COURSE STRUCTURE

For

B.Tech.

Department of Electrical and Electronics Engineering

(*for 24 admitted batch*)

PRAGATI ENGINEERING COLLEGE

(An Autonomous Institution)
ADB Road, Surampalem, Kakinada District, A.P.-533 437
(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUK, Kakinada)
(Recognized by UGC under sections 2 (f) and 12 (b) of UGC act, 1956)

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

COURSE STRUCTURE

INDUCTION PROGRAMME

S.No.	Course Name	Category	L	T	P	Credits
1	Physical Activities -- Sports, Yoga and Meditation, Plantation	MC	0	0	6	0
2	Career Counselling	MC	2	0	2	0
3	Orientation to all branches -- career options, tools, etc.	MC	3	0	0	0
4	Orientation on admitted Branch -- corresponding labs, tools and platforms	EC	2	0	3	0
5	Proficiency Modules & Productivity Tools	ES	2	1	2	0
6	Assessment on basic aptitude and mathematical skills	MC	2	0	3	0
7	Remedial Training in Foundation Courses	MC	2	1	2	0
8	Human Values & Professional Ethics	MC	3	0	0	0
9	Communication Skills -- focus on Listening, Speaking, Reading, Writing skills	BS	2	1	2	0
10	Concepts of Programming	ES	2	0	2	0

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I YEAR – I SEMESTER

Sl. No	Category	Course Code	Course Title	L	T	P	Credits
1	BS&H	24BP101T	Engineering Physics	3	0	0	3
2	BS&H	24BM101T	Linear Algebra and Calculus	3	0	0	3
3	Engineering Science	24EE101T	Basic Electrical and Electronics Engineering	3	0	0	3
4	Engineering Science	24ME101T	Engineering Graphics	1	0	4	3
5	Engineering Science	24CS101T	Introduction to programming	3	0	0	3
6	BS&H	24BP101P	Engineering Physics Laboratory	0	0	2	1
7	Engineering Science	24EE101P	Electrical and Electronics Engineering Workshop	0	0	3	1.5
8	Engineering Science	24CS101P	Computer Programming Laboratory	0	0	3	1.5
9	Engineering Science	24IT101P	IT Workshop	0	0	2	1
10	BS&H	24MH102P	NSS/NCC/Scouts and Guides/Community Service	0	0	1	0.5
Total Credits							**20.5**

I YEAR – II SEMESTER

Sl. No	Category	Course Code	Course Title	L	T	P	Credits
1	BS&H	24BE201T	Communicative English	2	0	0	2
2	BS&H	24BM201T	Differential equations and Vector Calculus	3	0	0	3
3	BS&H	24BC201T	Chemistry	3	0	0	3
4	Engineering Science	24CM201T	Basic Civil and Mechanical Engineering	3	0	0	3
5	Professional Core	24CS201T	Data Structures	3	0	0	3
6	Engineering Science	24ME203P	Engineering Workshop	0	0	3	1.5
7	BS&H	24BE201P	Communicative English Laboratory	0	0	2	1
8	Professional Core	24CS201P	Data Structures Laboratory	0	0	3	1.5
9	BS&H	24BC201P	Chemistry Laboratory	0	0	2	1
10	BS&H	24MH201P	Health and wellness, Yoga and sports	0	0	1	0.5
Total Credits							**19.5**

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II YEAR – I SEMESTER

Sl. No	Category	Course Code	Course Title	L	T	P	Credits
1	BS&H	24BM302T	Complex Variables & Numerical Methods	3	0	0	3
2	HSMC	24HM301T	Universal human values understanding harmony and Ethical human conduct	2	1	0	3
3	Engineering Science	24EE301T	Electromagnetic Field Theory	3	0	0	3
4	Professional Core	24EE302T	Electrical Circuit Analysis-II	3	0	0	3
5	Professional Core	24EE303T	DC Machines & Transformers	3	0	0	3
6	Professional Core	24EE303P	DC Machines & Transformers Laboratory	0	0	3	1.5
7	Professional Core	24EE302P	Electrical Circuit Analysis-II and Simulation Laboratory	0	0	3	1.5
8	Skill Enhancement Course	24AM301P	Data Structures Laboratory	0	1	2	2
9	Audit Course	24BC301T	Environmental Science	2	0	0	-
Total Credits				**15**	2	**15**	**20**

II YEAR – II SEMESTER

Sl. No	Category	Course Code	Course Title	L	T	P	Credits
1	BS&H	24HM401T	Managerial Economics & Financial Analysis	2	0	0	2
2	Engineering Science/Basic Science	24EC401T	Analog Circuits	3	0	0	3
3	Professional Core	24EE401T	Power Systems-I	3	0	0	3
4	Professional Core	24EE402T	Induction and Synchronous Machines	3	0	0	3
5	Professional Core	24EE403T	Control Systems	3	0	0	3
6	Professional Core	24EE402P	Induction and Synchronous Machines Laboratory	0	0	3	1.5
7	Professional Core	24EE403P	Control Systems Laboratory	0	0	3	1.5
8	Skill Enhancement Course	24AI401S	Python Programming	0	1	2	2
9	Engineering Science	24HM401P	Design Thinking & Innovation	1	0	2	2
Total				15	1	10	**21**
Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation							

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I Year I Semester
ENGINEERING PHYSICS
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Basic Sciences	**Course Code**	24BP101T
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Intermediate Physics	**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	Impart Knowledge of Physical Optics phenomena like Interference, Diffraction and Polarization required to design instruments with higher resolution.
2	Impart the knowledge of Dielectric& Magnetic materials for engineering Applications.
3	Understand the basics of Semiconductors and their working mechanism for their utility in Engineering applications.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Analyzetheintensityvariationoflightduetopolarization,interferenceanddiffraction	K4
CO2	Familiarize with the basics of crystals and their structures.	K2
CO3	Applying the concepts of quantum mechanics for calculation of free quantum particle energies and phenomenon of electrical & thermal conductivities to sub microscopic particles	K3
CO4	Apply the basics of phenomenon related to dielectric materials and Magnetic Materials to study their dependence on temperature and frequency response.	K3
CO5	Understand the Band formation, electrical conductivities in semiconductors and study the types of semiconductors using Hall Effect.	K2

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	-	1	1	-	-	-	-	-	-	-
CO2	2	2	1	-	-	-	-	-	-	-	-	-
CO3	2	2	-	1	-	-	-	-	-	-	-	-
CO4	2	2	-	-	-	-	-	-	-	-	-	-
CO5	2	2	2	-	-	-	-	-	-	-	-	1

COURSE CONTENT

UNIT – I -WAVE OPTICS

Interference: Introduction - Principle of superposition –Interference of light - Interference in thin films (Reflection Geometry) & applications - Colours in thin films- Newton's Rings, Determination of wavelength and refractive index.

Diffraction: Introduction - Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & N-slits (Qualitative) – Diffraction Grating - Dispersive power and resolving power of Grating (Qualitative).

UNIT - II - CRYSTALLOGRAPHY AND X-RAY DIFFRACTION

Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC - Miller indices – separation between successive (hkl) planes.

X - ray diffraction: Bragg's law - X-ray Diffractometer – crystal structure determination by Laue's and powder methods

UNIT – III - DIELECTRIC AND MAGNETIC MATERIALS

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector – Relation between the electric vectors - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius- Mossotti equation - complex dielectric constant – Frequency dependence of polarization – dielectric loss

Magnetic Materials: Introduction - Magnetic dipole moment - Magnetization-Magnetic susceptibility and permeability – Atomic origin of magnetism - Classification of magnetic materials: Dia, para, Ferro, anti-ferro&Ferri magnetic materials - Domain concept for Ferromagnetism & Domain walls (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT – IV - QUANTUM MECHANICS AND FREE ELECTRON THEORY

Quantum Mechanics: Introduction-Dual nature of matter – Heisenberg's Uncertainty Principle – Significance and properties of wave function – Schrodinger's time independent and dependent wave equations– Particle in a one-dimensional infinite potential well.

Free Electron Theory: Introduction-Classical free electron theory (Qualitative with discussion of merits and demerits) – Quantum free electron theory – electrical conductivity based on quantum free electron theory - Fermi-Dirac distribution - Density of states - Fermi energy

UNIT - V - BAND THEORY OF SOLIDS & SEMICONDUCTOR PHYSICS

BAND THEORY OF SOLIDS

Bloch's Theorem (Qualitative) - Kronig Penny Model(Qualitative)-E vs K diagram-V vs K diagram, Effective mass of electron- Classification of Crystalline Solids-Concept of hole

SEMICONDUCTOR PHYSICS

Semiconductors: Introduction-Formation of energy bands – classification of crystalline solids - 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 – Hall effect and its applications.

TEXT BOOKS

"A Text book of Engineering Physics" by M.N.Avadhanulu, P.G.Kshir sagar -S.Chand Publications,
"Engineering Physics" by Tirupati Naidu &Veeranjaneyalu, V G S Publishers
"Engineering Physics" by P.K Palanisamy,Sci Tech Publication

REFERENCE BOOKS

Kettles Introduction to Solid state Physics-Charles Kittel,Wiley India Edition
Solid State Physics ,AJ Dekker, I Edition,Macmillan Publishers India Private Limited
"Engineering Physics" by M.R.Srinivasan, New Age international publishers.
"Solid State Physics" by SO Pilai., - New age International Publishers

WEB RESOURCES

Web Resources: https://www.loc.gov/rr/scitech/selected-internet/physics.html
Unit I:https://nptel.ac.in/courses/122/107/122107035/#
Unit II: https://nptel.ac.in/courses/113/104/113104014/
Unit III: https://nptel.ac.in/courses/113/104/113104090/
https://youtu.be/DDLljK1ODeg
Unit IV :https://study.com/academy/lesson/the-de-broglie-hypothesis-definition-significance.html
https://nptel.ac.in/courses/115/101/115101107/
https://nptel.ac.in/courses/115/105/115105122/
Unit V :https://www.electronics-tutorials.ws/diode/diode_1.html
https://nptel.ac.in/courses/115/105/115105099/
https://nptel.ac.in/courses/108/108/108108122/

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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

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I Year I Semester
LINEAR ALGEBRA AND CALCULUS
(Common to All Branches)

Course Category	Basic Sciences	**Course Code**	24BM101T
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Matrix Algebra, Limits, Continuity, Differentiability and inerrability	**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES

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

Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Developanduseofmatrixalgebratechniquesthatareneededbyengineersforpractical applications.	K3
CO2	Find the Eigen values and Eigen vectors and able to reduce the given quadratic form into canonical form by orthogonal transformation.	K3
CO3	Utilize mean value theorems to real life problems.	K3
CO4	Familiarize with functions of several variables which is useful in optimization & learn important tools of calculus in higher dimensions	K3
CO5	Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

COURSE CONTENT

UNIT I - Matrices:

Rank of a matrix by echelon form, normal form. Cauchy–Binet formulae (without proof). Inverse of Non- singular matrices by Gauss-Jordan method, **System of linear equations**: Solving system of Homogeneous linear equations and solving Non-Homo generous linear equations by Gauss elimination method, Gauss Jacobi and Gauss Seidel Iteration Methods**.**

UNIT II - Eigen values, Eigenvectors and Orthogonal Transformation:

Eigen values, Eigenvectors 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 III - Calculus:

Mean Value Theorems: Rolle's Theorem, Lagrange's mean value theorem with their geometrical interpretation, Cauchy's mean value theorem, Taylor's and Maclaurin theorems with remainders (without proof), Problems and applications on the above theorems. Taylor's and Maclaurin series.

UNIT IV - Partial differentiation and Applications (Multi variable calculus):

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Taylor's and Maclaurin's series expansion of functions of two variables. Jacobians, Functional dependence, maxima and minima of functions of two variables, method of Lagrange multipliers.

UNIT V - Multiple Integrals (Multi variable Calculus):

Double integrals, change of order of integration, triple integrals, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).

TEXT BOOKS

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCE BOOKS

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14th Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5th Edition (9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5th Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, , Pearson publishers, 9th edition.
5. Higher Engineering Mathematics, H. K Das, Er. RajnishVerma, S. Chand Publications,2014, Third Edition (Reprint 2021)
6. Advanced Engineering Mathematics by H. K Dass, S. ChandPublications,2022, 22nd Edition(Reprint 2022).

WEB RESOURCES

1. https://en.wikipedia.org/wiki/System_of_linear_equations
2. https://en.wikipedia.org/wiki/Eigenvalues_and_eigenvectors
3. https://www.math.hmc.edu/calculus/tutorials/eigenstuff/
4. https://en.wikipedia.org/wiki/Quadratic_form
5. https://en.wikipedia.org/wiki/Calculus
6. https://en.wikipedia.org/wiki/Partial_derivative
7. https://www.whitman.edu/mathematics/calculus_online/section14.03.html
8. https://en.wikipedia.org/wiki/Multiple_integral
9. http://tutorial.math.lamar.edu/Classes/CalcIII/MultipleIntegralsIntro.aspx

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

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I Year I Semester
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Engineering Science	**Course Code**	24EE101T
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

PART-A:BASIC ELECTRICAL ENGINEERING

COURSE OBJECTIVES
To expose to the field of electrical & electronics engineering, laws and principles of electrical/ electronic engineering and to acquire fundamental knowledge in the relevant field.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Know the fundamental laws, operating principles of motors, generators, MC and MI instruments	K2
CO2	Apply the problem solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations.	K3
CO3	Apply the mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	-	-	-	-	-	-	-	-
CO2	2	2	2	-	-	2	-	-	-	-	-	-
CO3	3	3	-	-	-	-	2	2	-	-	-	-

COURSE CONTENT

UNIT - I

DC Circuits: Electrical circuit elements (R, L and C), Ohm's Law and its limitations, KCL & KVL, series, parallel, series-parallel circuits, Super Position theorem, Simple numerical problems.

AC Circuits: A.C. Fundamentals: Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor, Voltage and current relationship with phasor diagrams in R, L, and C circuits, Concept of Impedance, Active power, reactive power and apparent power, Concept of power factor (Simple Numerical problems).

UNIT - II

Machines and Measuring Instruments

Machines: Construction, principle and operation of (i) DC Motor, (ii) DC Generator, (iii) Single Phase Transformer, (iv) Three Phase Induction Motor and (v) Alternator, Applications of electrical machines.

Measuring Instruments: Construction and working principle of Permanent Magnet Moving Coil (PMMC), Moving Iron (MI) Instruments and Wheat Stone bridge.

