbine and reaction turbine – compounding of impulse turbines - velocity diagrams in impulse and reaction turbines, blade efficiency, degree of reaction.

UNIT – V **8 Hrs**

Refrigeration & Air-Conditioning

Refrigeration: Bell-Coleman cycle - vapour compression cycle, sub cooling and super heating-vapour absorption cycle, properties of common refrigerants.

Principles of Psychrometry and Air Conditioning: Psychometric properties, psychometric processes, summer and winter air conditioning systems.

Textbooks:

Thermal Engineering, Mahesh V Rathore, Tata McGraw Hill 2017

1. M.L.Mathur and F.S.Mehta, Thermal Engineering, Jain brothers,2014

Reference Books:

1. Ganesan V, Internal Combustion Engines, Tata McGraw Hill, 2017.
2. Yahya, S. M., Turbines, Compressors and Fans, 4/e, Tata McGraw Hill, 2010.
3. Nag P.K, Engineering Thermodynamics, 4/e, Tata McGraw-Hill, 2008.

Onkar Singh, Thermal Turbomachines, 3/e, Wiley India, 2014.

4. Refrigeration and Air Conditioning, C.P.Arora

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Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20APC0306	3	0	0	3	CIE	30M
Course Title	:	**KINETICS OF MACHINERY**					SEE	70M
Pre-requisite	:	**NIL**						

Course Objectives:

The Objectives of this course are to:

- To provide a foundation for the study of Dynamics of Machinery and machine design.
- Comprehend the fundamentals of kinematics and to understand the concept of machines, mechanisms and related terminologies.
- Analyze a mechanism for displacement, velocity and acceleration at any point in a moving link.
- To develop skills for designing and analyzing linkages and mechanisms.
- Formulate the concept of synthesis and analysis of different mechanisms.
- To understand the Principles and working of various straight line motion mechanisms.

To analyze Steering gear mechanisms and working of Hooke's joint.

- To understand the theory of gears, gear trains and cams.

UNIT – I **8 Hrs**

MECHANISMS AND MACHINES

Elements or Links – Classification – Rigid Link, flexible and fluid link. Types of kinematic pairs – sliding, turning, rolling, screw and spherical pairs – lower and higher pairs – closed and open pairs – constrained motion – completely, partially or successfully constrained and incompletely constrained. Mechanisms and machines – classification of mechanisms and machines – kinematic chain – inversion of mechanisms – inversions of quadric cycle chain, single and double slider crank chain. Mobility of mechanisms.

UNIT – II **8 Hrs**

Steering & Straight-Line Motion Mechanisms

Straight Line Motion Mechanisms- Exact and approximate, copied and generated types – Peaucellier, Hart, Scott Russel, Grasshopper, Watt, Tchebicheff and Robert Mechanisms. Pantograph.

Steering Mechanisms: Conditions for correct steering – Davis Steering gear, Ackermann"s steering gear.

Hooke's Joint (Universal coupling) -Single and double Hooke's joint — applications – Simple problems.

UNIT – III **10 Hrs**

KINEMATICS

Velocity and Acceleration Diagrams- Velocity and acceleration – Motion of link in machine – Determination of Velocity and acceleration – Graphical method – Application of relative velocity method– Slider crank mechanism, four bar mechanism. Acceleration diagrams for simple mechanisms, determination of Coriolis component of acceleration, Klein's construction: Analysis of slider crank mechanism for displacement, velocity and acceleration of slider using analytical method.

Instantaneous Centre Method: Instantaneous centre of rotation, centrode and axode – relative motion between two bodies – Three centers in-line theorem – Locating instantaneous canters for simple mechanisms and determination of angular velocity of points and links.

UNIT – IV **10 Hrs**

GEARS & GEAR TRAINS

GEARS: Higher pairs, toothed gears – types – law of gearing, condition for constant velocity Ratio for transmission of motion, Forms of tooth- cycloidal and involute profiles. Velocity of sliding – phenomena of interference – Methods to avoid interference - Condition for minimum number of teeth, expressions for arc of contact and path of contact. Introduction to Helical, Bevel and Worm gears

GEAR TRAINS:

Introduction –Types of gears – Simple, Compound, Reverted and Epicyclic gear trains, Train value – Methods of finding train value or velocity ratio – Tabular column method for Epicyclic gear trains. Torque in epicyclic gear trains. Differential gear of an automobile – Simple problems

UNIT – V **8**

Hrs

CAMS & Followers

CAMS: Definitions of cam and follower – uses – Types of followers and cams – Terminology. Types of follower motion - Uniform velocity, Simple harmonic motion, Cycloidal, uniform acceleration and retardation, Maximum velocity and maximum acceleration during outward and return strokes. Drawing of cam profiles.

ANALYSIS OF MOTION OF FOLLOWERS: Tangent cam with roller follower – circular arc (Convex) cam with flat faced and roller follower

Textbooks:

1. Theory of Machines and Mechanisms-S.S.Rattan, Tata McGraw Hill Publishers.
2. Theory of Machines R.S Khurmi& J.K Gupta, S Chand Publishers.

Reference Books:

1. Theory of Machines by Thomas Bevan/ CBS
2. Theory of Machines / R.K Bansal
3. Theory of Machines Sadhu Singh PearsonsEdn
4. Mechanism and Machine Theory / JS Rao and RV Dukkipati / New Age

The theory of Machines /Shiegley/ Oxford.

5. Theory of machines – PL. Balaney/khanna publishers

Course Outcomes (CO):

- Build up critical thinking and problem-solving capacity of various mechanical engineering problems related to kinematics of machines (L4)
- Understand the basic principles of mechanisms in mechanical engineering (L1)
- Assess various concepts of mechanisms like straight line motion mechanisms, Steering gear mechanisms and working principles of power elements (Gears, gear trains, Cams) and design related problems effectively (L6)
- Examine the velocity and acceleration diagram for a given mechanism (L3)

- Utilize analytical, mathematical and graphical aspects of kinematics of Machines for effective design (L3)

Construct the cam profile for a given motion (L3)

- Analyze various gear trains (L

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Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20APC0307T	3	0	0	3	CIE	30M
Course Title	:	**Manufacturing Technology**					SEE	70M
Pre-requisite	:	**NIL**						

Course Objectives:

- To introduce the parameters in the metal cutting operation.
- To relate tool wear and tool life and the variables that control them.
- To calculate machining times for different machining processes.

To impart knowledge on various metal cutting processes. (Lathe, drilling, boring shaping, slotting, milling and grinding).

- To teach the principles of jigs and fixtures and types of clamping and work holding devices.

UNIT – I **8 Hrs**

Material Removal Processes

Metal Cutting: Single and multi-point cutting tools, orthogonal and oblique cutting, Merchant circle diagram, chip formation, tool wear and tool life, surface finish and integrity, machinability, cutting tools and materials, cutting fluids.

UNIT – II **12 Hrs**

Lathe and Drilling Machines

Lathe and Lathe Operations: Principles of working, specifications, types of lathes, operations, work and tool holders. Taper turning, thread turning attachments for lathes. Machining time calculations. Turret and capstan lathes - Principle of working-

Drilling Machines: Principles of working, specifications, types, and operations performed - tool holding devices - nomenclature of twist drill, Machining time calculations

UNIT – III **8**

Hrs

Boring, Reaming and Taping

Boring Machines- Principles of working, specifications, types, and operations performed - tool holding devices - nomenclature of boring tools, Machining time calculations

Reaming and Reamers: Principles of working, specifications, types, and operations performed – tool holding devices - nomenclature of reamers. Machining time calculations

Taping and Taps: Principles of working, specifications, types, and operations performed - tool holding devices - nomenclature of taps.

UNIT – IV **10 Hrs**

Milling, Shaping and Abrasive Machining

Milling operations and Milling machines - Principles of working, specifications, classifications of milling machines, machining operations, types and geometry of milling cutters, methods of indexing, and accessories to milling machines, machining time calculations.

Shaping, Slotting and planning machines - Principles of working - principal parts, specification, classification, operations performed, machining time calculations

Abrasive Machining: Grinding and grinding machines: Grinding process, types of grinding machines, grinding process parameters, honing, lapping, other finishing processes.

UNIT – V **8 Hrs**

Jigs and Fixtures

Principles of design of Jigs and fixtures and uses, 3-2-1 principle of location and clamping, classification of Jigs & Fixtures, types of clamping and work holding devices, typical examples of jigs and fixtures

Textbooks:

1. P.N. Rao, Manufacturing Technology: Metal Cutting and Machine Tools, (Volume 2), 3/e, Tata McGraw-Hill Education, 2013
2. R.K. Jain and S.C. Gupta, Production Technology, 17/e, Khanna Publishers, 2012.

Reference Books:

1. Kalpakzian S and Schmid SR, Manufacturing Engineering and Technology, 7/e, Pearson, 2018.
2. Milton C.Shaw , Metal Cutting Principles, 2/e, Oxford, 2012
3. Hindustan Machine Tools, Production Technology, TMH, 2001
4. V.K.Jain, Advanced Machining Process,12/e, Allied Publications, 2010

AB. Chattopadhyay, Machining and Machine Tools, 2/e, Wiley, 2017

5. Halmi A Yousuf & Hassan, , Machine Technology: Machine Tools and Operations, CRC Press Taylor and Francis Group, 2008

Course Outcomes (CO):

At the end of the course, the student will be able to

- Choose cutting processes and variables. (L3)
- Relate tool wear and tool life. (L1)
- Calculate the machining parameters for different machining processes. (L5)
- Identify methods to generate different types of surfaces. (L3)

Explain work-holding requirements. (L2)

- Design jigs and fixtures. (L6)

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Course Category	:	HUMANITY SCIENCE	L	T	P	C	Exam	3Hrs
Course Code	:	20AHS5202	3	0	0	3	CIE	30M
Course Title	:	**MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS (Common to All branches of Engineering)**					SEE	70M
Pre-requisite	:	**NIL**						

Course Objectives:

- To inculcate the basic knowledge of micro economics and financial accounting
- To make the students learn how demand is estimated for different products, input-output relationship for optimizing production and cost
- To Know the Various types of market structure and pricing methods and strategy

To give an overview on investment appraisal methods to promote the students to learn how to plan long-term investment decisions.

- To provide fundamental skills on accounting and to explain the process of preparing financial statements

UNIT - I

Managerial Economics

Introduction – Nature, meaning, significance, functions, and advantages. Demand-Concept, Function, Law of Demand - Demand Elasticity- Types – Measurement. Demand Forecasting- Factors governing Forecasting, Methods. Managerial Economics and Financial Accounting and Management.

UNIT – II

Production and Cost Analysis

Introduction – Nature, meaning, significance, functions and advantages. Production Function– Least- cost combination– Short run and Long run Production Function- Iso quants and Iso costs, MRTS - Cobb-Douglas Production Function - Laws of Returns - Internal and External Economies of scale. Cost & Break-Even Analysis - Cost concepts and Cost behavior- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems)-Managerial significance and limitations of Break-Even Analysis.

UNIT – III

Business Organizations and Markets

Introduction – Nature, meaning, significance, functions and advantages. Forms of Business Organizations- Sole Proprietary - Partnership - Joint Stock Companies - Public Sector Enterprises. Types of Markets - Perfect and Imperfect Competition - Features of Perfect Competition Monopoly- Monopolistic Competition–Oligopoly-Price-Output Determination - Pricing Methods and Strategies

UNIT – IV

Capital Budgeting

Introduction – Nature, meaning, significance, functions and advantages. Types of Working Capital, Components, Sources of Short-term and Long-term Capital, Estimating Working capital requirements. Capital Budgeting– Features, Proposals, Methods and Evaluation. Projects – Pay Back Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

UNIT – V

Financial Accounting and Analysis

Introduction – Nature, meaning, significance, functions and advantages. Concepts and Conventions- Double-Entry Book Keeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

Varshney & Maheswari: Managerial Economics, Sultan Chand, 2013.

1. Aryasri: Business Economics and Financial Analysis, 4/e, MGH, 2019

Reference Books:

1. Ahuja Hl Managerial economics Schand,3/e,2013
2. S.A. Siddiqui and A.S. Siddiqui: Managerial Economics and Financial Analysis, New Age International, 2013.

Joseph G. Nellis and David Parker: Principles of Business Economics, Pearson, 2/e, New Delhi.

3. Domnick Salvatore: Managerial Economics in a Global Economy, Cengage, 2013.

Course Outcomes (CO):

- Define the concepts related to Managerial Economics, financial accounting and management.
- Understand the fundamentals of Economics viz., Demand, Production, cost, revenue and markets
- Apply the Concept of Production cost and revenues for effective Business decision
- Analyze how to invest their capital and maximize returns

Evaluate the capital budgeting techniques

- Develop the accounting statements and evaluate the financial performance of business entity

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Course Category	:	MANDATORY COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20AMC9903	3	0	0	0	CIE	50M
Course Title	:	**BIOLOGY FOR ENGINEERS**					SEE	--
Pre-requisite	:	**NIL**						

Course Objectives:

To provide basic understanding about life and life Process. Animal and plant systems.