UNIT – III

Energy Resources, Electricity Bill & Safety Measures

Energy Resources: Conventional and non-conventional energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear, Solar & Wind power generation.

Electricity bill: Power rating of household appliances including air conditioners, PCs, Laptops, Printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers.

Equipment Safety Measures: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. Personal safety measures: Electric Shock, Earthing and its types, Safety Precautions to avoid shock.

Textbooks:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, DhanpatRai& Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, McGraw Hill, 2019, Fourth Edition
2. Principles of Power Systems, V.K. Mehtha, S.Chand Technical Publishers, 2020
3. Basic Electrical Engineering, T. K. Nagsarkar and M. S. Sukhija, Oxford University Press, 2017
4. Basic Electrical and Electronics Engineering, S. K. Bhatacharya, Person Publications, 2018, Second Edition.

Web Resources:

1. https://nptel.ac.in/courses/108105053
2. https://nptel.ac.in/courses/108108076

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PART-B :BASIC ELECTRONICS ENGINEERING

COURSE OBJECTIVES	
1	To impart knowledge on semiconductor devices.
2	To introduce concepts of biasing and applications of diodes and transistors.
3	To introduce fundamentals of digital electronics.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the basic concepts of diodes and transistors	K2
CO2	Understand the working principles of semiconductor devices and applications	K2
CO3	Understand number system, Boolean algebra, basics of combinational and sequential circuits	K2

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2										
CO2	2	2										
CO3	2	2										

COURSE CONTENT

UNIT – I - SEMICONDUCTORDEVICES

Introduction - Evolution of electronics – Vacuum tubes to nano electronics - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics — Elementary Treatment of Small Signal CE Amplifier.

UNIT -II - BASICELECTRONICCIRCUITSANDINSTRUMENTTAION

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, Block diagram and working of common emitter (RC coupled) amplifier with its frequency response. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

UNIT – III - DIGITAL ELECTRONICS

Overview of Number Systems, BCD codes, Functionality of Logic Gates– NOT,OR,AND,NOR,NAND,XOR and XNOR. Excess-3code, Graycode, Hamming code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Simple combinational circuits–Half and Full Adders. Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only)

Textbooks:

1. Robert.L.Boylestad&LouisNashelsky,ElectronicDevices&CircuitTheory,PearsonEducation,2021.
2. Digital Design by Morris Mano, 3E, Prentice Hall, India, 2001

Reference Books:

1. R.S.Sedha, A Text book of Electronic Devices and Circuits, S.Chand&Co,2010.
2. Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India, 2002.
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

Web References:

1. NPTEL- https://archive.nptel.ac.in/courses/108/108/108108122/
2. Neso Academy- https://www.nesoacademy.org/ec/05-digital-electronics

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year I Semester
ENGINEERING GRAPHICS
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Engineering Science	**Course Code**	24ME101T
Course Type	Theory	**L-T-P-C**	1-0-4-3
Prerequisites		**Continuous Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To enable the students with various concepts like dimensioning, conventions and standards related to Engineering Drawing.
2	To impart knowledge on the projection of points, lines and plane surfaces.
3	To improve the visualization skills for better understanding of projection of solids.
4	To develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.
5	To make the students understand the viewing perception of a solid object in Isometric and Perspective projections.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.	K2
CO2	Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.	K3
CO3	Understand and draw projection of solids in various positions in first quadrant.	K3
CO4	Explain principles behind development of surfaces.	K2
CO5	Prepare isometric and perspective sections of simple solids.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	2	2	-	-	-	-	-	-	-	1	-
CO2	3	2	2	-	-	-	-	-	-	-	1	-
CO3	3	2	2	-	-	-	-	-	-	-	1	-
CO4	3	2	2	-	-	-	-	-	-	-	1	-
CO5	3	2	2	-	3	-	-	-	-	-	1	-

COURSE CONTENT

UNIT - I

Introduction: Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods.

Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involutes, Normal and tangent to Curves.

Scales: Plain scales, diagonal scales and vernier scales.

UNIT - II

Orthographic Projections: Reference plane, importance of reference lines or Plane, Projections of a point situated in any one of the four quadrants.

Projections of Straight Lines: Projections of straight lines parallel to both reference planes, perpendicular to one reference plane and parallel to other reference plane, inclined to one reference plane and parallel to the other reference plane. Projections of Straight Line Inclined to both the reference planes

Projections of Planes: regular planes Perpendicular to both reference planes, parallel to one reference plane and inclined to the other reference plane; plane inclined to both the reference planes.

UNIT - III

Projections of Solids: Types of solids: Polyhedral and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

UNIT - IV

Sections of Solids: Perpendicular and inclined section planes, Sectional views and True shape of section, Sections of solids in simple position only.

Development of Surfaces: Methods of Development: Parallel line development and radial line development. Development of a cube, prism, cylinder, pyramid and cone.

UNIT - V

Conversion of Views: Conversion of isometric views to orthographic views; Conversion of orthographic views to isometric views.

Computer graphics: Creating 2D&3D drawings of objects including PCB and Transformations using Auto CAD (*Not for end examination*).

Textbook:

1. N. D. Bhatt, Engineering Drawing, Charotar Publishing House, 2016.

Reference Books:

1. Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.
2. Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc,2009.
3. Engineering Drawing with an Introduction to AutoCAD, DhananjayJolhe, Tata McGraw Hill, 2017.

Web References:

1. http://nptel.ac.in/courses/112103019/
2. https://www.cadtutor.net/tutorials/autocad/

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year I Semester
INTRODUCTIONTOPROGRAMMING
(Common to All Branches)

Course Category	Engineering Science	**Course Code**	24CS101T
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Continuous Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSEOBJECTIVES	
1	To introduce students to the fundamentals of computer programming.
2	To provide hands-on experience with coding and debugging.
3	To foster logical thinking and problem-solving skills using programming.
4	Tofamiliarizestudentswithprogrammingconceptssuchasdatatypes,control structures, functions and arrays.
5	To encourage collaborative e learning and team work in coding projects.

COURSEOUTCOMES		
Upon successful completion of the course, the student will be ableto :		**Cognitive Level**
CO1	Understand basics of computers, the concept of algorithm and algorithmic thinking.	K3
CO2	Analyze a problem and develop an algorithm to solve it.	K4
CO3	Implement various algorithms using the C programming language.	K5
CO4	Understand more advanced features of C language.	K3
CO5	Developproblem-solvingskillsandtheabilitytodebugandoptimizethecode.	K4

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6-Creating

ContributionofCourseOutcomestowardsachievementofProgramOutcomes(1– Low, 2 - Medium, 3– High)

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3	3	1	-	-	-	-	-	-	-
CO2	3	3	3	3	1	-	-	-	-	-	-	-
CO3	3	3	3	2	1	-	-	-	-	-	-	-
CO4	2	3	3	3	1	-	-	-	-	-	-	-
CO5	3	3	3	3	1	-	-	-	-	-	-	-

COURSE CONTENT

UNIT-I
Introduction to Programming and Problem Solving
History of Computers, Basic organization of a computer: ALU, input-output units, memory, program counter, Introduction to Programming Languages, Basics of a Computer Program- Algorithms, flowcharts (Using Dia Tool), pseudo code. Introduction to Compilation and Execution, Primitive Data Types, Variables and Constants, Basic Input and Output, Operations, Type Conversion and Casting.
Problem solving techniques: Algorithmic approach, characteristics of algorithm, Problem solving strategies: Top-down approach, Bottom-up approach, Time and space complexities of algorithms.

UNIT-II
Control Structures
Simple sequential programs, Conditional Statements (if, if-else, switch), Loops (for, while, do-while) Break and Continue, Programming Examples.

UNIT-III
Arrays and Strings
Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Arrays Applications , Introduction to Strings, String input and output functions, String handling functions.

UNIT-IV
Pointers & User Defined Data types
Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions.

UNIT-V
Functions& File Handling
Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Life time of Variables, Storage Classes, Basics of File Handling.
Note: The syllabus is designed with C Language as the fundamental language of implementation.

TEXTBOOKS
1. "The C Programming Language", Brian W.Kernighan and Dennis M.Ritchie, Prentice-Hall,2005, 2nd Edition
2. Schaum's Outline of Programming with C,Byron S Gottfried, McGraw-Hill Education,4th edition, 2018

REFERENCEBOOKS
1. Computing fundamentals and C Programming, Balaguruswamy,E., Mc Graw-Hill Education, 7th Edition, 2017
2. Programming in C, Rema Theraja, Oxford,2016,2nd edition
3. C Programming, A ProblemSolvingApproach,Forouzan,Gilberg,Prasad,CENGAGE,3rd edition, 2009

WEB RESOURCES
1. http://nptel.ac.in/courses/106104128/
2. http://students.iitk.ac.in/programmingclub/course/#notes
3. http://c-faq.com/~scs/cclass/cclass.html

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year I Semester
ENGINEERING PHYSICS LABORATORY
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Basic Sciences	**Course Code**	24BP101P
Course Type	Laboratory	**L-T-P-C**	0-0-2-1
Prerequisites	Intermediate Physics	**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	The student will have exposure to various experimental skills which isessential for an Engineering student.
2	To gain practical knowledge by applying the experimental methods to correlate with the Theoretical Physics.
3	Apply the Analytical techniques and graphical analysis to the experimental data

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the basics of Interference, Diffraction in Physics using instruments like Spectrometer, Travelling microscope.	K2
CO2	Study the Mechanical Laws, Strength of materials, Magnetic and Dielectric constants of materials.	K3
CO3	Apply the basics of Current Electricity and Semiconductors in engineering application	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	-	-	-	1	-	-	-	-	-	-	-
CO2	2	1	-	-	-	-	-	-	-	-	-	-
CO3	2	2	2	-	1	-	-	-	-	-	-	-

COURSE CONTENT

(Any TEN of the listed experiments are to be conducted. Out of which any TWO experiments may be conducted in virtual mode).

1. Determination of radius of curvature of a given Plano-convex lens by Newton's Rings.
2. Determination of wavelengths of different spectral lines in mercury spectrum using diffraction grating in normal incidence configuration.
3. Verification of Brewster's law
4. Determination of wavelength of Laser light using diffraction grating.
5. Estimation of Planck's constant using photoelectric effect.
6. Sonometer: Verification of laws of stretched string.
7. Determination of young's modulus for the given material of wooden scale by non- uniform bending (or double cantilever) method.
8. Determination of rigidity modulus of the material of the given wire using Torsional pendulum
9. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
10. Determination of magnetic susceptibility by Kundt's tube method.
11. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
12. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
13. Determination of dielectric constant using charging and discharging method.
14. Determination of the resistivity of semiconductors by four probe methods.
15. Determination of energy gap of a semiconductor using p-n junction diode.
16. Determination of temperature coefficients of a thermistor.
17. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.

TEXT BOOKS

College Customized Manual

REFERENCE BOOKS

ATextbookofPracticalPhysics-S.Balasubramanian,M.N.Srinivasan,S.Chand Publishers, 2017

WEB RESOURCES

1. https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype
2. www.vlab.co.in

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year I Semester

ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP

(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Engineering Science	**Course Code**	24EE101P
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites		**Continuous Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

PART-A: ELECTRICAL ENGINEERING WORKSHOP

COURSE OBJECTIVES
To impart knowledge on the fundamental laws & theorems of electrical circuits, functions of electrical machines and energy calculations.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Know the Electrical circuit design concepts; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer.	K2
CO2	Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.	K3
CO3	Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.	K3
CO4	Analyse various characteristics of electrical circuits, electrical machines and measuring instruments.	K4
CO5	Design suitable circuits and methodologies for the measurement of various electrical parameters; Household and commercial wiring.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	2	2	2	-	1	-	-	-	1	-	-	-
CO2	2	2	2	-	1	-	-	-	1	-	-	-
CO3	2	2	-	-	1	-	-	-	1	-	-	-
CO4	2	2	-	-	1	-	-	-	1	-	-	-
CO5	-	-	-	-	1	1	1	-	1	-	-	-

List of experiments:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Measurement of Three- phase power in Three-phase induction motor using two wattmeter method
5. Speed control of DC shunt motor
6. Measurement of Power and Power factor using Single-phase wattmeter
7. Measurement of Earth Resistance using Megger
8. Calculation of Electrical Energy for Domestic Premises

Reference Books:

1. Basic Electrical Engineering, D. C. Kulshreshtha, Tata McGraw Hill, 2019, First Edition
2. Power System Engineering, P.V. Gupta, M.L. Soni, U.S. Bhatnagar and A. Chakrabarti, DhanpatRai& Co, 2013
3. Fundamentals of Electrical Engineering, Rajendra Prasad, PHI publishers, 2014, Third Edition

Note: Minimum Six Experiments to be performed.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

PART B: ELECTRONICS ENGINEERING LABORATORY

COURSE OBJECTIVES
Toimpartknowledgeontheprinciplesofdigitalelectronicsandfundamentalsofelectrondevices& its applications.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO6	Identify & testing of various electronic components.	K3
CO7	Understand the usage of electronic measuring instruments.	K3
CO8	Plot and discuss the characteristics of various electron devices.	K3
CO9	Explain the operation of a digital circuit.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO6	2	2		2	2							
CO7	2	2		2	2							
CO8	2	2		2	2							
CO9	2	2		2	2							

List of experiments:

1. Introduction to Active and Passive devices must be experiment-1 (includes Resistors, Capacitors, Inductors, Diodes, Transistors, Power supplies, Ammeter(s), Voltmeter(s), necessary devices)
2. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
3. Plot V– I characteristics of Zener Diode and its application as voltage Regulator.
4. Determine ripple factor of full wave rectifier.
5. Plot Input & Output characteristics of BJT in CE and CB configurations.
6. Determining CE Amplifier input and output impedance with and without bypass capacitor.
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of S-R,J-K & D flip flops using respective ICs.

Tools / Equipment Required: DC Power supplies, Mult imeters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices. Multi sim /PSPICE software for Simulation.

References:

1. Robert.L.Boylestad&LouisNashelsky,ElectronicDevices&CircuitTheory,PearsonEducation, 2021.
2. R.P.Jain, Modern Digital Electronics, 4th Edition, Tata McGraw Hill,2009
3. R.T.Paynter,IntroductoryElectronicDevices&Circuits– ConventionalFlowVersion,PearsonEducation,2009.

Note: Minimum Six Experiments to be performed. All the experiments shall be implemented using both Hardware and Software.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year I Semester
COMPUTER PROGRAMMING LABORATORY
(Common to All Branches)

Course Category	Engineering Science	**Course Code**	24CS101P
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites		**Continuous Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES

The course aims to give students hands–on experience and train the month e concepts of the C-programming language.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Read, understand, and trace the execution of programs written in C language.	K3
CO2	Select the right control structure for solving the problem.	K3
CO3	Develop C programs which utilize memory efficiently using programming Constructs like pointers.	K3
CO4	Develop, Debug and Execute programs to demonstrate the Applications of arrays, functions, basic concepts of pointer sin C.	K5

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6-Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1– Low,2 -Medium, 3– High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3	3	1	-	-	-	-	-	-	-
CO2	3	3	3	3	1	-	-	-	-	-	-	-
CO3	3	3	3	3	1	-	-	-	-	-	-	-
CO4	3	3	3	3	1	-	-	-	-	-	-	-

COURSE CONTENT

WEEK 1
Objective: Getting familiar with the programming environment on the computer and writing the first program.
Suggested Experiments/Activities:
Tutorial 1 : Problem-solving using Computers.
Lab1: Familiarization with programming environment

i. Basic Linux environment and its editors likeVi,Vim & Emacsetc.
ii. Exposure to Turbo C, gcc
iii. Writing simple programs using printf(),scanf()

WEEK 2
Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.
Suggested Experiments/Activities:
Tutorial 2: Problem-solving using Algorithms and Flowcharts.
Lab 2: Converting algorithms /flowcharts into C Source code.
Developing the algorithms/flowcharts for the following sample programs

i) Sum and average of 3numbers
ii) Conversion of Fahrenheit to Celsius and vice versa
iii) Simple interest calculation

WEEK 3
Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.
Suggested Experiments/Activities:
Tutorial 3: Variable types and type conversions:
Lab3: Simple computational problems using arithmetic expressions.

i) Finding the square root of a given number
ii) Finding compound interest
iii) Area of a triangle using heron's formulae
iv) Distance travelled by an object

WEEK4
Objective : Explore the full scope of expressions, type-compatibility of variables & constants and operators used in the expression and how operator precedence works.
Suggested Experiments/Activities:
Tutorial 4: Operators and the precedence and as associatively:
Lab 4: Simple computational problems using the operator' precedence and associatively

i) Evaluate the following expressions.
   a. A+B*C+(D*E)+F*G
   b. A/B*C-B+A*D/3
   c. A+++B---A
   d. J=(i++)+(++i)
ii) Find the maximum of three numbers using conditional operator
iii) Takemarksof5subjectsinintegers, and find the total, average in float

WEEK5
Objective: Explore the full scope of different variants of "if construct" namely if-else, null- else, if-else if*-else, switch and nested-if including in what scenario each one of them can be used and how to use them. Explore all relational and logical operators while writing conditionals for "if construct".
Suggested Experiments/Activities:
Tutorial 5: Branching and logical expressions:
Lab 5: Problems involving if-then-else structures.

i) Write a C program to find them axandm in off our numbers using if-else.
ii) Write a C program to generate electricity bill.
iii) Find the roots of the quadratic equation.
iv) Write a C program to simulate a calculator using switch case.
v) Write a C program to find the given year is a leap year or not.

WEEK6

Objective : Explore the full scope of iterative constructs namely while loop, do-while loop and for loop in addition to structured jump constructs like break and continue including when each of these statements is more appropriate to use.

Suggested Experiments/Activities:

Tutorial 6: Loops, while and for loops

Lab 6: Iterativeproblemse.g.,the sum of series

i) Find the factorial of given number using any loop.
ii) Find the given number is a prime or not.
iii) Computes in e and cos series
iv) Checking a number palindrome
v) Construct a pyramid of numbers.

WEEK7

Objective: Explore the full scope of Arrays construct namely defining and initializing 1-D and 2-Dand more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-Darrays,explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7:1DArrays: searching.

Lab 7: 1D Array manipulation, linear search

i) Find the min and max of a1-D integer array.
ii) Perform linear search on 1 D array.
iii) There verse of a 1 D integer array
iv) Find 2's complement of the given binary number.
v) Eliminate duplicate elements in an array.

WEEK8

Objective: Explore the difference between other arrays and character arrays that can be used as Strings by using null character and get comfortable with string by doing experiments that will reverse a string and concatenate two strings. Explore sorting solution bubble sort using integer arrays.

Suggested Experiments/Activities:

Tutorial 8: 2 D arrays, sorting and Strings.

Lab8: Matrix problems, String operations, Bubble sort

i) Addition of two matrices
ii) Multiplication two matrices
iii) Sort array elements using bubble sort
iv) Concatenate two strings without built-in functions
v) Reverse a string using built-in and without built-in string functions

WEEK9

Objective: Explore pointers to manage a dynamic array of integers, including memory allocation & amp; value initialization, resizing changing and reordering the contents of an array and memory de-allocation using malloc (), calloc (), realloc () and free () functions. Gain experience processing command-line arguments received by C

Suggested Experiments/Activities:

Tutorial 9: Pointers, structures and dynamic memory allocation

Lab 9: Pointers and structures, memory dereference.

i) Write a C program to find the sum of a1Darrayusingmalloc()
ii) Write a C program to find the total, average of n students using structures
iii) Entern students data using calloc() and display failed students list
iv) Readstudentnameandmarksfromthecommandlineanddisplaythestudentdetailsalongwith the total.
v) Write a C program to implement realloc ()

WEEK10

Objective : Experiment with C Structures, Unions, bit fields and self-referential structures (Singly linked lists) and nested structures

Suggested Experiments/Activities:

Tutorial 10: Bit fields, Self-Referential Structures, Linked lists

Lab 10: Bit fields, linked lists

Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit-fields

i) Create and display a singly linked list using self-referential structure.
ii) Demonstrate the differences between structures and unions using a C program.
iii) Write a C program to shift/rotate using bit fields.
iv) Write a C program to copy one structure variable to another structure of the same type.

WEEK 11

Objective: Explore the Functions, sub-routines, scope and extent of variables, doing some experiments by parameter passing using call by value. Basic methods of numerical integration

Suggested Experiments/Activities:

Tutorial 11: Functions, call by value, scope and extent,

Lab 11: Simple functions using call by value, solving differential equations using Eulers theorem.

i) Write a C function to calculate NCR value.
ii) Write a C function to find the length of a string.
iii) Write a C function to transpose of a matrix.
iv) Write a C function to demonstrate numerical integration of differential equations using Euler's method

WEEK 12

Objective: Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

Suggested Experiments/Activities:

Tutorial 12: Recursion, the structure of recursive calls

Lab12: Recursive functions

i) Write a recursive function to generate Fibonacci series.
ii) Write a recursive function to find the lcm of two numbers.
iii) Write a recursive function to find the factorial of a number.
iv) Write a C Program to implement Ackermann function using recursion.
v) Write a recursive function to find the sum of series.

WEEK13

Objective: Explore the basic difference between normal and pointer variables, Arithmetic operations using pointers and passing variables to functions using pointers

Suggested Experiments/Activities:

Tutorial 13: Call by reference, dangling pointers

Lab 13: Simple functions using Call by reference, Dangling pointers.

i) Write a C program to swap two numbers using call by reference.
ii) Demonstrate Dangling pointer problem using a C program.
iii) Write a C program to copy one string into another using pointer.
iv) Write a C program to find no of lower case, uppercase, digits and other characters using pointers.

WEEK14

Objective : To understand data files and file handling with various file I/O functions. Explore the differences between text and binary files.

Suggested Experiments/Activities:

Tutorial 14: File handling

Lab 14: File operations

i) Write a C program to write and read text into a file.
ii) Write a C program to write and read text into a binary file usingf read() and f write()
iii) Copy the contents of one file to another file.
iv) Write a C program to merge two files into the third file using command-line arguments.
v) Find no.of lines, words and characters in a file
vi) Write a C program to print last n characters of a given file.

TEXT BOOKS

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. Byron Gottfried, Schaum 's Outline of Programming with C, McGrawHill

REFERENCEBOOKS

1. Brian W.Kernighan and Dennis M.Ritchie, The C Programming Language, Prentice-Hall of India
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

WEB RESOURCES

1. https://www.researchgate.net/publication/322908864_C_Programming_Lab_Manual
2. https://www.javatpoint.com/c-programs

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year I Semester
IT WORKSHOP
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Engineering Science	**Course Code**	24IT101P
Course Type	Laboratory	**L-T-P-C**	0-0-2-1
Prerequisites		**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES

1. To introduce the internal parts of a computer, peripherals, I/O ports, connecting cables.
2. To demonstrate configuring the system as Dual boot both Windows and other Operating Systems Viz. Linux, BOSS.
3. To teach basic command line interface commands on Linux.
4. To teach the usage of Internet for productivity and self-paced life-long learning.
5. To introduce Compression, Multimedia and Antivirus tools and Office Tools such as Word processors, Spread sheets and Presentation tools.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Perform Hardware trouble shooting.	K3
CO2	Understand Hardware components and inter dependencies.	K3
CO3	Safe guard computer systems from viruses/worms.	K3
CO4	Document/ Presentation preparation.	K3
CO5	Perform calculations using spreadsheets.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	-	-	1	-	-	-	-	-	-	-
CO2	3	3	-	-	1	-	-	-	-	-	-	-
CO3	2	2	-	-	2	2	1	2	-	-	-	-
CO4	1	-	-	-	3	1	-	-	-	2	-	-
CO5	2	-	-	-	3	1	-	-	-	-	-	-

COURSE CONTENT

PC Hardware & **Software Installation**

Task 1: Identify the peripherals of a computer, components in a CPU and its functions. Draw the block diagram of the CPU along with the configuration of each peripheral and submit to your instructor.

Task2: Every student should disassemble and assemble the PC back to working condition. Lab instructors should verify the work and follow it up with a Viva. Also students need to go through the video which shows the process of assembling a PC. A video would be given as part of the course content.

Task 3: Every student should individually install MS windows, Linux / BOSS on the personal computer. This computer should have windows installed. The system should be configured as dual boot (VM Ware) with both Windows and Linux / BOSS Lab instructor should verify the installation and follow it up with a Viva.

Internet & World Wide Web

Task1: Orientation & Connectivity Boot Camp: Students should get connected to their Local Area Network and access the Internet. In the process they configure the TCP/IP setting. Finally students should demonstrate, to the instructor, how to access the websites and email. If there is no internet connectivity preparations need to be made by the instructors to simulate the WWW on the LAN.

Task2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, book marks, search toolbars and popup blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task3: Search Engines & Net iquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

Task 4: Cyber Hygiene: Students would be exposed to the various threats on the internet and would be asked to configure their computer to be safe on the internet. They need to customize their browsers to block popup, lock active x downloads to avoid viruses and/or worms.

WORD

Task 1: Word Orientation: The mentor needs to give an overview of Microsoft (MS) office or equivalent (FOSS) tool word : Importance of MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using word–Accessing, over view of tool bars, saving files, Using help and resources, rulers, format painter in word.

Task 2: Using Word to create a project certificate. Features to be covered:-Formatting Fonts in word, Drop Cap in word, Applying Text effects, Using Character Spacing, Borders and Colors, Inserting Header and Footer, Using Date and Time option in Word.

Task 3: Creating project abstract Features to be covered:-Formatting Styles, Inserting table, Bullets and Numbering, Changing Text Direction, Cell alignment, Foot note, Hyperlink, Symbols, Spell Check, Track Changes.

Task4: Creating a Newsletter: Features to be covered:-Table of Content, News paper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Text boxes, Paragraphs and Mail Merge in word.

EXCEL

Excel Orientation: The mentor needs to tell the importance of MS office or equivalent (FOSS) tool Excel as a Spreadsheet tool, give the details of the four tasks and features that would be covered in each. Using Excel–Accessing, overview of tool bars, saving excel files, Using help and resources.

Task 1: Creating a Scheduler - Features to be covered: Gridlines, Format Cells, Summation, auto fill, Formatting Text.

Task 2: Calculating GPA -. Features to be covered:- Cell Referencing, Formulae in excel –average, std. deviation, Charts, Renaming and Inserting worksheets, Hyper linking, Count function.

POWERPOINT

Task 1: Students will be working on basic power point utilities and tools which help them create basic power point presentations. PPT Orientation, Slide Layouts, Inserting Text, WordArt, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in Power Point.

Task 2: Interactive presentations - Hyperlinks, Inserting –Images, Clip Art, Audio, Video, Objects, Tables and Charts.

Task 3: Master Layouts (slide, template, and notes), Types of views (basic, presentation, slide slotter, notes etc), and Inserting– Back ground, textures, Design Templates, Hidden slides.

AI TOOLS –ChatGPT

Task1: Prompt Engineering: Experiment with different types of prompts to see how the model responds. Try asking questions, starting conversations, or even providing incomplete sentences to see how the model completes them.

- Ex: Prompt: "You are acknowledgeable AI. Please answer the following question: What is the capital of France?"

Task2: Creative Writing: Use the model as a writing assistant. Provide the beginning of a story or a description of a scene, and let the model generate the rest of the content. This can be a fun way to brainstorm creative ideas

- Ex: Prompt: "In a world where gravity suddenly stopped working, people started floating upwards. Write a story about how society adapted to this new reality."

Task 3: Language Translation: Experiment with translation tasks by providing a sentence in one language and asking the model to translate it into another language. Compare the output to see how accurate and fluent the translations are.

- Ex: Prompt: "Translate the following English sentence to French: 'Hello, how are you doing today?'"

Reference Books:

1. Comdex Information Technology course toolkit, Vikas Gupta, WILEY Dreamtech,2--3.
2. The Complete Computer upgrade and repair book, Chery lAS chmidt, WILEY Dreamtech, 2-13, 3rd edition.
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2-12, 2nd edition.
4. PC Hardware- A Handbook, Kate J.Chase, PHI (Microsoft).
5. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme.– CISCO Press, Pearson Education,3rd edition.
6. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition.