To understand what bimolecules, are, their structures are functions. Application of certain bimolecules in Industry.

- Brief introduction about human physiology and bioengineering.
- To understand hereditary units, i.e. DNA (genes) and RNA and their synthesis in living organism.
- How biology Principles can be applied in our daily life using different technologies.
- Brief introduction to the production of transgenic microbes, Plants and animals.

UNIT I: **8 Hrs**

Introduction to Basic Biology

Cell as Basic unit of life, cell theory, Cell shapes, Cell structure, Cell cycle. Chromosomes. Prokaryotic and eukaryotic Cell. Plant Cell, Animal Cell, Plant tissues and Animal tissues, Brief introduction to five kingdoms of classification.

Unit II: **8 Hrs**

Introduction to Biomolecules

Carbohydrates, lipids, proteins, Vitamins and minerals, Nucleic acids (DNA and RNA) and their types. Enzymes, Enzyme application in Industry. Large scale production of enzymes by Fermentation.

Unit III: **8 Hrs**

Human Physiology

Nutrition: Nutrients or food substances. Digestive system, Respiratory system, (aerobic and anaerobic Respiration). Respiratory organs, respiratory cycle. Excretory system.

Unit IV: **8 Hrs**

Introduction to Molecular Biology and recombinant DNA Technology

Prokaryotic gene and Eukaryotic gene structure. DNA replication, Transcription and Translation. r DNA technology. Introduction to gene cloning.

Unit V: **8 Hrs**

Application of Biology

Brief introduction to industrial Production of Enzymes, Pharmaceutical and therapeutic Proteins, Vaccines and antibodies. Basics of biosensors, biochips, Bio fuels, and Bio Engineering. Basics of Production of Transgenic plants and animals.

TEXT BOOKS:

1. P.K.Gupta, " Cell and Molecular Biology"
2. U. Satyanarayana. "Biotechnology", 2017

REFERENCE BOOKS:

1. N. A. Campbell, J. B. Reece, L. Urry, M. L. Cain and S. A. Wasserman, "Biology: A global approach", Pearson Education Ltd, 2018.
2. T Johnson, "Biology for Engineers", CRC press, 2011 "Molecular Biology and Biotechnology" 2 nd ed. J.M. Walker and E.B. Gingold. Panima Publications. PP 434.
3. David Hames, "Instant Notes in Biochemistry", 2016
4. Phil Tunner, A. Mctennan, A. Bates & M. white "Instant Notes – Molecular Biology" 2014

Course Outcomes (CO):

After studying the course, the student will be able to:

- Explain about cells and their structure and function. Different types of cells and basics for classification of living Organisms.
- Explain about biomolecules, their structure and function and their role in the living organisms. How biomolecules are useful in Industry.
- Briefly about human physiology.
- Explain about genetic material, DNA, genes and RNA how they replicate, pass and preserve vital information in living Organisms.
- Know about application of biological Principles in different technologies for the production of medicines and Pharmaceutical molecules through transgenic microbes, plants and animals.

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Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20APC0304P	0	0	3	1.5	CIE	30M
Course Title	:	**Applied Thermodynamics Lab**					SEE	70M
Pre-requisite	:	NIL						

Course Objectives:

- Understand the functioning and performance of I.C. Engines
- To find heat losses in various engines

LIST OF EXPERIMENTS

Demonstration of diesel and petrol engines by cut models

1. Valve timing diagram of 4-stroke diesel engine
2. Port timing diagram of 2-stroke petrol engine
3. Performance of 2-stroke single cylinder petrol engine
4. Morse test on multi cylinder petrol engine
5. Performance of 4-stroke single cylinder diesel engine
6. Assembly and disassembly of diesel and petrol engines
7. Exhaust gas analysis
8. Performance of two stage reciprocating air compressor
9. Determination of nozzle characteristics

10. Performance of Refrigeration system

Performance of Air conditioning system

11. Performance of heat pump

Course Outcomes (CO):

Upon the successful completion of course, students will be able to

- Explain different working cycles of engine
- Describe various types of combustion chambers in IC engines
- Illustrate the working of refrigeration and air conditioning systems
- Evaluate heat balance sheet of IC engine.

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(IV Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20APC0307P	0	0	3	1.5	CIE	30M
Course Title	:	**MANUFACTURING TECHNOLOGY LAB**					SEE	70M
Pre-requisite	:	NIL						

Course Objectives:

- Familiarize the construction and working of various machine tools.
- Teach selection of parameters for different machining processes.

List of Experiments:

1. Demonstration of operations on general purpose machines: Lathe, drilling, milling, shaper, slotting, cylindrical and surface grinding machines.
2. Step turning and knurling on lathe machine
3. Taper turning and knurling on lathe machine
4. Thread cutting (left hand or right hand) on lathe machine.
5. Drilling and Boring operations.
6. Reaming and tapping operations.
7. Milling (Gear cutting) by using simple and Compound indexing.
8. key way/Groove cutting on milling machine

9. Shaping and planning operations
10. Slotting operations

Cylindrical and surface grinding operations

11. Grinding of single point cutting tool

Course Outcomes (CO):

After completion of this course the student may be able to

Implement the concept of machining with various machine tools.(L5)

- Get hands on experience on various machine tools and machining operations. (L5)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester Mechanical Engineering)

Course Category	:	PROFESSIONAL COURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20APC0305	0	0	3	1.5	CIE	30M
Course Title	:	**COMPUTER AIDED MACHINE DRAWING**					SEE	70M
Pre-requisite	:	NIL						

Course Objectives:

- Introduce conventional representations of material and machine components.
- Train to use software for 2D and 3D modeling.
- Familiarize with thread profiles, riveted, welded and key joints.
- Teach solid modeling of machine parts and their sections.

Explain creation of 2D and 3D assembly drawings.

- Familiarize with limits, fits and tolerances in mating components

The following contents are to be done by any 2D software package

Conventional representation of materials and components:

Detachable joints: Drawing of thread profiles, hexagonal and square-headed bolts and nuts, bolted joint with washer and locknut, stud joint, screw joint and foundation bolts.

Riveted joints: Drawing of rivet, lap joint, butt joint with single strap, single riveted, double riveted double strap joints.

Welded joints: Lap joint and T joint with fillet, butt joint with conventions.

Keys: Taper key, sunk taper key, round key, saddle key, feather key, woodruff key.

Couplings: rigid – Muff, flange; flexible – bushed pin-type flange coupling, universal coupling, Oldhams' coupling.

The following contents to be done by any 3D software package

Sectional views

Creating solid models of complex machine parts and create sectional views.

Assembly drawings: (Any four of the following using solid model software)

Lathe tool post, tool head of shaping machine, tail stock, machine vice, gate valve, carburetor, piston, connecting rod, eccentric, screw jack, plumber block, axle bearing, pipe vice, clamping device, Geneva cam, universal coupling,

Manufacturing drawing:

Representation of limits, fits and tolerances for mating parts. Use any four parts of above assembly drawings and prepare manufacturing drawing with dimensional and geometric tolerances.

Textbooks:

1. K.L.Narayana, P.Kannaiah and K.Venkat Reddy, Production Drawing, New Age International Publishers, 3/e, 2014
2. Software tools/packages- Auto CAD, Solid works or equivalent.

Reference Books:

1. Cecil Jensen, Jay Helsel and Donald D.Voisinet, Computer Aided Engineering Drawing, Tata Mcgraw-Hill, NY, 2000.

James Barclay, Brain Griffiths, Engineering Drawing for Manufacture, Kogan Page Science, 2003.

2. N.D.Bhatt, Machine Drawing, Charotar, 50/e, 2014.

Course Outcomes (CO):

After completion of this lab student will be able to

- Demonstrate the conventional representations of materials and machine components.
- Model riveted, welded and key joints using CAD system.
- Create solid models and sectional views of machine components.
- Generate solid models of machine parts and assemble them.

Translate 3D assemblies into 2D drawings.

- Create manufacturing drawing with dimensional and geometric tolerances.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(IV Semester Mechanical Engineering)

Course Category	:	SKILL ORIENTEDCOURSE	L	T	P	C	Exam	3Hrs
Course Code	:	20ASC9901	1	0	2	2	CIE	30M
Course Title	:	**SOFT SKILLS**					SEE	70M
Pre-requisite	:	NIL						

Course Objectives:

- To encourage all round development of the students by focusing on soft skills
- To make the students aware of critical thinking and problem-solving skills

To develop leadership skills and organizational skills through group activities

- To function effectively with heterogeneous teams

UNIT – I **10 Hrs**

Soft Skills & Communication Skills

Introduction, meaning, significance of soft skills – definition, significance, types of communication skills - Intrapersonal & Inter-personal skills - Verbal and Non-verbal Communication

Activities:

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self- expression – articulating with felicity

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic. **Verbal Communication**- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation

UNIT – II **10 Hrs**

Critical Thinking

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking

Activities:

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues – placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

UNIT – III **10 Hrs**

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution –
Methods of decision making – Effective decision making in teams – Methods & Styles

Activities:

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision.

Case Study & Group Discussion

UNIT – IV **10 Hrs**

Emotional Intelligence & Stress Management

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation– Stress factors – Controlling Stress – Tips

Activities:

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations.

Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation, Organizing Debates

UNIT – V **10 Hrs**

Leadership Skills

Team-Building – Decision-Making – Accountability – Planning – Public Speaking – Motivation – Risk- Taking - Team Building - Time Management

Activities:

Forming group with a consensus among the participants- choosing a leader- encouraging the group members to express views on leadership- democratic attitude- sense of sacrifice – sense of adjustment – vision – accommodating nature- eliciting views on successes and failures of leadership using the past knowledge and experience of the participants, Public Speaking, Activities on Time Management, Motivation, Decision Making, Group discussion etc.

NOTE-:

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.

Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear or for good Leadership – Mahendar Singh Dhoni etc.

Textbooks:

1. Personality Development and Soft Skills (English, Paperback, Mitra Barun K.) Publisher: Oxford University Press; Pap/Cdr edition (July 22, 2012)
2. Personality Development and Soft Skills: Preparing for Tomorrow, Dr Shikha Kapoor Publisher : I K International Publishing House; 0 edition (February 28, 2018)

Reference Books:

1. Soft skills: personality development for life success by Prashant Sharma, BPB publications 2018.
2. Soft Skills By Alex K. Published by S.Chand
3. Soft Skills: An Integrated Approach to Maximise Personality Gajendra Singh Chauhan, Sangeetha Sharma Published by Wiley.
4. Communication Skills and Soft Skills (Hardcover, A. Sharma) Publisher: Yking books
5. SOFT SKILLS for a BIG IMPACT (English, Paperback, Renu Shorey) Publisher: Notion Press
6. Life Skills Paperback English Dr. Rajiv Kumar Jain, Dr. Usha Jain Publisher: Vayu Education of India

Course Outcomes (CO):

By the end of the program students should be able to

- Memorize various elements of effective communicative skills
- Interpret people at the emotional level through emotional intelligence
- apply critical thinking skills in problem solving
- analyse the needs of an organization for team building

Judge the situation and take necessary decisions as a leader

- Develop social and work-life skills as well as personal and emotional well-being

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING,

KURNOOL

DEPARTMENT OF CIVIL ENGINEERING

COURSE STRUCTURE AND DETAILED SYLLABUS

REGULATION: RU20

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

RAYALASEEMA UNIVERSITY,

Pasupula, Kurnool District, Andhra Pradesh 518002

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
Course Structure & Syllabus for First Year Regular B.Tech. Degree Program
(Effective for the batches admitted from 2020-21 onwards)
CIVIL ENGINEERING

INDUCTION PROGRAM (3 weeks duration)

- Physical activity
- Creative Arts
- Universal Human Values
- Literary
- Proficiency Modules
- Lectures by Eminent People
- Visits to local Areas
- Familiarization to Dept./Branch & Innovations

B. Tech – I Semester (Theory – 5, Lab – 4)

S.No	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5401	Linear Algebra and Calculus	3	0	0	3	30	70	100
2	BS	20ABS5602T	Engineering Physics	3	0	0	3	30	70	100
3	HS	20AHS5201T	Communicative English	3	0	0	3	30	70	100
4	ES	20AES0201T	Basic Electrical & Electronics Engineering	3	0	0	3	30	70	100
5	ES	20AES0301T	Engineering Drawing	1	0	2	2	30	70	100
PRACTICAL										
6	BS	20ABS5602P	Engineering Physics Lab	0	0	3	1.5	30	70	100
7	HS	20AHS5201P	Communicative English Lab	0	0	3	1.5	30	70	100
8	ES	20AES0201T	Basic Electrical & Electronics Engineering Lab	0	0	3	1.5	30	70	100
9	ES	20AES0301P	Engineering Graphics Lab	0	0	2	1	30	70	100
			TOTAL:	**13**	**00**	**13**	**19.5**	**270**	**630**	**900**

B. Tech – II Semester (Theory – 5, Lab – 5)

S.No	Course Category	Course Code	Course Title	Instruction Hours per week			Credits	Scheme of Examination (Max. Marks)		
				L	T	P		CIE	SEE	Total
THEORY										
1	BS	20ABS5402	Differential Equations and Vector Calculus	3	0	0	3	30	70	100
2	BS	20ABS5102T	Engineering Chemistry	3	0	0	3	30	70	100
3	ES	20AES0501T	C-Programming & Data Structures	3	0	0	3	30	70	100
4	ES	20AES0101T	Strength of Materials	3	0	0	3	30	70	100
5	MC	20AMC9901	Environmental Science	3	0	0	0	30	-	30
PRACTICAL										
6	BS	20ABS5102P	Engineering Chemistry Lab	0	0	3	1.5	30	70	100
7	ES	20AES0501P	C-Programming & Data Structures Lab	0	0	3	1.5	30	70	100
8	ES	20AES0101P	Strength of Materials Lab	0	0	3	1.5	30	70	100
9	ES	20AES0302	Engineering Workshop	0	0	3	1.5	30	70	100
10	ES	20AES0502	IT Workshop	0	0	3	1.5	30	70	100
			TOTAL:	**15**	**00**	**15**	**19.5**	**300**	**630**	**930**

DETAILED SYLLABUS

B.TECH - I SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, CSE, ECE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5401	3	0	0	3	CIE	30 M
Course Title	:	LINEAR ALGEBRA AND CALCULUS					SEE	70 M

COURSE OBJECTIVES:

- This course will illuminate the students in the concepts of calculus and linear algebra.
- To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real world problems and their applications.

Bridge Course: Limits, continuity, Types of matrices

Unit I: Matrices **(10 hrs)**

Rank of a matrix by echelon form, normal form. Solving system of homogeneous and non-homogeneous equations linear equations. Eigenvalues and Eigenvectors and their properties, Cayley-Hamilton theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton theorem, diagonalisation of a matrix.

Learning Outcomes:

At the end of this unit, the student will be able to

- Solving systems of linear equations, using technology to facilitate row reduction determine the rank, eigenvalues and eigenvectors (L3).
- Identify special properties of a matrix, such as positive definite, etc., and use this information to facilitate the calculation of matrix characteristics; (L3)

Unit II: Mean Value Theorems **(06 hrs)**

Rolle's Theorem, Lagrange's mean value theorem, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), related problems.

Learning Outcomes:

At the end of this unit, the student will be able to

- Translate the given function as series of Taylor's and Maclaurin's with remainders (L3)
- Analyze the behaviour of functions by using mean value theorems (L3)

Unit III: Multivariable calculus **(10 hrs)**

Partial derivatives, total derivatives, chain rule, change of variables, Jacobians, maxima and minima of functions of two variables, method of Lagrange multipliers.

Learning Outcomes:

At the end of this unit, the student will be able to

- Find partial derivatives numerically and symbolically and use them to analyze and interpret the way a function varies. (L3)
- Acquire the Knowledge maxima and minima of functions of several variable (L1)
- Utilize Jacobian of a coordinate transformation to deal with the problems in change of variables (L3)

Unit IV: Multiple Integrals (10 hrs)

Double integrals, change of order of integration, change of variables. Evaluation of triple integrals, change of variables between Cartesian, cylindrical and spherical polar co-ordinates. Finding areas and volumes using double and triple integrals.

Learning Outcomes:

- At the end of this unit, the student will be able to
- Evaluate double integrals of functions of several variables in two dimensions using Cartesian and polar coordinates (L5)
- Apply double integration techniques in evaluating areas bounded by region (L4)
- Evaluate multiple integrals in Cartesian, cylindrical and spherical geometries (L5)

Unit V: Beta and Gamma functions (06 hrs)

Beta and Gamma functions and their properties, relation between beta and gamma functions, evaluation of definite integrals using beta and gamma functions.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand beta and gamma functions and its relations (L2)
- Conclude the use of special function in evaluating definite integrals (L4)

Text Books:

1. B. S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

Reference Books:

1. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
2. George B. Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 201.
4. B. V. Ramana, Higher Engineering Mathematics, McGraw Hill Education

Course Outcomes:

At the end of the course, the student will be able to

- Develop the use of matrix algebra techniques that is needed by engineers for practical applications (L6)
- Utilize mean value theorems to real life problems (L3)
- Familiarize with functions of several variables which is useful in optimization (L3)
- Students will also learn important tools of calculus in higher dimensions. Students will become familiar with 2- dimensional coordinate systems (L5)
- Students will become familiar with 3- dimensional coordinate systems and also learn the utilization of special functions

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CE and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5602T	3	0	0	3	CIA	30 M
Course Title	:	ENGINEERING PHYSICS					SEE	70 M

COURSE OBJECTIVES:

- To make a bridge between the physics in school and engineering courses.
- To identify the importance of the optical phenomenon i.e. interference, diffraction and polarization related to its Engineering applications.
- To understand the mechanisms of emission of light, the use of lasers as light sources for low and high energy applications, study of propagation of light wave through optical fibres along with engineering applications.
- To open new avenues of knowledge in dielectric and magnetic materials which find potential in the emerging micro device applications.
- Considering the significance of micro miniaturization of electronic devices and significance of low dimensional materials, the basic concepts of nano materials, their properties and applications in modern emerging technologies are elicited.
- To familiarize the concepts of theoretical acoustics to practical use in engineering field. To explain the significance of ultrasound and its application in NDT for diversified engineering application.
- To enlighten the periodic arrangement of atoms in crystals, Bragg's law and to provide fundamentals related to structural analysis through laue and powder diffraction methods.

UNIT I: Wave Optics **(12 hrs)**

Interference- Principle of superposition – Interference of light – Conditions for sustained interference - Interference in thin films (Reflection Geometry) – Colors in thin films – Newton's Rings – Determination of wavelength and refractive index.

Diffraction- Introduction – Fresnel and Fraunhofer diffraction – Fraunhofer diffraction due to single slit, double slit and N-slits (qualitative) – Grating spectrum.

Polarization- Introduction – Types of polarization – Polarization by reflection, refraction and double refraction - Nicol's Prism - Half wave and Quarter wave plates with applications.

Learning Outcomes:

The students will be able to

1. **Explain** the need of coherent sources and the conditions for sustained interference (L2)
2. **Identify** engineering applications of interference (L3)
3. **Analyze** the differences between interference and diffraction with applications (L4)
4. **Illustrate** the concept of polarization of light and its applications (L2)
5. **Classify** ordinary polarized light and extraordinary polarized light (L2)

Unit II: Lasers and Fiber optics **(08 hrs)**

Lasers: Introduction – Characteristics of laser – Spontaneous and Stimulated emission of radiation – Einstein's coefficients – Population inversion – Lasing action – Pumping mechanisms – Nd-YAG laser – He-Ne laser – Applications of lasers.

Fiber optics: Introduction – Principle of optical fiber – Acceptance Angle – Numerical Aperture – Classification of optical fibers based on refractive index profile and modes – Propagation of electromagnetic wave through optical fibers – Propagation Losses (qualitative) – Applications.

Learning Outcomes:

The students will be able to

1. **Understand** the basic concepts of LASER light Sources (L2)
2. **Apply** the concepts to learn the types of lasers (L3)
3. **Identifies** the Engineering applications of lasers (L2)
4. **Explain** the working principle of optical fibers (L2)
5. **Classify** optical fibers based on refractive index profile and mode of propagation (L2)
6. **Identify** the applications of optical fibers in various fields (L2)

Unit III: Engineering Materials **(08 hrs)**

Dielectric Materials- Introduction – Dielectric polarization – Dielectric polarizability, Susceptibility and Dielectric constant – Types of polarizations: Electronic and Ionic, Orientation polarizations (Qualitative) – Lorentz internal field – Clausius-Mossotti equation-Dielectric loss.

Magnetic Materials- Introduction – Magnetic dipole moment – Magnetization – Magnetic susceptibility and Permeability – Origin of permanent magnetic moment – Classification of magnetic materials: Dia, para & Ferro – Domain concept of Ferromagnetism (Qualitative) – Hysteresis – Soft and Hard magnetic materials.

Nanomaterials- Introduction – Surface area and quantum confinement – Physical properties: electrical and magnetic properties – Synthesis of nanomaterials: Top-down: Ball Milling – Bottom-up: Chemical Vapour Deposition – Applications of nanomaterials.

Learning Outcomes:

The students will be able to

1. **Explain** the concept of dielectric constant and polarization in dielectric materials (L2)
2. **Summarize** various types of polarization of dielectrics (L2)
3. **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics(L2)
4. **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2)
5. **Explain** the applications of dielectric and magnetic materials (L2)
6. **Apply** the concept of magnetism to magnetic devices (L3)
7. **Identify** the nano size dependent properties of nanomaterials (L2)
8. **Illustrate** the methods for the synthesis and characterization of nanomaterials (L2)
9. **Apply** the basic properties of nanomaterials in various Engineering branches (L3).

Unit IV: Acoustics and Ultrasonics **(10 hrs)**

Acoustics- Introduction – Requirements of acoustically good auditorium – Reverberation – Reverberation time – Sabine's formula (Derivation using growth and decay method) – Absorption coefficient and its determination – Factors affecting acoustics of buildings and their remedies.

Ultrasonics: Introduction – Properties – Production by magnetostriction and piezoelectric methods – Detection – Acoustic grating – Non Destructive Testing – Pulse echo system through transmission and reflection modes – Applications.

Learning Outcomes:

The students will be able to

1. **Explain** how sound is propagated in buildings (L2)
2. **Analyze** acoustic properties of typically used materials in buildings (L4)
3. **Recognize** sound level disruptors and their use in architectural acoustics (L2)
4. **Identify** the use of ultrasonics in different fields (L3)

Unit-V: Crystallography and X-ray diffraction (08 hrs)

Crystallography- Space lattice, Basis, unit cell and lattice parameters – Bravais Lattice – Crystal systems – Packing fraction – Coordination number – Packing fraction of SC, BCC & FCC – Miller indices – Separation between successive (hkl) planes.

X-Ray Diffraction- Bragg's law – Bragg's X-ray diffractometer – Crystal structure determination by Powder method.

Learning Outcomes:

The students will be able to

- **Classify** various crystal systems (L2)
- **Identify** different planes in the crystal structure (L3)
- **Analyze** the crystalline structure by Bragg's X-ray diffractometer (L4)
- **Apply** powder method to measure the crystallinity of a solid (L4)

Text books:

1. Engineering Physics – Dr. M.N. Avadhanulu & Dr. P.G. Kshirsagar, S. Chand and Company
2. Engineering physics – D.K. Battacharya and Poonam Tandon, Oxford University press.

Reference Books:

1. Engineering Physics - Sanjay D. Jain, D. Sahasrambudhe and Girish, University Press
2. Engineering Physics – D K Pandey, S. Chaturvedi, Cengage Learning
3. Engineering Physics – M.R. Srinivasan, New Age Publications
4. Engineering Physics – K. Thyagarajan, McGraw Hill Publishers

COURSE OUTCOMES:

1. **Explain** the need of coherent sources and the conditions for sustained interference (L2). **Identify** applications of interference in engineering (L3). **Analyze** the differences between interference and diffraction with applications (L4). **Illustrate** the concept of polarization of light and its applications (L2). **Classify** ordinary polarized light and extraordinary polarized light (L2) The different realms of physics and their applications in both scientific and technological systems are achieved through the study of wave optics.
2. **Explain** various types of emission of radiation (L2). **Identify** the role of laser in engineering applications (L3). **Describe** the construction and working principles of various types of lasers (L1). **Explain** the working principle of optical fibers (L2). **Classify** optical fibers based on refractive index profile and mode of propagation (L2). **Identify** the applications of optical fibers in medical, communication and other fields (L2). **Apply** the fiber optic concepts in various fields (L3).