Web References:

1. PC Hardware & Software Installation: Peripheral Devices: Computer Peripherals - Wikipedia
   Components in a CPU: CPU Components and Their Functions - Guru99
2. Internet & World Wide Web: TCP/IP and Networking Basics: TCP/IP Explained - Lifewire
   Internet Browsing and Configuration: How Web Browsing Works - HowStuffWorks
3. Word: Microsoft Word Tutorials: Microsoft Word Basics - GCFGlobal
4. Excel: Excel Tutorial and Functions: Excel Tutorial - Microsoft
5. AI Tools - ChatGPT: GPT-3.5 and ChatGPT Information: GPT-3.5 Guide - OpenAI

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year I Semester
NSS / NCC / SCOUTS AND GUIDES / COMMUNITY SERVICE
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Humanities	**Course Code**	24MH102P
Course Type	Theory	**L-T-P-C**	0-0-1-0.5
Prerequisites		**Continuous Evaluation** **Viva Voce** **Total Marks**	90 10 100

COURSE OBJECTIVES
Theobjectiveofintroducingthiscourseistoimpartdiscipline,character,fraternity,teamwork, socialconsciousnessamongthestudentsandengagingtheminselflessservice.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		
CO1	Understand the importance of discipline, character and service motto.	
CO2	Solvesomesocietalissuesbyapplyingacquiredknowledge,facts,andtechniques.	
CO3	Explore human relationships by analyzing social problems.	
CO4	Determine to extend their help for the fellow beings and downtrodden people.	
CO5	Develop leadership skills and civic responsibilities.	

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3		1	1			3
CO2						3		1				3
CO3						3			1	1		3
CO4						3		1				3
CO5						3	3	1	1	1		3

COURSE CONTENT

UNIT – I - Orientation

General Orientation on NSS/NCC/ Scouts & Guides/Community Service activities, career guidance.

Activities:

i) Conducting ice breaking sessions-expectations from the course-knowing personal talents and skills
ii) Conducting orientations programs for the students future plans-activities-releasing road map etc.
iii) Displaying success stories-motivational biopics- award winning movies on societal issues etc.
iv) Conductingtalentshowinsingingpatrioticsongs-paintings-anyothercontribution.

UNIT – II - Nature &Care

Activities:

i) Best out of waste competition.
ii) Poster and signs making competition to spread environmental awareness.
iii) Recycling and environmental pollution article writing competition.
iv) Organising Zero-waste day.
v) Digital Environmental awareness activity via various social media platforms.
vi) Virtual demonstration of different eco-friendly approaches for sustainable living.
vii) Write a summary on any book related to environmental issues.

UNIT – III - Community Service

Activities:

i) Conducting One Day Special Camp in a village contacting village- are a leaders-Survey in the village, identification of problems-helping them to solve via media-authorities- experts-etc.
ii) Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
iii) Conducting consumer Awareness. Explaining various legal provisions etc.
iv) Women Empowerment Programmes-Sexual Abuse, Adolescent Health and Population Education.
v) Any other programmes in collaboration with local charities, NGOs etc.

Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, A Text Book of National Service Scheme Vol;.I, Vidya Kutir Publication, 2021 (ISBN 978-81-952368-8-6)
2. Red Book - National Cadet Corps Standing Instructions Vol I & II, Directorate General of NCC, Ministry of Defense, NewDelhi
3. Davis M. L. and cornwell D. A., "Introduction to Environmental Engineering", McGraw Hill, New York 4/e 2008
4. Masters G. M. Joseph K. and Nagendran R. "Introduction to Environmental Engineering and Science", Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

General Guidelines:

1. Institutes must assign slots in the Timetable for the activities.
2. Institutes are required to provide instructor to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit.Eachactivityshallbeevaluatedbytheconcernedteacherfor15marks, totaling to 90marks.
- Astudentshallbeevaluatedbytheconcernedteacherfor10marksbyconductingviva voce on the subject.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year II Semester
COMMUNICATIVE ENGLISH
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Humanities	**Course Code**	24BE201T
Course Type	Theory	**L-T-P-C**	2-0-0-2
Prerequisites	LSRW Skills.	**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	The main objective of introducing this course, Communicative English, is to facilitate effective listening, Reading, Speaking and Writing skills among the students.
2	It enhances the same in their comprehending abilities, oral presentations, reporting useful information and providing knowledge of grammatical structures and vocabulary.
3	This course helps the students to make them effective in speaking and writing skills and to make them industry ready.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the context, topic, and pieces of specific information from social or Transactional dialogues.	K2
CO2	Apply grammatical structures to formulate sentences and correct word forms.	K3
CO3	Analyze discourse markers to speak clearly on a specific topic in informal discussions.	K4
CO4	Evaluate reading/listening texts and to write summaries based on glob	K5
CO5	Create a coherent paragraph, essay, and resume.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	2	-	-
CO3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-

COURSE CONTENT

UNIT I
Lesson: HUMAN VALUES: Gift of Magi (Short Story)
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.
Writing: Mechanics of Writing- Capitalization, Spellings, Punctuation-Parts of Sentences.
Grammar: Parts of Speech, Basic Sentence Structures- forming questions.
Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

UNIT II
Lesson: NATURE: The Brook by Alfred Tennyson (Poem)
Listening: Answering a series of questions about main ideas and supporting ideas after listening to audio texts.
Speaking: Discussion in pairs/ small groups on specific topics followed by short structure talks.
Reading: Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.
Writing: Structure of a paragraph - Paragraph writing (specific topics)
Grammar: Cohesive devices – linkers, use of articles and zero article; Prepositions.
Vocabulary: Homonyms ,Homophones, Homographs.

UNIT III
Lesson: BIOGRAPHY: ElonMusk
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, Note-making, paraphrasing.
Grammar: Verbs-tenses; subject-verb agreement; Compound words, Collocations.
Vocabulary: Compound words, Collocations.

UNIT IV
Lesson: INSPIRATION: The Toys o f Peace by Saki
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, Resumes
Grammar: Reporting verbs, Direct & Indirect speech, Active & Passive Voice
Vocabulary : Words often confused, Jargons.

UNIT V

Lesson: MOTIVATION : The Power of Intrapersonal Communication (An Essay)

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.

Reading: Reading comprehension.

Writing: Writing structured essays on specific topics.

Grammar: Editing short texts – identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)

Vocabulary : Technical Jargons.

TEXT BOOKS

1. Path finder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023. (Units1,2 & 3)
2. Empowering with Language by Cengage Publications, 2023(Units4 &5).

REFERENCE BOOKS

1. Dubey, ShamJi & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press,2019.
4. Lewis, Norman. Word Power Made Easy- The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

WEB RESOURCES

1. www.bbc.co.uk/learningenglish
2. https://dictionary.cambridge.org/grammar/british-grammar/
3. www.eslpod.com/index.html
4. https://www.learngrammar.net/
5. https://english4today.com/english-grammar-online-with-quizzes/
6. https://www.talkenglish.com/grammar/grammar.aspx

VOCABULARY

1. https://www.youtube.com/c/DailyVideoVocabulary/videos
2. https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year II Semester
DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to All Branches)

Course Category	Basic Sciences	**Course Code**	24BM201T
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Differentiation, Integration and Partial Differentiation. Differential Equations (Variable Separable)	**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To enlighten the learners in the concept of differential equations and multi variable calculus
2	To familiarize the students with the foundations of line, surface and volume integrals.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Solve the first order differential equations related to various engineering fields.	K3
CO2	Solve the higher order differential equations to various engineering fields.	K3
CO3	Identify solution methods for partial differential equations that model physical processes.	K3
CO4	Interpret the physical meaning of different operators such as gradient, curl and divergence.	K3
CO5	Estimate the work done against a field, circulation and flux using vector calculus.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

COURSE CONTENT

UNIT I
Differential equations of first order and first degree:
Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. **Applications**: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

UNIT II
Linear differential equations of higher order (Constant Coefficients):
Definitions, homogenous and non-homogenous differential equations, complimentary function, particular integral, general solution, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

UNIT III
Partial Differential Equations:
Introduction and formation of Partial Differential Equations by elimination of arbitrary constants and arbitrary functions, solutions of first order linear equations using Lagrange's method. Homogeneous Linear Partial differential equations with constant coefficients

UNIT IV
Vector differentiation:
Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient and applications, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

UNIT V
Vector integration:
Line integral-circulation-work done by the force, Scalar potential, surface integral-flux, Green's theorem in a plane (without proof), Stoke's theorem (without proof), volume integral, Divergence theorem (without proof) and related problems.

TEXT BOOKS

1. Higher Engineering Mathematics, B. S. Grewal, Khanna Publishers, 2017, 44th Edition
2. Advanced Engineering Mathematics, Erwin Kreyszig, John Wiley & Sons, 2018, 10th Edition.

REFERENCE BOOKS

1. Thomas Calculus, George B.Thomas, Maurice D.Weir and JoelHass, Pearson Publishers,2018, 14th Edition.
2. Advanced Engineering Mathematics, DennisG.Zill andWarrenS.Wright, Jones and Bartlett,2018.
3. Advanced Modern Engineering Mathematics,GlynJames, Pearson publishers, 2018,5th Edition.
4. Advanced Engineering Mathematics, R.K.Jain and S.R.K.Iyengar, Alpha Science International Ltd., 2021 5the Edition (9th reprint)
5. Higher Engineering Mathematics, B.V.Ramana,, McGraw HillEducation,2017
6. Advanced Engineering Mathematics by H. K Dass, S. ChandPublications,2022, 22nd Edition(Reprint 2022).

WEB RESOURCES

1. https://mathworld.wolfram.com/First-OrderOrdinaryDifferentialEquation.html
2. https://en.wikipedia.org/wiki/Differential_equation
3. https://en.wikipedia.org/wiki/Partial_differential_equation
4. https://en.wikipedia.org/wiki/Vector_calculus
5. https://en.wikipedia.org/wiki/Vector_calculus

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year II Semester
CHEMISTRY
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Basic Sciences	**Course Code**	24BC201T
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To familiarize chemistry and its applications
2	To train the students on the principles and applications of electrochemistry and polymers
3	To introduce instrumental methods and to explain the Green Principles and applications

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	To introduce the quantum mechanical concepts of measurements for physical systems	K2
CO2	Apply the principle of Band diagrams in the application of conductors and semiconductors	K2
CO3	Compare the materials of construction for battery and electrochemical sensors	K2
CO4	Explain the preparation, properties, and applications of thermoplastics & Thermosetting & elastomers conducting polymers.	K3
CO5	Summarize the concepts of Instrumental methods.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	1	2	2	2		2	2	1	1	2	2
CO2	2	2	1			1	1				1	
CO3	1	1		1	2				2		2	1
CO4	2	2		1			1			2		1
CO5	1	1	1				1				2	1

COURSE CONTENT

UNIT -I

Structure and Bonding Models:

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2.Molecular orbital theory – bonding in homo- and hetero nuclear diatomic molecules – energy level diagrams of O2 and CO, etc. π-molecular orbital of benzene, calculation of bond order.

UNIT - II

Modern Engineering materials

Semiconductors – Introduction, types and applications.

Super Conductors-Introduction, types and applications.

Super capacitors: Introduction, Classification–Applications.

Nano materials: Introduction, classification, properties and applications of Fullerenes, Carbon Nano tubes- Arc-Discharge & Chemical Vapour deposition method and Graphines Nano particles.

UNIT - III

Electrochemistry and Applications

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry-potentiometric titrations (red ox titrations), concept of conductivity, conductivity cell, conduct metric titrations (acid-base titrations).

potentiometric sensors with examples. Reference electrodes: Normal Hydrogen Electrode(NHE) and Calomel Electrode. Primary cells – Zinc-air battery, Secondary cells –lithium-ion batteries- working of the batteries including cell reactions; Fuel cells- hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC)

UNIT - IV

Polymer Chemistry

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation. Free radical, Cationic and Anionic Mechanisms.

Plastics –Thermo and Thermosetting plastics, Preparation, properties and applications of

– PVC, Teflon, Bakelite, Nylon-6,6, Urea-Formaldehyde resin. Elastomers –Buna-S, Buna-N–preparation, properties and applications.

Conducting polymers – Types, Polyacetylene, – Mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

UNIT -V

Instrumental Methods its Applications and **Non-conventional energy sources and Green Chemistry**

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV Visible Spectroscopy electronic transition, Instrumentation, IR spectroscopy, fundamental modes and selection rules, Chromatography-Basic Principles,

Non-conventional energy sources: Solar energy- introduction to PV cell / Solar cell- construction, working and applications. Hydro power plant and Geo-thermal energy.

Green chemistry: Principles and applications.

TEXT BOOKS

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.

REFERENCE BOOKS

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson,2007.
2. J.D.Lee, Concise In organic Chemistry, 5th Edition, Wiley Publications, Feb.2008
3. Text book of Polymer Science, Fred W.Bill mayer Jr,3rd Edition

WEB RESOURCES

UNIT -I

Structure and BondingModels:https://archive.nptel.ac.in/courses/104/106/104106096/

UNIT - II

Modern Engineering materials :https://nptel.ac.in/courses/118104008

UNIT - III

Electrochemistry and Applications:https://archive.nptel.ac.in/courses/113/105/113105102/

UNIT – IV -

Polymer Chemistry :https://archive.nptel.ac.in/courses/104/105/104105124/

UNIT -V

Instrumental Methods & Applications:https://onlinecourses.nptel.ac.in/noc22_cy45/preview

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year II Semester
BASIC CIVIL AND MECHANICAL ENGINEERING
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Engineering Science	**Course Code**	24CM201T
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

PART-A : BASIC CIVIL ENGINEERING

COURSE OBJECTIVES	
1	Get familiarized with the scope and importance of Civil Engineering sub-divisions
2	Introduce the preliminary concepts of surveying.
3	Acquire preliminary knowledge on Transportation and its importance in nation's economy.
4	Get familiarized with the importance of quality, conveyance and storage of water.
5	Introduction to basic civil engineering materials and construction techniques.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Enlist various basic characteristics and sub-divisions of Civil Engineering, pre-fabricated materials and technology to appreciate their role in ensuring better society.	K2
CO2	Illustrate the concepts of surveying and basics of Foundation Engineering.	K3
CO3	Know the significance of various domains in transportation engineering and be acquitted with types of pavements. Get an overview about Environmental Engineering and Water Resource Engineering.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	2	-	-	-	-	-	-	-	-	-	-	-
CO2	1	1	-	-	-	-	-	-	-	-	-	1
CO3	1	1	1	-	-	2	-	-	1	-	-	1

COURSE CONTENT

UNIT I

Basics of Civil Engineering: Role of Civil Engineers in Society- Various Disciplines of Civil Engineering- Structural Engineering- Geo-technical Engineering- Transportation Engineering -Hydraulics and Water Resources Engineering - Environmental Engineering-Scope of each discipline - Building Construction and Planning- Construction Materials-Cement- Aggregate -Bricks-Stones-Sand-Cement Concrete-Steel-Timber. Introduction to Prefabricated construction Techniques.

UNIT II

Surveying : Objectives of Surveying- Horizontal Measurements- Angular MeasurementsIntroduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.
Foundations: Types of foundations — Bearing capacity and settlement — Requirement of good foundations.

UNIT III

Transportation Engineering: Importance of Transportation in Nation's economic development- Types of Highway Pavements- Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering.
Water Resources and Environmental Engineering: Introduction, Sources of water- Quality of water- Specifications- Introduction to Hydrology–Rainwater Harvesting-Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

TEXT BOOKS

1. Basic Civil Engineering, M.S.Palanisamy, Tata Mcgraw Hill publications (India) Pvt. Ltd. Fourth Edition.
2. Introduction to Civil Engineering, S.S. Bhavikatti, New Age International Publishers. 2022. First Edition.
3. Basic Civil Engineering, SatheeshGopi, Pearson Publications, 2009, First Edition.

REFERENCE BOOKS

1. Surveying, Vol- I and Vol-II, S.K. Duggal, Tata McGraw Hill Publishers 2019. Fifth Edition.
2. Hydrology and Water Resources Engineering, Santosh Kumar Garg, Khanna Publishers, Delhi. 2016
3. Irrigation Engineering and Hydraulic Structures - Santosh Kumar Garg, Khanna Publishers, Delhi 2023. 38th Edition.
4. Highway Engineering, S.K.Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10th Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

WEB RESOURCES

1. https://nptel.ac.in/courses/105101087
2. https://nptel.ac.in/courses/105104101
3. https://nptel.ac.in/courses/105104103

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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R23

PART – B: BASIC MECHANICAL ENGINEERING

COURSE OBJECTIVES	
1	Get familiarized with the scope and importance of Mechanical Engineering in different sectors and industries.
2	Explain different engineering materials and different manufacturing processes.
3	Provide an overview of different thermal and mechanical transmission systems and introduce basics of robotics and its applications.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the different manufacturing processes.	K2
CO2	Explain the basics of thermal engineering and its applications.	K3
CO3	Describe the working of different mechanical power transmission systems, power plants and basics of robotics and its applications.	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)												
CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	-	-	-	-	-	-	-	-	-	2	-
CO2	3	-	-	-	-	-	-	-	-	-	2	-
CO3	3	-	-	-	-	-	-	-	-	-	2	-

COURSE CONTENT

UNIT –I -

Introduction to Mechanical Engineering: Role of Mechanical Engineering in Industries and Society- Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Engineering Materials - Metals-Ferrous and Non-ferrous, Ceramics, Composites, Smart materials.

UNIT - II

Manufacturing Processes: Principles of Casting**,** Forming, joining processes, Machining, Introduction to CNC machines, 3D printing, and Smart manufacturing.

Thermal Engineering – working principle of Boilers, Otto cycle, Diesel cycle, Refrigeration and air-conditioning cycles, IC engines, 2-Stroke and 4-Stroke engines, SI/CI Engines, Components of Electric and Hybrid Vehicles.

UNIT - III

Power plants – working principle of Steam, Diesel, Hydro, Nuclear power plants.

Mechanical Power Transmission - Belt Drives, Chain, Rope drives, Gear Drives and their applications.

Introduction to Robotics - Joints & links, configurations, and applications of robotics.

(Note: The subject covers only the basic principles of Civil and Mechanical Engineering systems. The evaluation shall be intended to test only the fundamentals of the subject)

Textbooks:

1. Internal Combustion Engines by V.Ganesan, By Tata McGraw Hill publications (India) Pvt. Ltd.
2. A Tear book of Theory of Machines by S.S. Rattan, Tata McGraw Hill Publications, (India) Pvt. Ltd.
3. An introduction to Mechanical Engg by Jonathan Wicker and Kemper Lewis, Cengage learning India Pvt. Ltd.

Reference Books:

1. Appuu Kuttan KK, Robotics, I.K. International Publishing House Pvt. Ltd. Volume-I.
2. 3D printing & Additive Manufacturing Technology- L. Jyothish Kumar, Pulak M Pandey, Springer publications.
3. Thermal Engineering by Mahesh M Rathore Tata McGraw Hill publications (India) Pvt. Ltd.
4. G. Shanmugam and M.S.Palanisamy, Basic Civil and the Mechanical Engineering, Tata McGraw Hill publications (India) Pvt. Ltd.

Web References:

1. https://ocw.mit.edu/courses/2-000-how-and-why-machines-work-spring-2002/
2. https://ocw.mit.edu/courses/2-008-design-and-manufacturing-ii-spring-2004/
3. https://ocw.mit.edu/courses/2-12-introduction-to-robotics-fall-2005/

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year II Semester
DATASTRUCTURES
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Professional Core	**Course Code**	24CS201T
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites		**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSEOBJECTIVES	
1	To provide the knowledge of basic data structures and their implementations.
2	To understand importance of data structures in context of writing efficient programs.
3	To develop skills to apply appropriate data structures in problem solving.

COURSEOUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Explaintheroleoflineardatastructuresinorganizingandaccessingdataefficiently In algorithms.	K2
CO2	Design,implement,andapplylinkedlistsfordynamicdatastorage,demonstrating understanding of memory allocation	K5
CO3	Developprogramsusingstackstohandlerecursivealgorithms,manageprogram states, and solve related problems.	K3
CO4	Applyqueue-basedalgorithmsforefficienttaskschedulingandbreadth-first traversal in graphs and distinguish between deques and priority queues, and apply them appropriately to solve data management challenges	K3
CO5	Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees, Graphs	K5

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6-Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1– Low, 2 -Medium, 3– High)

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	2	2	1	1	-	-	-	-	-	-
CO2	2	3	1	1	1	-	-	-	-	-	-	-
CO3	2	3	1	2	1	-	-	-	-	-	-	-
CO4	2	3	1	1	1	-	-	-	-	-	-	-
CO5	3	3	1	1	1	-	-	-	-	-	-	-

COURSE CONTENT

UNIT -I

Introduction to Linear Data Structures: Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures. Searching Techniques: Linear & Binary Search, Sorting Techniques : Bubble sort, Selection sort, Insertion sort, Quick and Merge sort.

UNIT -II

Linked Lists: Singly linked lists: representation and operations, doubly linked lists and circular linked lists, Comparing arrays and linked lists, Applications of linked lists.

UNIT -III

Stacks: Introduction to stacks: properties and operations, implementing stacks using arrays and linked lists, Applications of stacks in expression evaluation, back tracking, reversing list etc.

UNIT -IV

Queues: Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.
Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.

UNIT -V

Trees: Introduction to Trees, Binary Search Tree– Insertion, Deletion &Traversal
Hashing: Brief introduction to hashing and hash functions, Collision resolution techniques: chaining and open addressing, Hash tables: basic implementation and operations, Applications of hashing in unique identifier generation, caching, etc.
Graphs: Introduction, Graph Representation, Traversal techniques

TEXTBOOKS

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.2020
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2nd Edition ,2014

REFERENCEBOOKS

1. Algorithms and Data Structures : The Basic Tool box by Kurt Mehlhorn and Peter Sanders.
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D.Ullman, and JohnE. Hopcroft.
3. Problem Solving with Algorithms and Data Structures "by Brad Miller and David Ranum.
4. Introduction to Algorithms by Thomas H.Cormen, Charles E.Leiserson, Ronald L.Rivest and Clifford Stein. 3rd Edition 2009
5. Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick.

WEB RESOURCES

1. https://faculty.washington.edu/jstraub/dsa/Master_2_7a.pdf
2. https://www.geeksforgeeks.org/data-structures/

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

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I Year II Semester
ENGINEERING WORKSHOP
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Engineering Science	**Course Code**	24ME203P
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites		**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES
To familiarize students with wood working, sheet metal operations, fitting and electrical house wiring skills

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Identify workshop tools and their operational capabilities.	K2
CO2	Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.	K3
CO3	Apply knowledge in preparation of pipe joints and practice of Plumbing tools.	K3
CO4	Apply basic electrical engineering knowledge for House Wiring Practice	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	-	3	1	3	-	-	-	-	3	-	-
CO2	3	-	3	1	3	-	-	-	-	3	-	-
CO3	3	-	3	1	3	-	-	-	-	3	-	-
CO4	3	-	3	1	3	-	-	-	-	3	-	-

COURSE CONTENT

1.**Demonstration**: Safety practices and precautions to be observed in workshop.

2. **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

3. **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

4. **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 tire puncture and change of two-wheeler tire

5. **Electrical Wiring**: Familiarity 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

6. **Foundry Trade:** Demonstration and practice on Moulding tools and processes, Preparation of Green Sand Moulds for given Patterns.

7. **Welding Shop**: Demonstration and practice on Arc Welding and Gas welding. Preparation of Lap joint and Butt joint.

8. **Plumbing:** Demonstration and practice of Plumbing tools, Preparation of Pipe joints with coupling for same diameter and with reducer for different diameters.
Note: Minimum of 12 Experiments to be conducted from the above covering all the trades.

Textbooks:

1. Basic Workshop Technology: Manufacturing Process, Felix W.; Independently Published,2019. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
2. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, DhanpathRai& Co., 2015 & 2017.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. HajraChoudhury& Others, Media Promoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. &Upadhyay P.A.; AtulPrakashan, 2021-22.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year II Semester
COMMUNICATIVE ENGLISH LABORATORY
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Humanities	**Course Code**	24BE201P
Course Type	Laboratory	**L-T-P-C**	0-0-2-1
Prerequisites	LSRW Skills	**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	The main objective of introducing this course, Communicative English Laboratory, is to expose the students to a variety of self-instructional, learner friendly modes of language learning.
2	The students will get trained in basic communication skills and also make them ready to face job interviews.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the different aspects of the English language proficiency with emphasis on LSRW skills.	K2
CO2	Apply communication skills through various language learning activities.	K3
CO3	Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.	K4
CO4	Evaluate and exhibit professionalism in participating in debates and group discussions.	K5
CO5	Able to present ideas effectively and manage interviews confidently.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	-	-	-	-	-	-	-	-	-	3	-	-
CO2	-	-	-	-	-	-	-	-	-	3	-	-
CO3	-	-	-	-	-	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-	-	2	-	-
CO5	-	-	-	-	-	-	-	-	-	2	-	-

COURSE CONTENT

UNIT - I
Vowels & Consonants.
Neutralization/Accent Rules.

UNIT - II
Communication Skills & JAM.
Role Play or Conversational Practice.

UNIT - III
E-mail Writing.
Resume Writing, Cover letter, SOP.

UNIT - IV
Group Discussions-methods & practice.
Debates-Methods &Practice.

UNIT - V
PPT Presentations/ Poster Presentation.
Interviews Skills.

Laboratory Manual Lab Book

1. Strengthen Your Steps: A Multi-Model Course in Communication Skills published by Maruti Publications

REFERENCE BOOKS

1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press.2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw- Hill Education India,2016
3. Hewing's, Martin. Cambridge Academic English (B2).CUP,2012.
4. J.Sethi & P.V.Dhamija. A Course in Phonetics and Spoken English,(2nd Ed),Kindle, 2013

WEB RESOURCES

Spoken English:

1. www.esl-lab.com
2. www.englishmedialab.com
3. www.englishinteractive.net
4. https://www.britishcouncil.in/english/online
5. http://www.letstalkpodcast.com/
6. https://www.youtube.com/c/mmmEnglish_Emma/featured
7. https://www.youtube.com/c/ArnelsEverydayEnglish/featured
8. https://www.youtube.com/c/engvidAdam/featured
9. https://www.youtube.com/c/EnglishClass101/featured
10. https://www.youtube.com/c/SpeakEnglishWithTiffani/playlists
11. https://www.youtube.com/channel/UCV1h_cBE0Drdx19qkTM0WNw

Voice & Accent:

1. https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA

Suggested Software:

1. Walden Infotech
2. Young India Films

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R23

I Year II Semester
DATASTRUCTURESLABORATORY
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Professional Core	**Course Code**	24CS201P
Course Type	Laboratory	**L-T-P-C**	0-0-3-1.5
Prerequisites		**Continuous Internal Assessment**	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES

The course aims to strengthen the ability of the students to identify and apply the suitable data structure for the given real-world problem. It enables them to gain knowledge in practical applications of data structures

COURSEOUTCOMES

Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.	K3
CO2	Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.	K3
CO3	Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.	K3
CO4	Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between deques and priority queues and apply them appropriately to solve data management challenges.	K3
CO5	Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.	K4

K1-Remembering,K2-Understanding,K3-Applying,K4-Analyzing,K5-Evaluating,K6-Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1– Low,2 -Medium, 3– High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	2	1	1	-	-	-	-	-	-
CO2	2	3	1	2	1	-	-	-	-	-	-	-
CO3	2	3	1	1	1	-	-	-	-	-	-	-
CO4	3	3	2	2	1	-	-	-	-	-	-	-
CO5	2	3	1	2	1	-	-	-	-	-	-	-

COURSE CONTENT

Exercise1:Array Manipulation

i) Write a program to reverse an array.
ii) C Programs to implement the Searching Techniques– Linear & Binary Search
iii) C Programs to implement Sorting Techniques–Bubble, Selection and Insertion Sort

Exercise2:Linked List Implementation

i) Implement a singly linked list and perform insertion and deletion operations.
ii) Develop a program to reverse a linked list iteratively and recursively.
iii) Solve problems involving linked list traversal and manipulation.

Exercise3:Linked List Applications

i) Create a program to detect and remove duplicates from a linked list.
ii) Implement a linked list to represent polynomials and perform addition.
iii) Implement a double- ended queue (deque) with essential operations.

Exercise4:Double Linked List Implementation

i) Implement a doubly linked list and perform various operations to understand its properties and applications.
ii) Implement a circular linked list and perform insertion, deletion, and traversal.

Exercise5:Stack Operations

i) Implement a stack using arrays and linked lists.
ii) Write a program to evaluate a post fix expression using a stack.
iii) Implement a program to check for balanced parentheses using a stack.

Exercise6:Queue Operations

i) Implement a queue using arrays and linked lists.
ii) Develop a program to simulate a simple printer queue system.
iii) Solve problems involving circular queues.

Exercise7:Stack and Queue Applications

i) Use a stack to evaluate an in fix expression and convert it to post fix.
ii) Create a program to determine whether a given string is a palindrome or not.
iii) Implement a stack or queue to perform comparison and check for symmetry.