3. **Explain** the concept of dielectric constant and polarization in dielectric materials (L2). **Summarize** various types of polarization of dielectrics (L2). **Interpret** Lorentz field and Claussius- Mosotti relation in dielectrics (L2). **Classify** the magnetic materials based on susceptibility and their temperature dependence (L2). **Explain** the applications of dielectric and magnetic materials (L2). **Apply** the concept of magnetism to magnetic devices (L3)
4. **Explain** sound waves and its propagation /interaction with construction material in design of buildings (L2). **Analyze** acoustic parameters of typically used materials in buildings (L4). **Recognize** sound level disruptors and their application in architectural acoustics (L2). **Identify** the use of ultrasonics in diversified fields of engineering (L3).
5. **Interpret** various crystal systems (L2) and **Analyze** the characterization of materials by XRD (L4). **Identify** the important properties of crystals like the presence of long-range order and periodicity, structure determination using X-ray diffraction technique is focused (L3). **Explain** the structure of the crystals by Laue and Powder techniques (L2).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CE and ECE)
(Common to II Semester CSE and ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AHS5201T	3	0	0	3	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH					SEE	70 M

INTRODUCTION:
The course is designed to train students in receptive (listening and reading) as well as productive and interactive (speaking and writing) skills by incorporating a comprehensive, coherent and integrated approach that improves the learners' ability to effectively use English language in academic/ workplace contexts. The shift is from *learning about the language* to *using the language*. component of campus placement tests. Activity based teaching-learning methods would be adopted to ensure that learners would engage in actual use of language both in the classroom and laboratory sessions.

COURSE OBJECTIVES:
- Facilitate effective listening skills for better comprehension of academic lectures and English spoken by native speakers
- Focus on appropriate reading strategies for comprehension of various academic texts and authentic materials
- Help improve speaking skills through participation in activities such as role plays, discussions and structured talks/oral presentations
- Impart effective strategies for good writing and demonstrate the same in summarizing, writing well organized essays, record and report useful information
- Provide knowledge of grammatical structures and vocabulary and encourage their appropriate use in speech and writing

Unit I: On the Conduct of Life: William Hazlitt
Listening: Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.
Speaking: Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.
Reading: Skimming to get the main idea of a text; scanning to look for specific pieces of information.
Reading for Writing: Beginnings and endings of paragraphs - introducing the topic, summarizing the main idea and/or providing a transition to the next paragraph. **Grammar and Vocabulary:** Parts of Speech, Content words and function words; word forms: verbs, nouns, adjectives and adverbs; nouns: countable and uncountable; singular and plural; basic sentence structures; simple question form - wh-questions; word order in sentences.

Learning Outcomes
At the end of the module, the learners will be able to
1. understand social or transactional dialogues spoken by native speakers of English and identify the context, topic, and pieces of specific information
2. ask and answer general questions on familiar topics and introduce oneself/others
3. employ suitable strategies for skimming and scanning to get the general idea of a text and locate specific information

4. recognize paragraph structure and be able to match beginnings/endings/headings with paragraphs
5. form sentences using proper grammatical structures and correct word forms

Unit II: The Brook: Alfred Tennyson
Listening: Answering a series of questions about main idea and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/small groups on specific topics followed by short structured talks.
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Paragraph writing (specific topics) using suitable cohesive devices; mechanics of writing - punctuation, capital letters.
Grammar and Vocabulary: Cohesive devices - linkers, sign posts and transition signals; use of articles and zero article; prepositions.

Learning Outcomes
At the end of the module, the learners will be able to
1. comprehend short talks on general topics
2. participate in informal discussions and speak clearly on a specific topic using suitable discourse markers
3. understand the use of cohesive devices for better reading comprehension
4. write well structured paragraphs on specific topics
5. identify basic errors of grammar/ usage and make necessary corrections in short texts

Unit III: The Death Trap: Saki
Listening: Listening for global comprehension and summarizing what is listened to.
Speaking: Discussing specific topics in pairs or small groups and reporting what is discussed
Reading: Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.
Writing: Summarizing, Paragraph Writing.
Grammar and Vocabulary: Verbs - tenses; subject-verb agreement; direct and indirect speech, reporting verbs for academic purposes.

Learning Outcomes
At the end of the module, the learners will be able to
1. Comprehend short talks and summarize the content with clarity and precision
2. Participate in informal discussions and report what is discussed
3. Infer meanings of unfamiliar words using contextual clues
4. Write summaries based on global comprehension of reading/listening texts
5. Use correct tense forms, appropriate structures and a range of reporting verbs in speech and writing

Unit IV: Innovation: Muhammad Yunus
Listening: Making predictions while listening to conversations/ transactional dialogues without video; listening with video.
Speaking: Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.

Reading: Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.
Writing: Letter Writing: Official Letters/Report Writing.
Grammar and Vocabulary: Quantifying expressions - adjectives and adverbs; comparing and contrasting; Voice - Active & Passive Voice

Learning Outcomes
At the end of the module, the learners will be able to
1. Infer and predict about content of spoken discourse
2. Understand verbal and non-verbal features of communication and hold formal/informal conversations
3. Interpret graphic elements used in academic texts
4. Produce a coherent paragraph interpreting a figure/graph/chart/table
5. Use language appropriate for description and interpretation of graphical elements

Unit V: Politics and the English Language: George Orwell
Listening: Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.
Speaking: Formal oral presentations on topics from academic contexts - without the use of PPT slides.
Reading: Reading for comprehension.
Writing: Writing structured essays on specific topics using suitable claims and evidences.
Grammar and Vocabulary: Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Learning Outcomes
At the end of the module, the learners will be able to
- take notes while listening to a talk/lecture and make use of them to answer questions
- make formal oral presentations using effective strategies
- comprehend, discuss and respond to academic texts orally and in writing
- produce a well-organized essay with adequate support and detail
- edit short texts by correcting common errors

Text Books:
1. **Language and Life: A Skills Approach- I Edition 2019, Orient Black Swan.**

Reference Books:

1. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
2. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
3. Raymond Murphy's *English Grammar in Use* Fourth Edition (2012) E-book
4. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
5. Oxford Learners Dictionary, 12th Edition, 2011
6. Norman Lewis *Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary* (2014)
7. *Speed Reading with the Right Brain: Learn to Read Ideas Instead of Just Words* by David Butler.

Web links

- www.englishclub.com
- www.easyworldofenglish.com
- www.languageguide.org/english/
- www.bbc.co.uk/learningenglish
- www.eslpod.com/index.html
- www.myenglishpages.com

COURSE OUTCOMES

At the end of the course, the learners will be able to

1. **Understand** the context, topic, and pieces of specific information from social or transactional dialogues spoken by native speakers of English
2. **Apply** grammatical structures to formulate sentences and correct word forms
3. **Analyze** discourse markers to speak clearly on a specific topic in informal discussions
4. **Evaluate** reading/listening texts and to write summaries based on global comprehension of these texts.
5. **Create** a coherent paragraph interpreting a figure/graph/chart/table

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CE, CSE and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0201T	3	0	0	3	CIA	30 M
Course Title	:	BASIC ELECTRICAL & ELECTRONICS ENGG.					SEE	70 M

PART-A: BASIC ELECTRICAL ENGINEERING
COURSE OBJECTIVES:-

- To introduce basics of electric circuits.
- To teach DC and AC electrical circuit analysis.
- To explain working principles of transformers and electrical machines.
- To impart knowledge on Power system generation, transmission and distribution

UNIT I: DC & AC Circuits
Electrical circuit elements (R - L and C) - Kirchhoff laws - Series and parallel connection of resistances with DC excitation. Superposition Theorem - Representation of sinusoidal waveforms - peak and rms values - phasor representation - real power - reactive power - apparent power – power factor - Analysis of single-phase ac circuits consisting of RL - RC - RLC series circuits, Resonance.

Learning Outcomes
At the end of this unit, the student will be able to

- Recall Kirchoff laws
- Analyze simple electric circuits with DC excitation
- Apply network theorems to simple circuits
- Analyze single phase AC circuits consisting of series RL - RC - RLC combinations

UNIT II: DC & AC Machines:
Principle and operation of DC Generator - EMF equations - OCC characteristics of DC generator – principle and operation of DC Motor – Performance Characteristics of DC Motor - Speed control of DC Motor – Principle and operation of Single Phase Transformer - OC and SC tests on transformer - Principle and operation of 3-phase AC machines [Elementary treatment only]

Learning Outcomes
At the end of this unit, the student will be able to

- Explain principle and operation of DC Generator & Motor.
- Perform speed control of DC Motor
- Explain operation of transformer and induction motor.
- Explain construction & working of induction motor - DC motor

UNIT III: Basics of Power Systems
Layout & operation of Hydro, Thermal, Nuclear Stations - Solar & wind generating stations – Typical AC Power Supply scheme – Elements of Transmission line – Types of Distribution systems: Primary & Secondary distribution systems.

Learning Outcomes

At the end of this unit, the student will be able to

- Understand working operation of various generating stations
- Explain the types of Transmission and Distribution systems

Text Books:

1. D. P. Kothari and I. J. Nagrath - “Basic Electrical Engineering” - Tata McGraw Hill - 2010.
2. V.K. Mehta & Rohit Mehta, “Principles of Power System” – S.Chand – 2018.

References:

1. L. S. Bobrow - “Fundamentals of Electrical Engineering” - Oxford University Press - 2011.
2. E. Hughes - “Electrical and Electronics Technology” - Pearson - 2010.
3. C.L. Wadhwa – “Generation Distribution and Utilization of Electrical Energy”, 3rd Edition, New Age International Publications.

Course Outcomes:

The student should be able to

- Apply concepts of KVL/KCL in solving DC circuits
- Understand and choose correct rating of a transformer for a specific application
- Illustrate working principles of DC Motor
- Identify t ype of electrical machine based on their operation
- Understand the basics of Power generation, Transmission and Distribution

PART-B: <u>ELECTRONICS ENGINEERING</u>

COURSE OBJECTIVES:-

- **Understand principles and terminology of electronics.**
- **Familiar with the theory, construction, and operation of electronic devices.**
- **Learn about biasing of BJTs and FETs.**
- **Design and construct amplifiers.**
- **Understand the concept & principles of logic devices.**

Unit I:

Diodes and Applications: Semiconductor Diode, Diode as a Switch& Rectifier, Half Wave and Full Wave Rectifiers with and without Filters; Operation and Applications of Zener Diode, LED, Photo Diode.

Transistor Characteristics: Bipolar Junction Transistor (BJT) – Construction, Operation, Amplifying Action, Common Base, Common Emitter and Common Collector Configurations, Operating Point, Biasing of Transistor Configuration; Field Effect Transistor (FET) – Construction, Characteristics of Junction FET, Concepts of Small Signal Amplifiers –CE & CC Amplifiers.

Learning outcomes:

1. Remember and understand the basic characteristics of semiconductor diode. (L1)
2. Understand principle of operation of Zener diode and other special semiconductor diodes. (L1)
3. Analyze BJT based biasing circuits. (L3)
4. Design an amplifier using BJT based on the given specifications. (L4)

Unit II:

Operational Amplifiers and Applications: Introduction to Op-Amp, Differential Amplifier Configurations, CMRR, PSRR, Slew Rate; Block Diagram, Pin Configuration of 741 Op-Amp, Characteristics of Ideal Op-Amp, Concept of Virtual Ground; Op-Amp Applications - Inverting, Non-Inverting, Summing and Difference Amplifiers, Voltage Follower, Comparator, Differentiator, Integrator.

Learning outcomes:

1. Describe operation of Op-Amp based linear application circuits, converters, amplifiers and non-linear circuits. (L2)
2. Analyze Op-Amp based comparator, differentiator and integrator circuits. (L3)

Unit III:

Digital Electronics: Logic Gates, Simple combinational circuits–Half and Full Adders, BCD Adder. Latches and Flip-Flops (S-R, JK and D), Shift Registers and Counters. Introduction to Microcontrollers and their applications (Block diagram approach only).

Learning outcomes:

1. Explain the functionality of logic gates. (L2)
2. Apply basic laws and De Morgan's theorems to simplify Boolean expressions. (L3)
3. Analyze standard combinational and sequential circuits. (L4)
4. Distinguish between 8085 & 8086 microprocessors also summarize features of a microprocessor. (L5)

Text Books:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices &Circuit Theory, Pearson Education,2007.
2. Ramakanth A. Gayakwad, Op-Amps & Linear ICs, 4thEdition, Pearson, 2017.
3. R. P. Jain, Modern Digital Electronics,3rd Edition, Tata Mcgraw Hill,2003.
4. Raj Kamal, Microcontrollers: Architecture, Programming, Interfacing and System Design, 2nd Edition, Pearson, 2012.

Reference Books:

1. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India,2002.
2. R. S. Sedha, A Text Book of Electronic Devices and Circuits, S.Chand& Co,2010.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

COURSE OUTCOMES:

After the completion of the course students will able to

CO1: Explain the theory, construction, and operation of electronic devices.

CO2: Apply the concept of science and mathematics to explain the working of diodes and its applications, working of transistor and its characteristics.

CO3: Design and analyze small signal amplifier circuits applying the biasing techniques.

CO4: Solve problems of various digital logic gates and circuits.

CO5: Correlate the fundamental concepts to various Real life applications of today.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CE & ECE and II Semester CSE & ME)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0301T	3	0	0	3	CIE	30 M
Course Title	:	ENGINEERING DRAWING					SEE	70 M

COURSE OBJECTIVES:

- Bring awareness that Engineering Drawing is the Language of Engineers.
- Familiarize how industry communicates technical information.
- Teach the practices for accuracy and clarity in presenting the technical information.
- Develop the engineering imagination essential for successful design.

Unit I:

Introduction to Engineering Drawing: Principles of Engineering Drawing and its significance - Conventions in drawing - lettering - BIS conventions.

(a) Conic sections including the rectangular hyperbola- general method only,
(b) Cycloid, epicycloids and hypocycloid c) Involutes

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the significance of engineering drawing
- Know the conventions used in the engineering drawing
- Identify the curves obtained in different conic sections
- Draw different curves such as cycloid, involute and hyperbola

Unit II:

Projection of points, lines and planes: Projection of points in any quadrant, lines inclined to one or both planes, finding true lengths, angle made by line. Projections of regular plane surfaces.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of projection
- Know how to draw the projections of points, lines
- Differentiate between projected length and true length
- Find the true length of the lines

Unit III:

Projections of solids: Projections of regular solids inclined to one or both planes by rotational or auxiliary views method.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the procedure to draw projection of solids
- Differentiate between rotational method and auxillary view method.
- Draw the projection of solid inclined to one plain
- Draw the projection of solids inclined to both the plains

Unit IV:

Sections of solids: Section planes and sectional view of right regular solids- prism, cylinder, pyramid and cone. True shapes of the sections.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand different sectional views of regular solids
- Obtain the true shapes of the sections of prism
- Draw the sectional views of prism, cylinder, pyramid and cone

Unit V:

Development of surfaces: Development of surfaces of right regular solids-prism, cylinder, pyramid, cone and their sectional parts.

Learning Outcomes:

At the end of this unit the student will be able to

- Understand the meaning of development of surfaces
- Draw the development of regular solids such as prism, cylinder, pyramid and cone
- Obtain the development of sectional parts of regular shapes

Text Books:

1) K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
2) N.D.Bhatt, Engineering Drawing, 53/e, Charotar Publishers, 2016.

Reference Books:

1) Dhanajay A Jolhe, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2009
2) Venugopal, Engineering Drawing and Graphics, 3/e, New Age Publishers, 2000
3) Shah and Rana, Engineering Drawing, 2/e, Pearson Education, 2009
4) K.C.John, Engineering Graphics, 2/e, PHI, 2013
5) Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

Course Outcomes:

After completing the course, the student will be able to

- Draw various curves applied in engineering. (l2)
- Show projections of solids and sections graphically. (l2)
- Draw the development of surfaces of solids. (l3)

Additional Sources

Youtube: http-sewor,Carleton.cag,kardos/88403/drawings.html conic sections-online, red woods.edu

(Common to I Semester CE and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5602PL	0	0	3	1.5	CIA	30 M
Course Title	:	ENGINEERING PHYSICS LAB					SEE	70 M

COURSE OBJECTIVES:

- Understand the role of Optical fiber parameters in engineering applications.
- Recognize the significance of laser by studying its characteristics and its application in finding the particle size.
- Illustrates the magnetic and dielectric materials applications.
- Identifies the various sensor applications.

Note: - In the following list of experiments, out of 15 experiments any 10 experiments must be performed in a semester.

List of Engineering Physics Experiments

1. Determine the thickness of the wire using wedge shape method

Experimental outcomes:
Operates optical instrument like travelling microscope. (L2)
Estimate the thickness of the wire using wedge shape method (L2)
Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)

2. Determination of the radius of curvature of the lens by Newton's ring method

Experimental outcomes:
Operates optical instrument like travelling microscope. (L2)
Estimate the radius of curvature of the lens (L2)
Identifies the formation of interference fringes due to reflected light from non-uniform thin film. (L2)
Plots the square of the diameter of a ring with no. of rings (L3)

3. Determination of wavelength by plane diffraction grating method

Experimental outcomes:
Operates optical instrument like spectrometer. (L2)
Estimate the wavelength of the given source (L2)
Identifies the formation of grating spectrum due diffraction. (L2)

4. Determination of dispersive power of prism.

Experimental outcomes:
Operates optical instrument like spectrometer. (L2)
Estimate the refractive index and dispersive power of the given prism (L2)
Identifies the formation of spectrum due to dispersion. (L2)

5. Determination of wavelength of LASER light using diffraction grating.

Experimental outcomes:
Operates various instrument (L2)
Estimate the wavelength of laser source (L2)
Identifies the formation of grating spectrum due diffraction. (L2)

6. Determination of particle size using LASER.

Experimental outcomes:
Operates various instrument (L2)
Estimate the Particles size using laser (L2)
Identifies the application of laser (L2)

7. To determine the numerical aperture of a given optical fiber and hence to find its acceptance angle

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)
Estimate the numerical aperture and acceptance angle of a given optical fiber. (L2)
Identifies the significance of numerical aperture and acceptance angle of an optical fiber in various engineering applications. (L2)

8. Determination of dielectric constant by charging and discharging method.

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)
Estimate the dielectric constant of the given substance. (L2)
Identifies the significance of dielectric constant in various devices. (L2)

9. To determine the magnetic field along the axis of a circular coil carrying current –Stewart Gee's method.

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)
Estimate the magnetic field along the axis of a circular coil carrying current. (L2)
Plots the intensity of the magnetic field of circular coil carrying current with distance (L3)

10. Measurement of magnetic susceptibility by Gouy's method

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)
Estimate the magnetic susceptibility of the given material. (L2)
Identifies the significance of magnetic susceptibility in various engineering applications. (L2)

11. To Study the variation of B versus H by magnetizing the magnetic material (B-H loop)

Experimental outcomes:

Operates various instruments and connect them as per the circuit. (L2)
Estimate the hysteresis loss, coercivity and retentivity of the ferromagnetic material. (L2)
Classifies the soft and hard magnetic material based on B-H curve. (L2)
Plots the magnetic field H and flux density B (L3)

12. Determination of ultrasonic velocity in liquid (Acoustic grating)

Experimental outcomes:

Operates various instruments. (L2)
Estimate the velocity of ultrasonic waves in liquids. (L2)
Illustrates the basic applications of ultrasonics. (L3)

13. Determination of Rigidity modulus of material of a wire-dynamic method (Torsional pendulum)

Experimental outcomes:

Operates various instruments. (L2)
Estimate the rigidity modules of a given wire (L2)
Plots length of the pendulum (l) with time period T^2 (L3)

14. Sonometer: Verification of the three laws of stretched strings

Experimental outcomes:

Operates various instruments. (L2)
Estimate the linear density of a given wire (L2)
Identify the frequency of tuning fork (L3)

15. Determination of spring constant of springs using Coupled Oscillator

Experimental outcomes:

Operates various instruments. (L2)

Estimate the coupling constant of a coupled oscillator (L2)
Plots the coupling distance (D) with coupling constant (C) (L3)
Apply the concept of oscillatory motion to molecules of a solid, multi vibrator etc.

Course Outcomes:

The students will be able to

1. **Operate** various optical instruments (L2)
2. **Estimate** wavelength of laser and particles size using laser(L2)
3. **Evaluate** the acceptance angle of an optical fiber and numerical aperture (L3)
4. **Estimate** the susceptibility and related magnetic parameters of magnetic materials (L2)
5. **Plot** the intensity of the magnetic field of circular coil carrying current with distance (L3)
6. **Determine** magnetic susceptibility of the material and its losses by B-H curve (L3)
7. **Apply** the concepts of ultrasonics by acoustic grating (L2)

References:

1. S. Balasubramanian, M.N. Srinivasan "A Text book of Practical Physics"- S Chand Publishers, 2017.
2. http://vlab.amrita.edu/index.php -Virtual Labs, Amrita University.

(Common to I Semester CE & ECE and II Semester CSE & ME)

Course Category	:	Humanities & Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AHS5201P	0	0	3	1.5	CIA	30 M
Course Title	:	COMMUNICATIVE ENGLISH LAB					SEE	70 M

COURSE OBJECTIVES:

- Students will be exposed to a variety of self instructional, learner friendly modes of language learning
- Students will learn better pronunciation through stress, intonation and rhythm
- Students will be trained to use language effectively to face interviews, group discussions, public speaking
- Students will be initiated into greater use of the computer in resume preparation, report writing, format making etc

LIST OF TOPICS

1. Phonetics
2. Reading comprehension
3. Describing objects/places/persons
4. Role Play or Conversational Practice
5. Just-A-Minute (JAM)
6. Etiquettes of Telephonic Communication
7. Information Transfer
8. Note Making and Note Taking
9. E-mail Writing
10. Group Discussions
11. Resume Writing
12. Debates
13. Oral Presentations
14. Poster Presentation
15. Interviews Skills

Suggested Software

- Orell
- Walden Infotech
- Young India Films

Reference Books

8. Bailey, Stephen. *Academic writing: A handbook for international students*. Routledge, 2014.
9. Chase, Becky Tarver. *Pathways: Listening, Speaking and Critical Thinking.* Heinley ELT; 2nd Edition, 2018.
10. Skillful Level 2 Reading & Writing Student's Book Pack (B1) Macmillan Educational.
11. Hewings, Martin. *Cambridge Academic English (B2)*. CUP, 2012.
12. A Textbook of English Phonetics for Indian Students by T.Balasubramanyam

Web Links

- www.esl-lab.com
- www.englishmedialab.com
- www.englishinteractive.net

Course Outcomes

1. Listening and repeating the sounds of English Language
2. Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
3. Apply communication skills through various language learning activities.
4. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
5. Evaluate and exhibit acceptable etiquette essential in social and professional settings
6. Create awareness on mother tongue influence and neutralize it in order to improve fluency in spoken English.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CE, CSE and ME)

Course Category	:	Engineering Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0201P	3	0	0	3	CIA	30 M
Course Title	:	BASIC ELECTRICAL & ELECTRONICS ENGG. LAB					SEE	70 M

PART-A: BASIC ELECTRICAL ENGINEERING LAB
COURSE OBJECTIVES:-

- To Verify Kirchoff's laws and Superposition theorem
- To learn performance characteristics of DC Machines.
- To perform various tests on 1- Phase Transformer.
- To Study the I – V Characteristics of Solar PV Cell

LIST OF EXPERIMENTS: -

1. Verification of Kirchhoff laws.
2. Verification of Superposition Theorem.
3. Magnetization characteristics of a DC Shunt Generator.
4. Speed control of DC Shunt Motor.
5. OC & SC test of 1 – Phase Transformer.
6. Load test on 1-Phase Transformer.
7. I – V Characteristics of Solar PV cell
8. Brake test on DC Shunt Motor.

COURSE OUTCOMES:

After completing the course, the student will be able to

- Understand Kirchoff's Laws & Superposition theorem.
- Analyze the various characteristics on DC Machines by conducting various tests.
- Analyze I – V Characteristics of PV Cell
- Apply the knowledge to perform various tests on 1-phase transformer

PART-B: ELECTRONICS ENGINEERING LAB
COURSE OBJECTIVES:-

- To verify the theoretical concepts practically from all the experiments.
- To analyze the characteristics of Diodes, BJT, MOSFET, UJT.
- To design the amplifier circuits from the given specifications.
- Exposed to linear and digital integrated circuits.

LIST OF EXPERIMENTS: (**Execute Six experiments**).

1. PN Junction diode characteristics A) Forward bias B) Reverse bias.
2. Zener diode characteristics and Zener as voltage Regulator.
3. Full Wave Rectifier with & without filter.
4. Wave Shaping Circuits. (Clippers & Clampers)
5. Input & Output characteristics of Transistor in CB / CE configuration.
6. Frequency response of CE amplifier.
7. Inverting and Non-inverting amplifiers using Op-Amps.
8. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.

9. Verification of Truth Tables of S-R, J-K& D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

COURSE OUTCOMES:

CO1: Learn the characteristics of basic electronic devices like PN junction diode, Zener diode & BJT.

CO2: Analyze the application of diode as rectifiers, clippers and clampers.

CO3: Learn the fundamental principles of amplifier circuits and need of Bias in Amplifier circuits.

CO4: Learn the basics of linear integrated circuits and understand characteristics of operational amplifier.