Exercise8:Binary Search Tree

i) Implementing a BST using Linked List.
ii) Traversing of BST.

Exercise9:Hashing

i) Implement a hash table with collision resolution techniques.
ii) Write a program to implement a simple cache using hashing.

TEXTBOOKS

1. Data Structures and algorithm analysis in C, Mark AllenWeiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed, Silicon Press, 2008

REFERENCEBOOKS

1. Algorithms and Data Structures: The Basic Tool box by Kurt Mehlhorn and Peter Sanders
2. C Data Structures and Algorithms by Alfred V.Aho, Jeffrey D.Ullman, and John E.Hopcroft

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year II Semester
CHEMISTRY LABORATORY
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Basic Sciences	**Course Code**	24BC201P
Course Type	Laboratory	**L-T-P-C**	0-0-2-1
Prerequisites		**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES
Verify the fundamental concepts with experiments.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Determine the cell constant and conductance of solutions.	K3
CO2	Prepare advanced polymer Bakelite materials.	K2
CO3	Estimate the given amount of dissolved compounds in a solution by using volumetric analysis and preparation of Nano particles	K3
CO4	Analyze the IR spectra of some organic compounds.	K4
CO5	Determine the concentration of different metal ions present in water by complex metric titrations.	K2

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3						2				
CO2	2	3	2					2				
CO3	2	3	3	2				2				
CO4	2	2	2	1				2				
CO5	2	2	2					2				

List of Experiments:

1. Determination of Hardness of a groundwater sample
2. Conduct metric titration of strong acid vs. strong base
3. Conduct metric titration of weak acid vs. strong base
4. Preparation of Nano particles. (Cu/Zn)
5. Determination of Vitamin-C
6. Estimation of $KMnO_4$ by using standard oxalic acid solution
7. Preparation of Phenol-formaldehyde resin (Bakelite)
8. Determination of total alkalinity of given sample of water
9. Wave length measurement of sample through UV-Visible Spectroscopy
10. Identification of simple organic compounds by IR
11. Preparation of nano materials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry

Reference:

"Vogel's Quantitative Chemical Analysis 6th Edition 6th Edition" Pearson Publicationsby J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

I Year II Semester
HEALTH AND WELLNESS, YOGA AND SPORTS
(Common to CSE, CSE (AIML), CE, EEE ME)

Course Category	Humanities	**Course Code**	24MH201P
Course Type	Theory	**L-T-P-C**	0-0-1-0.5
Prerequisites		**Continuous Evaluation** **Viva Voce** **Total Marks**	90 10 100

COURSE OBJECTIVES
The main objective of introducing this course is to make the students maintain their mental and physical wellness by balancing emotions in their life. It mainly enhances the essential traits required for the development of the personality.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		
CO1	UnderstandtheimportanceofyogaandsportsforPhysicalfitnessandsoundhealth.	
CO2	Demonstrate an understanding of health-related fitness components.	
CO3	Compare and contrast various activities that help enhance their health.	
CO4	Assess current personal fitness levels.	
CO5	Develop Positive Personality	

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						1		1				3
CO2						1	1					3
CO3						1						3
CO4						1						3
CO5						1		1				3

COURSE CONTENT

UNIT – I: Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.

Activities:

i) Organizing health awareness programmes in community
ii) Preparation of health profile
iii) Preparation of chart for balance diet for all age groups

UNIT – II: Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asan as- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices Asana, Kriya, Mudra, Bandha, Dhyana, SuryaNamaskar

UNIT – III: Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Common wealth games.

Activities:

i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
Practicing general and specific warm up, aerobics
ii) Practicing cardio respiratory fitness, treadmill, run test, 9 min walk, skipping and running.

Reference Books:

1. Gordon Edlin, Eric Golanty. Health and Wellness,14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company,1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide to Surviving Anywhere Third Edition, William Morrow Paperbacks,2014
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. Human Kinetics,Inc.2014

General Guidelines:

1. Institutes must assign slots in the Time table for the activities of Health/Sports/Yoga.
2. Institutes must provide field /facility and offer the minimum of five choices of as many as Games/Sports.
3. Institutes are required to provide sports instructor / yoga teacher to mentor the students.

Evaluation Guidelines:

- Evaluated for a total of 100 marks.
- A student can select 6 activities of his/her choice with a minimum of 01 activity per unit. Each activity shall be evaluated by the concerned teacher for 15 marks, totalling to 90 marks.
- A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.

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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

II YEAR – I SEMESTER
COMPLEX VARIABLES AND NUMERICAL METHODS
(EEE)

Course Category	Basic Sciences	**Course Code**	24BM302T
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	complex numbers, Differentiation & integration, Binomial Theorem	**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To elucidate the different numerical methods to solve nonlinear algebraic equations
2	To disseminate the use of different numerical techniques for carrying out numerical integration.
3	To familiarize the complex variables.
4	To equip the students to solve application problems in their disciplines

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Evaluate the approximate roots of polynomial and transcendental equations by different algorithms. Apply Newton's forward and backward interpolation and Lagrange's formulae for equal and unequal intervals.	K3
CO2	ApplynumericalintegraltechniquestodifferentEngineeringproblems.Apply different algorithms for approximating the solutions of ordinary differential equations with initial conditions to its analytical computations	K3
CO3	Apply Cauchy-Reimann equations to complex functions in order to determine whether a given continuous function is analytic.	K3
CO4	Evaluate the Taylor and Laurent expansions of simple functions, determining the nature of the singularities and calculating residues. Make use of the Cauchy residue theorem to evaluate certain integrals	K3
CO5	Explain properties of various types of conformal mappings	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	2	-	-	-	-	-	-	-	-	-
CO2	3	3	2	-	-	-	-	-	-	-	-	-
CO3	3	3	2	-	-	-	-	-	-	-	-	-
CO4	3	3	2	-	-	-	-	-	-	-	-	-
CO5	3	3	2	-	-	-	-	-	-	-	-	-

COURSE CONTENT

UNIT I
Iterative Methods:
Introduction–Solutionsofalgebraicandtranscendentalequations:Bisectionmethod– Secant method – Method of false position – General Iteration method – Newton-Raphson method (Simultaneous Equations)
Interpolation: Newton'sforwardandbackwardformulaeforinterpolation- Interpolation with unequal intervals – Lagrange's interpolation formula

UNIT II
Numerical integration, Solution of ordinary differential equations with initial conditions:
Trapezoidal rule– Simpson's $1/3^{rd}$and $3/8^{th}$rule– Solution of initial value problems by Taylor'sseries– Picard'smethodofsuccessiveapproximations–Euler'smethod–Runge- Kutta method (second and fourth order)– Milne's Predictor and Corrector Method

UNIT III
Functions of a complex variable and Complex integration:
Introduction – Continuity – Differentiability – Analyticity –Cauchy-Riemann equations in Cartesian and polar coordinates – Harmonic and conjugate harmonic functions – Milne – Thompson method.
Complexintegration:Lineintegral–Cauchy'sintegraltheorem–Cauchy'sintegralformula –Generalized integral formula (all without proofs) and problems on above theorems.

UNIT IV
Series expansions and Residue Theorem:
Radius of convergence – Expansion in Taylor's series, Maclaurin's series and Laurent series.
Types of Singularities: Isolated – Essential –Pole of order m– Residues – Residue theorem (without proof) – Evaluation of real integral of the types $\int_{-\infty}^{\infty} f(x)dx$ and $\int_{c}^{c+2\pi} f(\cos\theta,\ \sin\theta)d\theta$.

UNIT V
Conformal mapping:
Transformation by e^z,lnz,z^2,z^n (n positive integer), Sinz, cosz, z+a/z. Translation, rotation, inversion and bilinear- transformation- fixed point- cross ratio- properties- invariance of circles and cross ratio- determination of bilinear transformation mapping 3 given points.

TEXT BOOKS
1. **B.S.Grewal,**HigherEngineeringMathematics,44^{th}Edition,KhannaPublishers.
2. MicheaelGreenberg, Advanced Engineering Mathematics, Second Edition, Pearson's edition.

REFERENCE BOOKS
1. **ErwinKreyszig,**AdvancedEngineeringMathematics,10^{th}Edition,Wiley-India.
2. **B.V.Ramana,**HigherEngineeringMathematics,2007Edition,TataMc.GrawHill Education.
3. **Steven C. Chapra,** Applied Numerical Methods with MATLAB for Engineering andScience,Tata Mc. Graw Hill Education.
4. **M.K.Jain,S.R.K.IyengarandR.K.Jain,**NumericalMethodsforScientificand Engineering Computation, New Age International Publications.
5. **J. W. Brown and R. V. Churchill**, Complex Variables and Applications, 9^{th}edition,Mc-Graw Hill, 2013.

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WEB RESOURCES

1. https://en.wikibooks.org/wiki/Numerical_Methods/Equation_Solving
2. https://en.wikipedia.org/wiki/Numerical_integration
3. https://complex-analysis.com/content/complex_integration.html
4. https://en.wikipedia.org/wiki/Residue_theorem
5. https://mathworld.wolfram.com/ConformalMapping.html

II YEAR – I SEMESTER
UNIVERSAL HUMAN VALUES – UNDERSTANDING HARMONY and ETHICAL HUMAN CONDUCT
(Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CSE(AI), CSE(DS) and CSE(CYBER SECURITY)

Course Category	HSMC	**Course Code**	24HM301T
Course Type	Theory	**L-T-P-C**	2-1-0-3
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Blooms Taxonomy Level**
CO1	Understand the significance of value inputs in a classroom and start applying them in their life and profession	K1
CO2	Distinguish between values and skills, happiness and accumulation of physical facilities, the Self and the Body, Intention and Competence of an individual, etc.	K2
CO3	Understand the role of a human being in ensuring harmony in Family And Society.	K1
CO4	Appraise the role of a human being in ensuring harmony in Nature/Existence.	K2
CO5	Distinguish between ethical and unethical practices to actualize a harmonious environment wherever they work.	K2

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1						3						
CO2						3			3	3		3
CO3						3		2				3
CO4						3	3					
CO5						3		3				

COURSE CONTENT

UNIT – I Introduction to Value Education: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education), Understanding Value Education, self-exploration as the Process for Value Education, Continuous Happiness and Prosperity-the basic human aspirations, Happiness and Prosperity- Current Scenario, Method to Fulfill the Basic Human Aspirations.
Practice Sessions: PS1 Sharing about Oneself , PS2 Exploring Human Consciousness, PS3 Exploring Natural Acceptance

UNIT – II Harmony in Human Being: Understanding Human being as the Co-existence of the self and the body, Distinguishing between the Needs of the self and the body, The body as an Instrument of the self, Understanding Harmony in the self, Harmony of the self with the body, Programme to ensure self - regulation and Health
Practice Sessions: PS4 Exploring the difference of Needs of self and body, PS5 Exploring Sources of Imagination in the self, PS6 Exploring Harmony of self with the body

UNIT – III Harmony in the Family and Society: Harmony in the family - the Basic Unit of Human Interaction, 'Trust' - the Foundational Value in Relationship, 'Respect' - as the Right Evaluation, Other Feelings, Justice in Human – to - Human Relationship, Understanding Harmony in the Society, Vision for the Universal Human Order.
Practice Sessions: PS7 Exploring the Feeling of Trust, PS8 Exploring the Feeling of Respect,
PS9 Exploring Systems to fulfil Human Goal

UNIT – IV Harmony in the Nature/Existence: Understanding Harmony in the Nature, Interconnectedness, self-regulation and Mutual fulfillment among the Four Orders of Nature, Realizing Existence as Co- existence at All Levels, The Holistic Perception of Harmony in Existence
Practice Sessions: PS10 Exploring the Four Orders of Nature, PS11 Exploring Co-existence in Existence

UNIT – V Implications of the Holistic Understanding - a Look at Professional Ethics: Natural Acceptance of Human Values, Definitiveness of (Ethical) Human Conduct, A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order, Competence in Professional Ethics, Holistic Technologies, Production Systems and Management Models-Typical Case Studies, Strategies for Transition towards Value- based Life and Profession.
Practice Sessions: PS12 Exploring Ethical Human Conduct, PS13 Exploring Humanistic Models in Education, PS14 Exploring Steps of Transition towards Universal Human Order

Text books and Teachers Manual

1. 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
2. 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 - R R Gaur, R Asthana, G P Bagaria

Reference Books

1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999.
2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.
3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth- by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – PanditSunderlal
9. Rediscovering India - by Dharampal

Web References:

1. https://fdp-si.aicte-india.org
2. https://www.youtube.com/playlist?list=PLWDeKF97v9SP_Kt6jqzA3pZ3yA7g_OAQz

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II YEAR – I SEMESTER
ELECTROMAGNETIC FIELD THEORY

Course Category	Professional Core Courses	**Course Code**	**24EE301T**
Course Type	Theory	**L-T-P-C**	**3-0-0-3**
Prerequisites	**NIL**	**Internal Assessment**	**30**
		Semester End Examination	**70**
		Total Marks	**100**

COURSE OBJECTIVES	
1	To study the production of electric field and potentials due to different configurations of static charges.
2	To study the properties of conductors and dielectrics, calculate the capacitance of different configurations. Understand the concept of conduction and convection current densities.
3	To study the magnetic fields produced by currents in different configurations, application of Ampere's law and the Maxwell's second and third equations. To study the magnetic force and torque through Lorentz force equation in magnetic field environment like conductors and other current loops.
4	To develop the concept of self and mutual inductances and the energy stored.
5	To study time varying and Maxwell's equations in different fourth equation for the induced EMF.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Compute electric fields and potentials using Gauss law/ solve Laplace or Poisson's equations for various electric charge distributions.	K2
CO2	Analyse the behaviour of conductors in electric fields, electric diploe and the capacitance and energy stored in dielectrics.	K3
CO3	Calculate the magnetic field intensity due to current carrying conductor and understanding the application of Ampere's law, Maxwell's second and third law.	K3
CO4	Estimate self and mutual inductances and the energy stored in the magnetic field.	K3
CO5	Understand the concepts of Faraday's laws, Displacement current, Poynting theorem and Poynting vector.	K2

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)													
	PO 1	**PO 2**	**PO3**	**PO4**	**PO 5**	**PO6**	**PO 7**	**PO8**	**PO9**	**PO 10**	**PO1 1**	**PO 12**	**PS O1**	**PSO 2**
CO1	3	3	2	2	-	-	-	-	-	-	-	-	-	2
CO2	3	3	2	2	1	-	-	-	-	-	-	-	-	2
CO3	3	3	2	2	-	-	-	-	-	-	-	-	-	2
CO4	3	3	2	2	-	-	-	-	-	-	-	-	-	2
CO5	3	3	2	2	-	-	-	-	-	-	-	-	-	2

COURSE CONTENT

UNIT 1
Vector Analysis:
Vector Algebra: Scalars and Vectors, Unit vector, Vector addition and subtraction, Position and distance vectors, Vector multiplication, Components of a vector.
Coordinate Systems: Rectangular, Cylindrical and Spherical coordinate systems.
Vector Calculus: Differential length, Area and Volume. Del operator, Gradient of a scalar, Divergence of a vector and Divergence theorem (definition only). Curl of a vector and Stoke's theorem (definition only), Laplacian of a scalar
Electrostatics:
Coulomb's law and Electric field intensity (EFI) – EFI due to Continuous charge distributions (line and surface charge), Electric flux density, Gauss's law (Maxwell's first equation, $\nabla.\vec{D} = \rho_v$), Applications of Gauss's law, Electric Potential, Work done in moving a point charge in an electrostatic field (second Maxwell's equation for static electric fields,$\nabla \times \vec{E} = 0$), Potential gradient, Laplace's and Poison's equations.

UNIT 2
Conductors – Dielectrics and Capacitance:
Behavior of conductor in Electric field, Electric dipole and dipole moment – Potential and EFI due to an electric dipole, Torque on an Electric dipole placed in an electric field, Current density-conduction and convection current densities, Ohm's law in point form, Behavior of conductors in an electric field, Polarization, dielectric constant and strength, Continuity equation and relaxation time, Boundary conditions between conductor to dielectric, dielectric to dielectric and conductor to free space, Capacitance of parallel plate, coaxial and spherical capacitors, Energy stored and density in a static electric field.

UNIT 3
Magneto statics, Ampere's Law and Force in magnetic fields:
Biot-Savart's law and its applications viz. Straight current carrying filament, circular, square, rectangle and solenoid current carrying wire – Magnetic flux density and Maxwell's second Equation ($\nabla.\vec{B} = 0$), Ampere's circuital law and its applications viz. MFI due to an infinite sheet, long filament, solenoid, toroidal current carrying conductor, point form of Ampere's circuital law, Maxwell's third equation ($\nabla \times \vec{H} = \vec{J}$).
Magnetic force, moving charges in a magnetic field – Lorentz force equation, force on a current element in a magnetic field, force on a straight and a long current carrying conductor in a magnetic field, force between two straight long and parallel current carrying conductors, Magnetic dipole, Magnetic torque, and moment.

UNIT 4
Self and mutual inductance:
Self and mutual inductance – determination of self-inductance of a solenoid, toroid, coaxial cable and mutual inductance between a straight long wire and a square loop wire in the same plane – Energy stored and energy density in a magnetic field.

UNIT 5
Time Varying Fields:

Faraday's laws of electromagnetic induction, Maxwell's fourth equation$\left(\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}\right)$, integral and point forms ofMaxwell's equations, statically and dynamically induced EMF, Displacement current, Modification of Maxwell's equations for time varying fields, Poynting theorem and Poynting vector.

TEXT BOOKS

1 "Elements of Electromagnetics" by Matthew N O Sadiku, Oxford Publications, 7th edition, 2018.
2 "Engineering Electromagnetics" by William H. Hayt& John. A. Buck Mc. Graw-Hill, 7th Editon.2006.

REFERENCE BOOKS

1 "Introduction to Electro Dynamics" by D J Griffiths, Prentice-Hall of India Pvt. Ltd, 2nd edition.
2 "Electromagnetic Field Theory" by Yaduvir Singh, Pearson India, 1st edition, 2011.
3 "Fundamentals of Engineering Electromagnetics" by Sunil Bhooshan, Oxford University Press, 2012.
4 Schaum's Outline of Electromagnetics by Joseph A. Edminister, MahamoodNavi,4th Edition,2014.
5 Electromagetism :Problems with solutions by Ashutosh Pramanik,PHI publications
6 Electromagnetic Fields and Waves by R. L. Yadava, Khanna Publication House, 1st Edition,2019
7 Electromagnetic Field Theory (including Antennaes and wave propagation), by K.A. Gangadhar,P.M. Ramanthan ,16th edition, Khanna Publications, 2007.

WEB RESOURCES (Suggested)

1 https://archive.nptel.ac.in/courses/108/106/108106073/
2 https://onlinecourses.nptel.ac.in/noc19_ph08/preview
3 http://bookboon.com/en/essential-electromagnetism-ebook
4 https://ocw.mit.edu/courses/physics/8-07-electromagnetism-ii-fall-2012/
5 https://onlinecourses.nptel.ac.in/noc21_ee83/preview
6 https://onlinecourses.nptel.ac.in/noc21_ph05/preview

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II YEAR – I SEMESTER
ELECTRICAL CIRCUIT ANALYSIS-II

Course Category	Professional Core Courses	**Course Code**	**24EE302T**
Course Type	Theory	**L-T-P-C**	**3-0-0-3**
Prerequisites	**NIL**	**Internal Assessment** **Semester End Examination** **Total Marks**	**30** **70** **100**

COURSE OBJECTIVES	
1	To understand three phase circuits
2	To analyse transients in electrical systems
3	To evaluate network parameters of given electrical network
4	To apply Fourier analysis to electrical systems
5	To understand graph theory for circuit analysis and to understand the behaviour of filters

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Analyse the balanced and unbalanced 3 phase circuits for power calculations.	K4
CO2	Analyse the transient behaviour of electrical networks in different domains.	K4
CO3	Estimate various Network parameters.	K3
CO4	Apply the concept of Fourier series to electrical systems.	K3
CO5	Analyse the filter circuit for electrical circuits.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)													
	PO 1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	-	2
CO2	3	3	-	1	1	-	-	-	-	-	-	-	-	2
CO3	3	3	-	1	1	-	-	-	-	-	-	-	-	2
CO4	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO5	3	2	2	-	-	-	-	-	-	-	-	-	-	2

COURSE CONTENT

UNIT 1

Analysis of three phase balanced circuits:

Phase sequence, star and delta connection of sources and loads, relation between line and phase quantities, analysis of balanced three phase circuits, measurement of active and reactive power.

Analysis of three phase unbalanced circuits:

Loop method, Star-Delta transformation technique, two-wattmeter method for measurement of three phase power.

UNIT 2

Laplace transforms – Definition and Laplace transforms of standard functions– Shifting theorem – Transforms of derivatives and integrals, Inverse Laplace transforms and applications.

Transient Analysis: Transient response of R-L, R-C and R-L-C circuits (Series and parallel combinations) for D.C. and sinusoidal excitations – Initial conditions - Solution using differential equation approach and Laplace transform approach.

UNIT 3

Network Parameters: Impedance parameters, Admittance parameters, Hybrid parameters, Transmission (ABCD) parameters, conversion of Parameters from one form to other,

Conditions for Reciprocity and Symmetry, Interconnection of Two Port networks in Series, Parallel and Cascaded configurations- problems.

UNIT 4

Analysis of Electric Circuits with Periodic Excitation: Fourier series and evaluation of Fourier coefficients, Trigonometric and complex Fourier series for periodic waveforms, Application to Electrical Systems – Effective value and average value of non-sinusoidal periodic waveforms, power factor, effect of harmonics

UNIT 5

Filters: Classification of filters-Low pass, High pass, Band pass and Band Elimination filters, Constant-k filters -Low pass and High Pass, Design of Filters.

TEXT BOOKS

1 Engineering Circuit Analysis, William Hayt and Jack E. Kemmerly, 8th Edition McGraw-Hill, 2013

2 Fundamentals of Electric Circuits, Charles K. Alexander, Mathew N. O. Sadiku, 3rd Edition, Tata McGraw-Hill, 2019

REFERENCE BOOKS

1 Network Analysis, M. E. Van Valkenburg, 3rd Edition, PHI, 2019.
2 Network Theory, N. C. Jagan and C. Lakshminarayana, 1st Edition, B. S. Publications, 2012.
3 Circuits and Networks Analysis and Synthesis, A. Sudhakar, Shyam Mohan S. Palli, 5th Edition, Tata McGraw-Hill, 2017.
4 Engineering Network Analysis and Filter Design (Including Synthesis of One Port Networks)- Durgesh C. Kulshreshtha Gopal G. Bhise, Prem R. Chadha ,Umesh Publications 2012.
5 Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018, 7th Revised Edition.
6 A. Sudhakar, Shyammohan S. Palli, "Circuits and Networks Analysis and Synthesis", Tata McGraw-Hill, 2nd Edition.
7. Electric Circuits by David A. Bell, Oxford publications, 7th edition, 2009.
8 Networks and Systems, Asfaq Hussain, Khanna Publishing House, Delhi, 2nd Edition.

WEB RESOURCES (Suggested)

1 https://archive.nptel.ac.in/courses/117/106/117106108/
2 https://archive.nptel.ac.in/courses/108/105/108105159/
3 https://circuitglobe.com/circuit-analysis-of-3-phase-system-balanced-condition.html
4 https://www.tutorialspoint.com/network_theory/network_theory_twoport_networks
5 https://www.electronics-tutorials.ws/filter/filter_4.html
6 www.electrical4u.com/network-synthesis-hurwitz-polynomial-positive-real-functions
7 https://www.electrical4u.com/fourier-series-and-fourier-transform/

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II YEAR – I SEMESTER
DC MACHINES & TRANSFORMERS

Course Category	Professional Core Courses	**Course Code**	**24EE303T**
Course Type	Theory	**L-T-P-C**	**3-0-0-3**
Prerequisites	**NIL**	**Internal Assessment** **Semester End Examination** **Total Marks**	**30** **70** **100**

COURSE OBJECTIVES	
1	Understand the characteristics and applications of DC Machines.
2	Develop problem solving skills about the starting, speed control and testing of DC Machines.
3	Understand the concepts of efficiency and regulation of a transformer by obtaining equivalent circuit.
4	To Understand the methods of testing of single-phase transformer
5	Analyze the performance of single-phase transformers and to understand the connection diagrams of three-phase transformers.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the process of voltage build-up in DC generators and characteristics.	K2
CO2	Understand the process of torque production, starting and speed control of DC motors and illustrate their characteristics.	K2
CO3	Obtain the equivalent circuit of single-phase transformer and determine its efficiency & regulation.	K3
CO4	Analyze the performance of Parallel transformers, control voltages with tap changing methods	K4
CO5	Analyze various configurations of three-phase transformers.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)													
	PO 1	**PO 2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	2	-	-	-	-	-	-	-	-	-	1	2	2
CO2	3	2	1	-	-	-	-	-	-	-	-	-	2	1
CO3	1	2	2	-	-	-	-	-	-	-	-	-	-	2
CO4	3	2	-	-	-	-	-	-	-	-	-	-	-	1
CO5	3	2	-	1	-	-	-	-	-	-	-	-	-	2

COURSE CONTENT

UNIT 1
DC Generators:
Construction and principle of operation of DC machines – EMF equation for generator –
Excitation techniques – characteristics of DC generators –applications of DC Generators, Back-emf and torque equations of DC motor – Armature reaction and commutation.

UNIT 2
Starting, Speed Control and Testing of DC Machines
Characteristics of DC motors – losses and efficiency – applications of DC motors. Necessity of a starter – starting by 3-point and 4-point starters – speed control by armature voltage and field current control – testing of DC machines – brake test, Swinburne's test –Hopkinson's test–Field Test.

UNIT 3
Single-phase Transformers
Introduction to single-phase Transformers (Construction and principle of operation)–emf equation – operation on no-load and on load –lagging, leading and unity power factors loads –phasor diagrams.
Equivalent circuit –regulation – losses and efficiency – effect of variation of frequency and supply voltage on losses – all day efficiency.

UNIT 4
Testing of Transformers
Open Circuit and Short Circuit tests – Sumpner's test – separation of losses— Parallel operation with equal and unequal voltage ratios– auto transformer – equivalent circuit – comparison with two winding transformers.

UNIT 5
Three-Phase Transformers:
Polyphase connections- Y/Y, Y/Δ, Δ/Y, Δ/Δ, open Δ and Vector groups – third harmonics in phase voltages– Parallel operation–three winding transformers- transients in switching –off load and on load tap changers–Scott connection.

TEXT BOOKS

1 Electrical Machinery by Dr. P S Bimbhra, 7th edition, Khanna Publishers, New Delhi,1995.
2 Performance and analysis of AC machines by M.G. Say, CBS, 2002.

REFERENCE BOOKS

1 Electrical Machines by D. P.Kothari, I .J .Nagarth, McGraw Hill Publications, 5th edition
2 Electrical Machinery Fundamentals by Stephen J Chapman McGraw Hill education 2011.
3 Generalized Theory of Electrical Machines by Dr. P S Bimbhra, 7th Edition, Khanna Publishers, 2021.
4 Theory & Performance of Electrical Machines by J.B.Gupta, S.K.Kataria& Sons,2007.
5 Electric Machinery by Fitzgerald, A.E.,Kingsley, Jr.,C.,& Umans, S. D, 7th edition, McGraw-Hill Education, 2014.
6 Electrical Machines by R.K.Rajput, Lakshmi publications,5th edition.
7 Electrical Machines by Ashfaq Hussain, Second Edition, Dhanapat Rai & Sons.