CO5: Learn about available digital ICs and verify truth tables of Logic gates and Flipflops.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL
(Common to I Semester CE & ECE and II Semester CSE & ME)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0301P	3	0	0	3	CIE	30 M
Course Title	:	ENGINEERING GRAPHICS LAB					SEE	70 M

COURSE OBJECTIVES:
- Instruct the utility of drafting & modeling packages in orthographic and isometric drawings.
- Train the usage of 2D and 3D modeling.
- Instruct graphical representation of machine components.

Computer Aided Drafting:
Introduction to AutoCAD: Basic drawing and editing commands: line, circle, rectangle, erase, view, undo, redo, snap, object editing, moving, copying, rotating, scaling, mirroring, layers, templates, polylines, trimming, extending, stretching, fillets, arrays, dimensions.
Dimensioning principles and conventional representations.

Orthographic Projections: Systems of projections, conventions and application to orthographic projections - simple objects.

Isometric Projections: Principles of isometric projection- Isometric scale; Isometric views: lines, planes, simple solids.

TEXT BOOKS:
1) K. Venugopal, V.Prabhu Raja, Engineering Drawing + Auto Cad, New Age International Publishers.
2) Kulkarni D.M, AP Rastogi and AK Sarkar, Engineering Graphics with Auto Cad, PHI Learning, Eastern Economy editions.

REFERENCE BOOKS:
1) T. Jayapoovan, Engineering Graphics using Auto Cad, Vikas Publishing House
2) K.L.Narayana & P.Kannaiah, Engineering Drawing, 3/e, Scitech Publishers, Chennai, 2012.
3) Linkan Sagar, BPB Publications, Auto Cad 2018 Training Guide.
4) K.C.John, Engineering Graphics, 2/e, PHI, 2013
5) Basant Agarwal & C.M.Agarwal, Engineering Drawing, Tata McGraw-Hill, Copy Right, 2008.

COURSE OUTCOMES:
After completing the course, the student will be able to
- Use computers as a drafting tool. (L2)
- Draw isometric and orthographic drawings using CAD packages. (L3)

ADDITIONAL SOURCES
Youtube: http-sewor,Carleton.cag, kardos/88403/drawings.html conic sections-online, red woods.edu

B.TECH - II SEMESTER

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CE, CSE, ECE, and ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5402	3	0	0	3	CIE	30 M
Course Title	:	**DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**					SEE	70 M

COURSE OBJECTIVES:

1) To enlighten the learners in the concept of differential equations and multivariable calculus.
2) To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real world applications.

UNIT I: Linear differential equations of higher order (Constant Coefficients) (10 hrs)

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskean, method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Mass spring system.

Learning Outcomes:

At the end of this unit, the student will be able to

- Identify the essential characteristics of linear differential equations with constant coefficients (L3)
- Solve the linear differential equations with constant coefficients by appropriate method (L3)
- Classify and interpret the solutions of linear differential equations (L3)
- Formulate and solve the higher order differential equation by analyzing physical situations (L3)

UNIT II: Partial Differential Equations (08 hrs)

Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order equations using Lagrange's method.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply a range of techniques to find solutions of standard PDEs (L3)
- Outline the basic properties of standard PDEs (L2)

UNIT III: Applications of Partial Differential Equations (10 hrs)

Classification of PDE, method of separation of variables for second order equations. Applications of Partial Differential Equations: One dimensional Wave equation, One dimensional Heat equation.

Learning Outcomes:

At the end of this unit, the student will be able to

- Calcify the PDE (L3)
- Learn the applications of PDEs(L2)

UNIT IV: Vector differentiation (06 hrs)

Scalar and vector point functions, vector operator del, del applies to scalar point functions-Gradient, del applied to vector point functions-Divergence and Curl, vector identities.

Learning Outcomes:

At the end of this unit, the student will be able to

- Apply del to Scalar and vector point functions (L3)
- Illustrate the physical interpretation of Gradient, Divergence and Curl (L3)

UNIT V: Vector integration (08 hrs)

Line integral-circulation-work done, surface integral-flux, Green's theorem in the plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and applications of these theorems.

Learning Outcomes:

At the end of this unit, the student will be able to

- find the work done in moving a particle along the path over a force field (L4)
- evaluate the rates of fluid flow along and across curves (L4)
- apply Green's, Stokes and Divergence theorem in evaluation of double and triple integrals (L3)

TEXT BOOKS:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers, 2017.

REFERENCE BOOKS:

1. George B.Thomas, Maurice D. Weir and Joel Hass, Thomas Calculus, 13/e, Pearson Publishers, 2013.
2. R.K.Jain and S.R.K.Iyengar, Advanced Engineering Mathematics, 3/e, Alpha Science International Ltd., 2002.
3. Glyn James, Advanced Modern Engineering Mathematics, 4/e, Pearson publishers, 2011.
4. S L Ross , Differential Equations ,Wiley India, year 2007 edition.

COURSE OUTCOMES:

At the end of the course, the student will be able to

- Solve the differential equations related to various engineering fields (L6)
- Identify solution methods for partial differential equations that model physical processes (L3)
- Interpret the physical meaning of different operators such as gradient, curl and divergence (L5)
- Estimate the work done against a field, circulation and flux using vector calculus (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CE & ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5102T	3	0	0	3	CIE	30 M
Course Title	:	ENGINEERING CHEMISTRY					SEE	70 M

COURSE OBJECTIVES:

- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement.

Unit I: Water Technology: **(08 hrs)**

Introduction: Hardness of water and units, Estimation of hardness of water by EDTA Method - Estimation of dissolved oxygen by Winkler's method - Boiler troubles – Priming, foaming, scale and sludge, Caustic embrittlement, Municipal water treatment – specifications for drinking water, Bureau of Indian Standards (BIS) and World Health Organization (WHO) standards, ion-exchange processes – desalination of brackish water - Reverse Osmosis (RO) and electrodialysis.

Learning outcomes:

The student will be able to

- **List** the differences between temporary and permanent hardness of water (L1)
- **Explain** the principles of reverse osmosis and electrodialysis. (L2)
- **Compare** quality of drinking water with BIS and WHO standards. (L2)
- **Illustrate** problems associated with hard water - scale and sludge**.** (L2)
- **Explain** the working principles of different Industrial water treatment processes (L2)

Unit II: Electrochemistry and Applications: **(10 hrs)**

Electrodes – concepts, Electrochemical Cell, Nernst Equation, Cell Potential Calculations.

Primary cells – Zinc-air, Na-air batteries, Secondary cells – Nickel-Cadmium (Ni-Cd),and Lithium ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen, methanol fuel cells – working of the cells.

Corrosion: Introduction to corrosion, electrochemical theory of corrosion, differential aeration cell corrosion, galvanic corrosion, metal oxide formation by dry corrosion, Pilling Bedworth rule and Factors affecting the corrosion**,** cathodic and anodic protection, electroplating and electro less plating (Nickel and Copper).

Learning Outcomes:

At the end of this unit, the students will be able to

- **Apply** Nernst equation for calculating electrode and cell potentials (L3)
- **Recall** working and importance of batteries(L1)
- **Apply** Pilling Bedworth rule for corrosion and corrosion prevention (L3)
- **Demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
- **Compare** primary and secondary batteries and their applications (L2)

Unit III: Polymers and Fuel Chemistry **(10 hrs)**

Polymers: Introduction to polymers, functionality of monomers, Mechanism of chain growth, step growth and coordination polymerization.

Plastics: Thermoplastics and Thermo-setting plastics - Preparation, properties and applications of poly styrene, PVC and Bakelite. Calculation of molecular Weight of polymer by weight average and number average methods, Poly Dispersity Index.

Elastomers: Preparation, properties and applications of Buna-S, Buna-N, Thiokol, Calculation of Molecular Wt of Polymer by Weight Average and Number Average methods, Poly Dispersity Index.

Fuels: Types of fuels, calorific value, numerical problems based on calorific value; Analysis of coal.

Liquid Fuels: Refining of Petroleum, fuels for IC engines, knocking and anti-knock agents, Octane and Cetane values, cracking of oils; alternative fuels- propane, methanol and ethanol, bio-fuels(Coal gas, Biogas).

Learning Outcomes:

At the end of this unit, the students will be able to

- **Explain** different types of polymers and their applications (L2)
- **Find** various alternate fuels and its importance(L1)
- **Solve** the numerical problems based on Calorific value(L3)
- **Select** suitable fuels for IC engines (L3)
- **Explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)

Unit IV: Advanced Engineering Materials **(10 hrs)**

Composites: Definition, Constituents, Classification - Particle, Fibre and Structural reinforced composites, properties and Engineering applications.

Refractories: Classification, Properties, Factors affecting the refractory materials (Refractoriness, Refractory under load, Porosity, Refractive index, Dimensional stability) and Applications.

Lubricants: Classification, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Viscosity Index, Flash point, Fire point, Cloud point, saponification and Applications.

Building materials: Portland Cement, Rapid Hardening Cement, Quick Setting Cement, Constituents, phases and reactivity of clinker, Setting and Hardening of cement.

Learning Outcomes:

At the end of this unit, the students will be able to

- **Explain** the constituents of Composites and its classification (L2)
- **Recall** properties of refractories and lubricants (L1)
- **Identify** the factors affecting the refractory material(L3)
- **Illustrate** the functions and properties of lubricants (L2)
- **Demonstrate** the phases and reactivity of concrete formation (L2)
- **Identify** the constituents of Portland cement (L3)
- **Enumerate** the reactions at setting and hardening of the cement (L3)

Unit V: Surface Chemistry and Applications **(10 hrs)**

Introduction to surface chemistry, colloids, micelle formation, synthesis of colloids (Chemical methods - double decomposition, reduction, hydrolysis and oxidation; electrical disintegration or Bredig's Arc method), chemical and electrochemical methods (sol-gel method, Thermally activated chemical vapor deposition method)of preparation of nano metals and metal oxides, stabilization of colloids and nano materials by stabilizing agents, solid-gas interface, solid-liquid interface, adsorption isotherm- Langmuir, Freundlich, BET equation (no derivation) applications of colloids and nano materials – catalysis, medicine, sensors.

Learning Outcomes:

At the end of this unit, the students will be able to

- **Summarize** the concepts of colloids, micelle and nanomaterials (L2)
- **Explain** the synthesis of colloids with examples (L2)
- **Select** suitable methods for synthesis of Nanometals (L1)
- **Outline** the preparation of nanomaterials and metal oxides (L2)
- **Identify** the application of colloids and nanomaterials in medicine, sensors and catalysis (L2)

Text books:

1. Jain and Jain, Engineering Chemistry, 16/e, Dhanpat Rai, 2013.
2. Arun Bahl, B.S. Bahl and G.D. Tuli, Essentials of Physical Chemistry, S.Chand Publication, New Delhi 2012.

Reference Books:

1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992.
3. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
4. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

COURSE OUTCOMES:

At the end of the course the students will be able to:

1. **Demonstrate** the corrosion prevention methods and factors affecting corrosion (L2)
2. **Explain** the preparation, properties, and applications of thermoplastics & thermosetting, elastomers & conducting polymers. (L2)
3. **Finding** important properties of various engineering materials, polymers, colloids and its applications(L1)
4. **Explain** calorific values, octane number, refining of petroleum and cracking of oils (L2)
5. **Explain** the setting and hardening of cement and concrete phase (L2)
6. **Summarize** the concepts of colloids, micelle and nano materials (L2).

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0501T	3	0	0	3	CIE	30 M
Course Title	:	C PROGRAMMING & DATA STRUCTURES					SEE	70 M

COURSE OBJECTIVES:

- To illustrate the basic concepts of C programming language.
- To discuss the concepts of Functions, Arrays, Pointers and Structures of C Programming Language.
- To discuss the syntax and semantics of C Programming language
- To familiarize with Stack, Queue, Linked lists, Tree and graph data structures.
- To demonstrate programming by choosing appropriate Data Structures and Features of the C language.

Unit I:

Getting Started: What is C, The C Character Set, Constants, Variables and Keywords, Types of C Constants, Rules for Constructing Integer Constants, Rules for Constructing Real Constants, Rules for Constructing Character Constants, Types of C Variables, Rules for Constructing Variable Names, C Keywords, Form of a C Program, Comments in a C Program, What is main, Variables and their Usage, printf( ) and its Purpose, Compilation and Execution, Receiving Input.

Data Types Revisited: Integers, long and short, Integers, signed and unsigned, Chars, signed and unsigned, Floats and Doubles, A Few More Issues, Storage Classes in C-Automatic Storage Class, Register Storage Class, Static Storage Class, and External Storage Class.

C Instructions: Types of Instructions, Type Declaration Instruction, Arithmetic Instructions, Integer and Float Conversions, Type Conversion in Assignments, Hierarchy of Operations, Associativity of Operators, Control Instructions.

Decision Control Instruction: Decisions! Decisions, The if Statement, The Real Thing, Multiple Statements within if, The if-else Statement, Nested if-elses, Forms of if.

Learning Outcomes:

1. Understand the basic concepts of C language (L2)
2. Learn the functionality of operators and Control Statements of C (L2)
3. Use the if control structure of the C language (L3)

Unit II:

More Complex Decision Making: Use of Logical Operators, The else if Clause, The ! Operator, Hierarchy of Operators Revisited, a Word of Caution, the Conditional Operators.

Loop Control Instruction: Loops, the while Loop, Tips and Traps, More Operators.

More Complex Repetitions: The for Loop, Nesting of Loops, Multiple Initializations in the for Loop, The break Statement, The continue Statement, The do-while Loop, The Odd Loop.

Case Control Instruction: Decisions using switch, The Tips and Traps, switch versus if-else Ladder, The goto Keyword.

Functions: What is a Function?, Why use Functions?, Passing Values between Functions, Scope Rule of Functions, Order of Passing Arguments, Using Library Functions, One Dicey Issue, Return Type of Function.

Learning Outcomes:
1. Apply the concept of Loops in various applications. (L3)
2. Design programs using modular approach (L6)

Unit III:
Recursion: Recursion, Recursion and Stack
Pointers: Call by Value and Call by Reference, an Introduction to Pointers, Pointer Notation, Back to Function Calls.
The C Preprocessor: Features of C Preprocessor, Macro Expansion, Macros with Arguments, Macros versus Functions, File Inclusion.
Arrays: What are Arrays?, A Simple Program using Array, More on Arrays, Array Initialization Array Elements in Memory, Bounds Checking, Passing Array Elements to a Function, Pointers and Arrays, Passing an Entire Array to a Function, The Real Thing.
Multidimensional Arrays: Two-Dimensional Arrays, Initializing a Two-Dimensional Array, Memory Map of a Two-Dimensional Array, Pointers and Two-Dimensional Arrays, Pointer to an Array, Passing 2-D Array to a Function, Array of Pointers, Three-Dimensional Array.

Learning Outcomes:
1. Solve problems by using Recursion (L3)
2. Understand the concept of Array (L2)
3. Use pointers to efficiently use memory (L3)

Unit IV:
Strings: What are Strings, More about Strings, Pointers and Strings
Standard Library String Functions-strlen ( ), strcpy ( ), strcat ( ), strcmp ( ).

Handling Multiple Strings: Two-Dimensional Array of Characters, Array of Pointers to Strings, Limitation of Array of Pointers to Strings.

Structures: Why use Structures? Declaring a Structure, Accessing Structure Elements, How Structure Elements are Stored? Array of Structures, Additional Features of Structures, Uses of Structures.

Console Input/output: Types of I/O, **Console I/O Functions**-Formatted Console I/O Functions, sprintf ( ) and sscanf ( ) Functions Unformatted Console I/O Functions

File Input/output: Data Organization, **File Operations**-Opening a File, Reading from a File, Trouble in Opening a File, Closing the File, Counting Characters, Tabs, Spaces, **A File-Copy Program**-Writing to a File, File Opening Modes, **String (Line) I/O in Files**-The Awkward Newline, Record I/O in Files, Text Files and Binary Files, Record I/O Revisited, Database Management, **Low-Level File I/O** -A Low-Level File-Copy Program, I/O under Windows.

Learning Outcomes:

1. Understand the concept of Strings (L2)
2. Learn Structures and Unions (L2)
3. Operate Files through C Programs (L4)
4. Manipulate strings (L3)

Unit V:

Data Structures: Linked List-Single Linked List, Double Linked List, Circular Linked List. Stacks-Using Arrays and Linked List, Stack Applications.

Queue- Arrays and Linked List, Circular Queue, Priority Queue.

Trees-Binary Trees, Binary Search Tree.

Graphs-Graphs Implementation using Arrays and Linked List, Traversal of Graphs.

Learning Outcomes:

1. Implements basic data structures such as stacks, queues and trees.(L3)
2. Apply algorithms and data structures in solving problems. (L3)
3. Design indexing structures (L6)

Text Books:

1. Yashavant Kanetkar, "Let Us C", Fourteenth Edition, BPB Publications.
2. K R Venugopal, Sudeep R Prasad, "Mastering C", Mc GrawHill publications
3. Jeri R. hanly, Elliot B. Koffman, Ashok Kamthane, A. Ananda Rao, "Programming in C and Data Structures", Pearson.

Reference Books:

1. Brian W Kernighan and Dennis M Ritchie, "The C Programming Language", Second Edition, Prentice Hall Publication.
2. Ellis Horowitz, SartajSahni, Susan Anderson-Freed, "Fundamentals of Data Structures in C", Computer Science Press.
3. Pradip Dey and Manas Ghosh, Programming in C, Oxford University Press, 2nd Edition 2011.
4. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

Course Outcomes:

1. Learn the concepts of C Programming language. (L2)
2. Design applications in C, using functions, arrays, pointers and structures. (L6)
3. Apply the concepts of Stacks and Queues in solving the problems. (L3)
4. Explore various operations on Linked lists. (L5)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(II Semester CE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0101T	3	0	0	3	CIE	30 M
Course Title	:	STRENGTH OF MATERIALS					SEE	70 M

COURSE OBJECTIVES:

- To make the student understand how to resolve forces and moments in a given system
- To demonstrate the student to determine the centroid and second moment of area
- To impart procedure for drawing shear force and bending moment diagrams for beams.
- To make the student able to analyze flexural stresses in beams due to different loads.
- To enable the student to apply the concepts of strength of materials in engineering applications and design problems.

UNIT I: Introduction to Mechanics

Basic Concepts, system of Forces Coplanar Concurrent Forces - Components in Space Resultant - Moment of Forces and its Application - Couples and Resultant of Force Systems. Equilibrium of system of Forces: Free body diagrams, Equations of Equilibrium of Coplanar Systems and Spatial systems- **Center of Gravity and moment of inertia**: Introduction – Centroids of rectangular, circular, I, L and T sections - Centroids of built up sections. **Area moment of Inertia**: Introduction – Definition of Moment of Inertia of rectangular, circular, I, L and T sections - Radius of gyration. Moments of Inertia of Composite sections.

Learning Outcomes:

- Explain the basic concepts of forces
- Draw Free body Diagrams for forces
- Determine the centroid and moment of inertia for different cross section areas

UNIT II: Simple Stresses and Strains

Types of stresses and strains – Hooke‘s law – Stress – strain diagram for mild steel – working stress – Factor of safety – lateral strain, Poisson‘s ratio and volumetric strain – Elastic moduli and the relationship between them – Bars of Varying section – Composite bars – Temperature stresses. Strain energy – Resilience – Gradual, Sudden, impact and shock loadings – simple applications.

Learning Outcomes

- List out the concepts of stresses, strains, elastic moduli and strain energy.
- Evaluate relations between different moduli
- Explain different type’s loadings

UNIT III: Shear Force and Bending Moment

Definition of beam – types of beams – Concept of Shear force and bending moment – S.F and B.M diagrams for cantilever, simply supported and over hanging beams subjected to point loads, uniformly distributed load, uniformly varying loads and combination of these loads – point of contra flexure – Relation between S.F, B.M and rate of loading at section of a beam.

Learning Outcomes:

- Draw the shear force and bending moment diagrams for cantilevers, simply supported beams and Overhanging beams with different loads
- Explain the relationship between shear force and bending moments

UNIT IV: Flexural Stresses

Theory of simple bending – Assumptions – Derivation of bending equation– Neutral axis – Determination of bending stresses – Section modulus of rectangular and circular sections (Solid and Hollow), I, T, Angle and Channel Sections – Design of simple beam sections.

Learning Outcomes:

- Derive bending equations
- Compute the flexural stresses for different cross sections.
- Design beam sections for flexure

UNIT V:

Shear Stresses: Derivation of formula-Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T and angle sections. Combined bending and shear.

Analysis of trusses by Method of Joints & Sections.

Learning Outcomes:

- Determine shear stresses for different shapes.
- Evaluate effect of combined bending and shear on sections

Course Outcomes:

On completion of the course, the student will be able to:

1) Explain the different types of couples and force systems
2) Determine the centroid and moment of inertia for different cross-sections
3) List out the concepts of stress, strain, generalized Hooke's law, elastic moduli and strain energy.
4) Develop shear force and bending moment diagrams for different load cases.
5) Compute the flexural stresses and shear stresses for different loading cases and different cross-sections.

TEXT BOOKS:

1) S. Timoshenko, D.H. Young and J.V. Rao, "Engineering Mechanics", Tata McGraw-Hill Company.
2) Sadhu Singh, "Strength of Materials", 11th edition 2015, Khanna Publishers.

REFERENCES:

1. S.S.Bhavikatti, "Strength of materials", Vikas publishing house Pvt. Ltd.
2. R. Subramanian, "Strength of Materials", Oxford University Press.
3. R. K. Bansal, "Strength of Materials", Lakshmi Publications House Pvt. Ltd.
4. Advanced Mechanics of Materials – Seely F.B and Smith J.O. John wiley & Sons inc., New York.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CE & ECE)

Course Category	:	Mandatory Course	L	T	P	C	Exam	3 Hrs
Course Code	:	20AMC9901	3	0	0	0	CIA	30 M
Course Title	:	ENVIRONMENTAL SCIENCES					SEE	--

COURSE OBJECTIVES

- To make the students to get awareness on environment.
- To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day to day activities of human life.
- To save earth from the inventions by the engineers.

UNIT I:

Multidisciplinary Nature Of Environmental Studies: – Definition, Scope and Importance – Need for Public Awareness.

Natural Resources: Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies. – Energy resources:

Learning Outcomes:

- To know the importance of public awareness.
- To know about the various resources.

UNIT II:

Ecosystems: Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

(a) Forest ecosystem.
(b) Grass land ecosystem
(c) Desert ecosystem
(d) Aquatic ecosystems (ponds, streams, lakes, rivers, oceans, estuaries)

Biodiversity and its Conservation : Introduction 0 Definition: genetic, species and ecosystem diversity – Bio-geographical classification of India – Value of biodiversity: consumptive use, Productive use, social, ethical, aesthetic and option values – Biodiversity at global, National and local levels – India as a mega-diversity nation – Hot-sports of biodiversity – Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts – Endangered and endemic species of India – Conservation of biodiversity: In-situ and Ex-situ conservation of biodiversity.

Learning Outcomes:

- To know about various echo systems and their characteristics
- To know about the biodiversity and its conservation

UNIT III:

Environmental Pollution: Definition, Cause, effects and control measures of:

(a) Air Pollution.
(b) Water pollution
(c) Soil pollution
(d) Marine pollution
(e) Noise pollution
(f) Thermal pollution
(g) Nuclear hazards

Solid Waste Management: Causes**,** effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

Learning Outcomes:

- To know about the various sources of pollution.
- To know about the various sources of solid waste and preventive measures.
- To know about the different types of disasters and their managerial measures**.**

UNIT IV:

Social issues and the Environment: From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

Learning Outcomes:

- To know about the social issues related to environment and their protection acts.
- To know about the various sources of conservation of natural resources.
- To know about the wild life protection and forest conservation acts.

UNIT V:

Human Population And The Environment: Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of information Technology in Environment and human health – Case studies.

Field Work: Visit to a local area to document environmental assets River/forest grassland/hill/mountain – Visit to a local polluted site-Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes, etc..

Learning Outcomes:

- To know about the population explosion and family welfareprogrammes.

- To identify the natural assets and related casestudies.

TEXT BOOKS:

1) Text book of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2) Palaniswamy, "Environmental Studies", Pearson education
3) S. Azeem Unnisa, "Environmental Studies" Academic Publishing Company
4) K. Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications(India), Pvt. Ltd.

REFERENCES:

1) Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.
2) M. Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.
3) J. P. Sharma, Comprehensive Environmental studies, Laxmi publications.
4) J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited
5) G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Pubilishing House
6) Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited.

COURSE OUTCOMES:

At the end of the course, the student will be able to:

1) Grasp multidisciplinary nature of environmental studies and various renewable and non-renewable resources.
2) Understand flow and bio-geo- chemical cycles and ecological pyramids.
3) Understand various causes of pollution and solid waste management and related preventive measures.
4) About the rainwater harvesting, watershed management, ozone layer depletion and waste land reclamation.
5) Casus of population explosion, value education and welfare programmes.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to II Semester CE & ME)

Course Category	:	Basic Sciences	L	T	P	C	Exam	3 Hrs
Course Code	:	20ABS5102P	0	0	3	1.5	CIE	30 M
Course Title	:	ENGINEERING CHEMISTRY LAB					SEE	70 M

COURSE OBJECTIVES:

1. To Verify the fundamental concepts with experiments

List of Experiments:

1. Determination of Hardness of a groundwater sample.
2. Estimation of dissolved oxygen by Winklers method.
3. Estimation of Copper by EDTA method.
4. Determination of Strength of an acid in Pb-Acid battery.
5. Estimation of Ferrous Iron by Potassium dichromate.
6. Preparation of a polymer- Bakelite.
7. Determination of percentage of Iron in Cement sample by colorimetry.
8. Estimation of Calcium in port land Cement.
9. Preparation of nano materials by precipitation.
10. Adsorption of acetic acid by charcoal.
11. Determination of percentage moisture content in a coal sample.
12. Determination of Viscosity of lubricating oil by Redwood Viscometer 1.
13. Determination of Viscosity of lubricating oil by Redwood Viscometer 2.
14. Determination of Calorific value of gases by Junker's gas Calorimeter.

Course Outcomes:

At the end of the course, the students will be able to:

1. **Determine** the cell constant and conductance of solutions (L3)
2. **Prepare** advanced polymer materials (L2)
3. **Determine** the physical properties like surface tension, adsorption and viscosity (L3)
4. **Estimate** the Iron and Calcium in cement (L3)
5. **Calculate** the hardness of water (L4)
6. **Find** calorific values of various fuels, hardness of water samples (L1)

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RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0501P	0	0	3	1.5	CIE	30 M
Course Title	:	C PROGRAMMING & DATA STRUCTURES LAB					SEE	70 M

COURSE OBJECTIVES:

- To illustrate the concepts of C programming language
- To discuss the syntax and semantics of C programming language.
- To demonstrate using arrays, strings, pointers and structures.
- To illustrate the use of Stacks and Queues
- To teach different operations on linked lists.
- To demonstrate Binary search tree traversal techniques.

Week 1

For the first few weeks students have to do some practice programs to understand the concepts of the C programming language

Week 2

a) Write a C program to find both the largest and smallest number in a list of integers.
b) Write a C program that uses functions to perform the following:
(i) Addition of Two Matrices (ii) Multiplication of Two Matrices

Week 3

a) Write a C program that uses functions to perform the following operations:
(i) To insert a sub-string in to a given main string from a given position.
(ii) To delete n characters from a given position in a given string.

Week 4

a) Write a C program that displays the position or index in the string S where the string T begins, or – 1 if S doesn‘t contain T.
b) Write a C program to count the lines, words and characters in a given text.

Week 5

a) Write a C Program to perform various arithmetic operations on pointer variables.
b) Write a C Program to demonstrate the following parameter passing mechanisms:
(i) call-by-value (ii) call-by-reference

Week 6

Write a C program that uses functions to perform the following operations:

(i) Reading a complex number
(ii) Writing a complex number
(iii) Addition of two complex numbers
(iv) Multiplication of two complex numbers
(Note: represent complex number using a structure.)

Week 7

Write C programs that implement stack (its operations) using

(i) Arrays (ii) Pointers

Week 8

Write C programs that implement Queue (its operations) using

(i) Arrays (ii) Pointers

Week 9

Write a C program that uses Stack operations to perform the following:

(i) Converting infix expression into postfix expression

(ii) Evaluating the postfix expression

Week 10

Write a C program that uses functions to perform the following operations on singly linked list.

(i) Creation (ii) Insertion (iii) Deletion (iv) Traversal

Week 11

Write a C program that uses functions to perform the following operations on Doubly linkedlist.

(i) Creation (ii) Insertion (iii) Deletion (iv) Traversal

Week 12

Write a C program that uses functions to perform the following operations on circular linkedlist.

(i) Creation (ii) Insertion (iii) Deletion (iv) Traversal

Week 13

Write a C program that uses functions to perform the following:

(i) Creating a Binary Tree of integers

(ii) Traversing the above binary tree in preorder, inorder and postorder.

Week 14

Write C programs that use both recursive and non-recursive functions

(i) To find the factorial of a given integer.

(ii) To find the GCD (greatest common divisor) of two given integers.

(iii) To solve Towers of Hanoi problem.

Week 14

Write C programs that use both recursive and non-recursive functions to perform the following searching operations for a key value in a given list of integers:

(i) Linear search (ii) Binary search

Week 15

Write a C program that implements the following sorting methods to sort a given list of integers in ascending order

(i) Bubble sort (ii) Selection sort (iii) Insertion sort

Week 16 Application development

College information system – The students in groups can collect the information about the college and design a project which automates the some of the tasks like Attendance calculation, Grade calculation, etc.

TEXT BOOKS:

1. Programming in C and Data Structures, J.R.Hanly, Ashok N. Kamthane and A. Ananda Rao, Pearson Education.
2. B.A. Forouzon and R.F. Gilberg, "COMPUTER SCIENCE: A Structured Programming Approach Using C", Third edition, CENGAGE Learning, 2016.
3. Richard F. Gilberg & Behrouz A. Forouzan, "Data Structures: A Pseudocode Approach with C", Second Edition, CENGAGE Learning, 2011.

REFERENCE BOOKS:

1. PradipDey and ManasGhosh, Programming in C, Oxford University Press, 2nd Edition 2011.
2. E.Balaguruswamy, "C and Data Structures", 4th Edition, Tata Mc Graw Hill.
3. A.K.Sharma, Computer Fundamentals and Programming in C, 2nd Edition, University Press.
4. M.T.Somashekara, "Problem Solving Using C", PHI, 2nd Edition 2009.

COURSE OUTCOMES:

1. Demonstrate basic concepts of C programming language. (L2)
2. Develop C programs using functions, arrays, structures and pointers. (L6)
3. Illustrate the concepts Stacks and Queues. (L2)
4. Design operations on Linked lists. (L6)
5. Apply various Binary tree traversal techniques. (L3)
6. Develop searching and sorting methods. (L6)

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(II Semester CE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0101P	3	0	0	3	CIE	30 M
Course Title	:	STRENGTH OF MATERIALS LAB					SEE	70 M

COURSE OBJECTIVES:

- By performing this laboratory, the student will be able to know the structural behavior of various materials.

LIST OF EXPERIMENTS

1. Tension test.
2. Bending test on (Steel/Wood) Cantilever beam.
3. Bending test on simply supported beam.
4. Torsion test.
5. Hardness test.
6. Compression test on Open coiled springs
7. Tension test on Closely coiled springs
8. Compression test on wood/ concrete
9. Izod / Charpy Impact test on metals
10. Shear test on metals
11. Use of electrical resistance strain gauges.
12. Continuous beam – deflection test.

COURSE OUTCOMES:

By performing the various tests in this laboratory the student will be able to know the structural behavior various structural elements when subjected to external loads

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE & ECE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0302	0	0	3	1.5	CIE	30 M
Course Title	:	ENGINEERING WORKSHOP					SEE	70 M

COURSE OBJECTIVES:

- To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills.

LIST OF EXPERIMENTS

Trade I: Wood Working

Familiarity with different types of woods and tools used in wood working and make following joints

(a) Half – Lap joint (b) Mortise and Tenon joint (c) Corner Dovetail joint or Bridle joint

Trade II: Sheet Metal Working

Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets

(a) Tapered tray (b) Conical funnel (c) Elbow pipe (d) Brazing

Trade III: Fitting

Familiarity with different types of tools used in fitting and do the following fitting exercises.

(a) V-fit (b) Dovetail fit (c) Semi-circular fit

(d) Bicycle tyre puncture and change of two wheeler tyre.

Trade IV: Electrical Wiring

Familiarities with different types of basic electrical circuits and make the following connections

(a) Parallel and series (b) Two way switch (c) Godown lighting

(d) Tube light (e) Three phase motor (f) Soldering of wires

COURSE OUTCOMES:

After completion of this lab the student will be able to

- Apply wood working skills in real world applications. (l3)
- Build different objects with metal sheets in real world applications. (l3)
- Apply fitting operations in various applications. (l3)
- Apply different types of basic electric circuit connections. (l3)
- Use soldering and brazing techniques. (l2)

Note: In each section a minimum of three exercises are to be carried out.

RAYALASEEMA UNIVERSITY COLLEGE OF ENGINEERING, KURNOOL

(Common to I Semester CSE & ME and II Semester CE)

Course Category	:	Engineering Science	L	T	P	C	Exam	3 Hrs
Course Code	:	20AES0502	0	0	3	1.5	CIE	30 M
Course Title	:	IT WORKSHOP					SEE	70 M

COURSE OBJECTIVES:

- To make the students know about the internal parts of a computer, assembling and dissembling a computer from the parts, preparing a computer for use by installing the operating system
- To provide Technical training to the students on Productivity tools like Word processors, Spreadsheets, and Presentations
- To demonstrate Networking of computers and use Internet facility for Browsing and Searching
- To illustrate the need for security while using applications and devices.

Preparing your Computer

Task 1:

Learn about Computer: Identify the internal parts of a computer, and its peripherals, Represent the same in the form of diagrams including Block diagram of a computer, Write specifications for each part of a computer including peripherals and specification of a Desktop computer.

Task 2:

Assembling a Computer: Disassemble and assemble the PC back to working condition, Trouble shoot the computer and identify working and non-working parts, Identify the problem correctly by various methods like beeps.

Task 3:

Install Operating system and Applications: Install Linux on the computer, Install another operating system and make the system dual boot or multi boot, Install operating systems using Virtual machine.
Access the computing resources like CD/DVD drives, Pen drives, Printers, Speakers, Microphone, etc.
Install device drivers and install application programs.

Networking and Internet

Task 4:

Networking: Connect two computers directly using a cable or wireless connectivity and share information, Connect two or more computers using switch/hub and share information, Phuscally connect computers using crimpling activity, logical configuration, etc.

Task 5:

Browsing Internet: Access the Internet for Browsing, Search the Internet for required information, Create e-mail account, send and receive email, Get acquaintance with applications like Facebook, skype, etc.

Task 6:

Antivirus: Download freely available Antivirus software, install it and use it to check for threats to the computer being used, Submit information about the features of the antivirus used, installation process, virus definitions, virus engine, etc. Configure the computer for high security.

Productivity tools

Task 7:

Word Processor: Create documents using the word processor tool, Inserting and deleting the characters, words and lines, Alignment of the lines, Inserting header and Footer, changing the font, changing the colour, including images and tables in the word file, making page setup, copy and paste block of text, images, tables, linking the images which are present in other directory, formatting paragraphs, spell checking, etc.

Prepare project cover pages, content sheet, and chapter pages.

Task 8:

Presentations: Creating, opening, saving, and running the presentations, selecting the style for slides, formatting the slides with different fonts, colours, creating charts and tables, inserting and deleting text, graphics and animations, bulleting and numbering, hyperlinking, running the slide show, setting the timing for slide show.

Task 9:

Spreadsheet: Create, open, save the application documents and format them as per the requirement. Some of the tasks that may be practiced are Managing the worksheet environment, creating cell data, inserting and deleting cell data, format cells, adjust the cell size, applying formulas and functions, preparing charts, sorting cells.

Applications

Task 10:

Database management system: Install a Database management system, configure users, do some administration tasks.

Task 11:

Language Translators

Install different Natural language translators in a Computer/Mobile. Use them to convert text between different languages.

Use Voice to access applications and make them perform different tasks like calling users, etc.

Task 12:

Sharing

Install applications github, dropbox, google forms, google docs and use them to share information and work on a common project. It is a Team task.

Task 13:

IDE

Install applications like Vscode, and Eclipse and use the integrated development environment of those applications and perform tasks like editing, compiling, executing, etc.

Task 14:

Cyber Security

Practice the following Cyber Security related tasks

- Cyber Hygiene Practices of Personal digital devices
- Cyber Hygiene Practices for Home
- Cyber Hygiene Practices for Remote working and Learning
  Web source: Cyber Hygiene Practices - ISEA (infosecawareness.in)

References:

1. Peter Norton , Introduction to Computers, McGraw Hill
2. Joan Lambert, Joyce Cox, MOS study guide for word, Excel, Powerpoint & Outlook Exams, PHI.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education.
4. Rusen , Networking your computers and devices, PHI
5. Bigelows , Trouble shooting, Maintaining & Repairing PCs, TMH
6. Major reference is Websites like Google.com, dropbox.com, github.com and others.

Course Outcomes:

- Disassemble and Assemble a Personal Computer and prepare the computer ready to use. (L6)
- Prepare the Documents using Word processors and Prepare spread sheets for calculations using excel. (L3)
- Design Slide presentations using the presentation tool. (L6)
- Interconnect two or more computers for information sharing. (L4)
- Access the Internet and Browse it to obtain the required information. (L4)
- Analyze the vulnerabilities of the devices, and apply security features (L4)