WEB RESOURCES (Suggested)

1 nptel.ac.in/courses/108/105/108105112
2 nptel.ac.in/courses/108/105/108105155
3 https://onlinecourses.nptel.ac.in/noc24_ee103/preview
4 https://studyelectrical.com/2014/12/working-principle-of-dc-motor.html
5 https://www.electricaleasy.com/2014/05/three-phase-transformer-connections.html
6 https://www.allaboutcircuits.com/textbook/alternating-current/chpt-10/three-phase-transformer circuits/
7 http://www.electrical4u.com/single-three-phase-transformer-vs-bank-of-three-single-phase transformers/
8 http://www.electrical4u.com/principle-of-dc-generator/

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II YEAR I SEMESTER
DC MACHINES & TRANSFORMERS LAB

Course Category	Lab Course	**Course Code**	**24EE303P**
Course Type	Laboratory	**L-T-P-C**	**3-0-0-3**
Prerequisites	**NIL**	**Internal Assessment** **Semester End Examination** **Total Marks**	**15** **35** **50**

COURSE OBJECTIVES	
1	To perform the starting, speed control and speed control methods of DC Machines.
2	To conduct the experiment and plot the characteristics and applications of DC machines.
3	To perform testing methods of DC Machines.
4	To determine/Predetermine efficiency and regulation of the transformer through equivalent circuit.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Demonstrate starting and speed control methods of DC Machines .	K3
CO2	Apply theoretical concepts in analysing the characteristics of DC Machines	K3
CO3	Determine the performance characteristics of DC machines using different testing methods.	K3
CO4	Determine the performance parameters of single-phase transformer.	K3
K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating		

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	2	-	-	-	-	-	-	-	-	-	1	-
CO2	2	2	1	2	-	-	-	-	-	-	-	-	-	-
CO3	2	1	1	-	-	-	-	-	-	-	-	-	1	1
CO4	3	2	-	1	-	1	-	-	-	-	-	-	-	1

CONTENTS

Exp. No (Any 10 of the following experiments are to be conducted)

1	Speed control of DC shunt motor by Field Current and Armature Voltage Control.
2	Brake test on DC shunt motor- Determination of performance curves.
3	Swinburne's test - Predetermination of efficiencies as DC Generator and Motor.
4	Hopkinson's test on DC shunt Machines.
5	Load test on DC compound generator-Determination of characteristics.
6	Load test on DC shunt generator-Determination of characteristics.
7	Fields test on DC series machines-Determination of efficiency.
8	Brake test on DC compound motor-Determination of performance curves.
9	OC & SC tests on single phase transformer.
10	Sumpner's test on single phase transformer.
11	Scott connection of transformers.
12	Parallel operation of Single-phase Transformers.
13	Separation of core losses of a single-phase transformer.

Online Learning Resources:

1. https://ems-iitr.vlabs.ac.in/List%20of%20experiments.html

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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

II YEAR I SEMESTER
ELECTRICAL CIRCUIT ANALYSIS-II AND SIMULATION LAB

Course Category	Lab Course	**Course Code**	**24EE302P**
Course Type	Laboratory	**L-T-P-C**	**3-0-0-3**
Prerequisites	**NIL**	**Internal Assessment**	**15**
		Semester End Examination	**35**
		Total Marks	**50**

COURSE OBJECTIVES	
1	To measure three phase Active and Reactive power
2	To analyse transient behaviour of circuits
3	To determine 2-port network parameters
4	To analyse electrical circuits using simulation tools

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand the power calculations in three phase circuits.	K2
CO2	Evaluate the time response of given network.	K5
CO3	Evaluate two port network parameters.	K5
CO4	Simulate and analyse electrical circuits using suitable software.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	1	-	-	-	-	-	3	2	1	-	1	1
CO2	3	3	1	-	-	-	-	-	3	2	1	-	1	1
CO3	3	3	1	1	-	-	-	-	3	2	1	-	1	1
CO4	3	3	1	-	-	-	-	-	3	2	1	-	1	1

CONTENTS

Exp. No **(Any 10 of the following experiments are to be conducted)**

1 Measurement of Active Power and Reactive Power for balanced loads.
2 Measurement of Active Power and Reactive Power for unbalanced loads.
3 Determination of Z and Y parameters for a two port network.
4 Determination of ABCD and hybrid parameters
5 Verification of Kirchhoff's current law and voltage law using simulation tools.
6 Verification of mesh and nodal analysis using simulation tools.
7 Verification of super position and maximum power transfer theorems using simulation tools.
8 Verification of Reciprocity and Compensation theorems using simulation tools.
9 Verification of Thevenin's and Norton's theorems using simulation tools.
10 Verification of series and parallel resonance using simulation tools.
11 Simulation and analysis of transient response of RL, RC and RLC circuits.
12 Verification of self inductance and mutual inductance by using simulation tools

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II YEAR I SEMESTER
DATA STRUCTURES LAB

Course Category	Skill Enhancement Course	**Course Code**	**24EE301P**
Course Type		**L-T-P-C**	0-1-2-2
Prerequisites	**NIL**	**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSE OBJECTIVES	
1	To provide the knowledge of basic data structures and their implementations
2	To understand importance of data structures in context of writing efficientprograms
3	To develop skills to apply appropriate data structures in problem solving.

COURSE OUTCOMES	
At the end of the course, Student will be able to :	
CO1	Identify the role of data structures in organizing and accessing data.
CO2	Design, implement, and apply linked lists for dynamic data storage.
CO3	Develop applications using stacks and queues.
CO4	Design and implement algorithms for operations on binary trees and trees, binary search trees.
CO5	Devise novel solutions to small scale programming challenges involvingdata structures such as stacks, queues, Trees

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2														
CO3														
CO4														

COURSE CONTENT

UNIT I

Introduction to Data Structures: Definition and importance of Data structures, Abstract data types (ADTs) and its specifications, **Arrays**: Introduction, 1-D, 2-D Arrays, accessing elements of array, Row Major and Column Major storage of Arrays, **Searching Techniques**: Linear & Binary Search, **Sorting Techniques**: Bubble sort, Selection sort, Quick sort.

Sample experiments:

1. Program to find min & max element in an array.
2. Program to implement matrix multiplication.
3. Find an element in given list of sorted elements in an array using Binary search.
4. Implement Selection and Quick sort techniques.

UNIT II

Linked Lists: Singly linked lists: representation and operations, doubly linked lists andcircularlinked lists, Comparing arrays and linked lists, Applications of linked lists.

Sample experiments:

1. Write a program to implement the following operations.
   a. Insert b. Deletion c. Traversal
2. Write a program to store name, roll no, and marks of students in a class using circulardouble linked list.
3. Write a program to perform addition of given two polynomial expressions using linked list.

UNIT III

Stacks: Introduction to stacks: properties and operations, implementing stacks using arraysand linked lists, Applications of stacks in expression evaluation, backtracking, reversing listetc.

Sample experiments:

1. Implement stack operations using
   a. Arrays b. Linked list
2. Convert given infix expression into post fix expression using stacks.
3. Evaluate given post fix expression using stack.
4. Write a program to reverse given linked list using stack.

UNIT IV

Queues: Introduction to queues: properties and operations, Circular queues, implementing queuesusing arrays and linked lists, Applications of queues scheduling, etc.

Deques: Introduction to deques (double-ended queues), Operations on deques and their applications.

Sample experiments:

1. Implement Queue operations using
   a. Arrays b. Linked list
2. Implement Circular Queue using
   a. Arrays b. Linked list
3. Implement Dequeue using linked list.

UNIT V

Trees: Introduction to Trees, Binary trees and traversals, Binary Search Tree – Insertion,Deletion &Traversal

Sample experiments:

1. Implement binary tree traversals using linked list.
2. Write program to create binary search tree for given list of integers. Perform in-ordertraversalof the tree. Implement insertion and deletion operations.

Textbooks:

1. Data Structures and algorithm analysis in C, Mark Allen Weiss, Pearson, 2nd Edition.
2. Fundamentals of data structures in C, Ellis Horowitz, Sartaj Sahni, Susan Anderson-Freed,Silicon Press, 2008

Reference Books:

1. Algorithms and Data Structures: The Basic Toolbox by Kurt Mehlhorn and PeterSanders.
2. C Data Structures and Algorithms by Alfred V. Aho, Jeffrey D. Ullman, and John E.Hopcroft.
3. Problem Solving with Algorithms and Data Structures by Brad Miller and DavidRanum.
4. Introduction to Algorithms by Thomas H. Cormen, Charles E. Leiserson, Ronald L.Rivest,and Clifford Stein.
   Algorithms in C, Parts 1-5 (Bundle): Fundamentals, Data Structures, Sorting, Searching, and Graph Algorithms" by Robert Sedgewick

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II YEAR II SEMESTER
MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS
(Common to CE, EEE, ECE, CSE, and CSE (CYBER SECURITY)

Course Category	Management Course - I	**Course Code**	24HM401T
Course Type	Theory	**L-T-P-C**	2 -0 -0-2
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

Course Outcomes		**Blooms Taxonomy Level**
Upon successful completion of the course, the student will be able to		
CO 1	Understand of the concepts of managerial economics and demand in managerial decision making and predicting demand for goods and services	K1
CO 2	Assess the functional relation among production, cost of production, cost concepts and Break-Even Analysis.	K3
CO 3	Classify market structures for price and output decisions and Appraise the forms of business organizations and trade cycles in economic growth.	K1
CO 4	Apply capital budgeting techniques in financial decision making	K3
CO 5	Make use of the final accounting statements and analysis in financial decision making	K3

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1											1	
CO2											3	
CO3												1
CO4		2									3	2
CO5		2									3	2

COURSE CONTENT

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- Isoquantsand Is costs, Cost & Break-Even Analysis - Cost concepts and Cost behaviour- Break-Even Analysis (BEA) - Determination of Break-Even Point (Simple Problems).

Unit – III

Business Organizations and Markets: Introduction – 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. 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 Period Method, Accounting Rate of Return (ARR) Net Present Value (NPV) Internal Rate Return (IRR) Method (sample problems)

Unit – V

Financial Accounting and Analysis: Introduction - Concepts and Conventions- Double-Entry Bookkeeping, Journal, Ledger, Trial Balance- Final Accounts (Trading Account, Profit and Loss Account and Balance Sheet with simple adjustments). Introduction to Financial Analysis - Analysis and Interpretation of Liquidity Ratios, Activity Ratios, and Capital structure Ratios and Profitability.

Textbooks:

1. Varshney & Maheswari: Managerial Economics, Sultan Chand.
2. Aryasri: Business Economics and Financial Analysis, 4/e, MGH.

Reference Books :

1. Suma Damodaran - Managerial Economics - Oxford - 2011.
2. Vanitha Agarwal - Managerial Economics - Pearson Publications- 2011.
3.V.Maheswari - Financial Accounting- Vikas Publications - 2018
4. S. A. Siddiqui & A. S. Siddiqui - Managerial Economics and Financial Analysis - New Age International Publishers – 2012

Web References: https://www.slideshare.net/123ps/managerial-economics-ppt
https://www.slideshare.net/rossanz/production-and-cost-45827016
https://www.slideshare.net/darkyla/business-organizations-19917607
https://www.slideshare.net/balarajbl/market-and-classification-of-market
https://www.slideshare.net/ruchi101/capital-budgeting-ppt-59565396
https://www.slideshare.net/ashu1983/financial-accounting

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II YEAR II SEMESTER
ANALOG CIRCUITS

Course Category	Engineering Science / Basic Science	**Course Code**	24EC401T
Course Type	Theory	**L-T-P-C**	3-0-0-3
Prerequisites	Knowledge on Diode and Transistor	**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

COURSEOBJECTIVES	
The student will learn:	
1	To acquire the basic knowledge on clippers, clampers & biasing circuits
2	To determine the h-parameters of a transistor circuit & understand the feedback amplifiers
3	To know the operation of oscillators and operational amplifier
4	To understand the applications of operational amplifier, acquire the knowledge on IC555 timer and their applications
5	To know the operation of Analog to Digital Converters and Digital to Analog Converters

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Analyzediodeclippingandclampingcircuits.Understanddifferenttypesofbiasing circuits of a transistor	K2
CO2	Usesmallsignalmodelingfortransistorcircuitanalysisandillustratetheoperationof feedback amplifiers	K2
CO3	Understand operation of oscillators,	K3
CO4	operational amplifier and their applications, Use 555 timers in multi-vibrators, Schmitt Trigger and PLL applications	K3
CO5	Describe the operation of different ADC's and DAC's	K2

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes
(1 – Low, 2 - Medium, 3 – High)

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	2	2	2	2		-	-	-	-	-	2	2	2	2
CO2	2	2	2	2		-	-	-	-	-	2	2	2	2
CO3	2	2	2	2		-	-	-	-	-	2	2	2	2
CO4	2	2	2	2		-	-	-	-	-	2	2	2	2
CO5	2	2	2	2		-	-	-	-	-	2	2	2	2

COURSE CONTENT

UNIT–1:

Diode clipping and clamping circuits : Diode clippers, clipping at two independent levels, Transfer characteristics of clippers, clamping circuit operation.

DC biasing of BJTs : Load lines, Operating Point, Bias Stability, Collector-to-Base Bias, Self-Bias, Stabilization against Variations in V_{BE} and β for the Self-Bias Circuit, Bias Compensation, Thermal Run away, Thermal Stability.

UNIT–II:

Small Signals Modelling of BJT : Analysis of a Transistor Amplifier Circuit using h-parameters, Simplified CE Hybrid Model, Analysis of CE, CC, CB Configuration using Approximate Model, Frequency Response of CE and CC amplifiers.

Feedback Amplifiers : Classification of Amplifiers, the Feedback Concept, General Characteristics of Negative-Feedback Amplifiers, Effect of Negative Feedback upon Output and Input Resistances, Voltage-Series Feedback, Current-Series Feedback, Current-Shunt Feedback, Voltage-Shunt Feedback.

UNIT–III

Oscillator Circuits : Barkhausen Criterion of oscillation, Oscillator operation, R-C phase shift oscillator, Wien bridge Oscillator, Crystal Oscillator.

Operational Amplifiers: Introduction, Basic information of Op-Amp, Ideal Operational Amplifier, Block Diagram Representation of Typical Op-Amp, OP-Amps Characteristics: Introduction, DC and AC characteristics, 741 op-amp & its features.

Unit–IV:

OP-AMPS Applications: Introduction, Basic Op-Amp Applications, Instrumentation Amplifier, AC Amplifier, V to I andI to V Converter, Sample and Hold Circuit, Log and Antilog Amplifier, Multiplier and Divider, Differentiator, integrator.

ComparatorsandWaveformGenerators: Introduction,Comparator,SquareWave Generator,MonostableMultivibrator,TriangularWaveGenerator,SineWaveGenerators

UNIT–V:

Timers and Phase Locked Loop: Introduction to 555 timer, functional diagram, Monostable and Astable operations and applications, Schmitt Trigger, PLL block schematic, principles and description of individual blocks, 565 PLL, Applications of VCO (566).

Digital to Analog And Analog to Digital Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A-D Converters – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications

TEXTBOOKS:

1. Electronic Devices and Circuits-J.Millman,C.Halkias,TataMc-GrawHill,2nd Edition, 2010
2. Linear Integrated Circuits – D. Roy Choudhury, New Age International (p) Ltd, 2nd Edition, 2003

REFERENCE BOOKS:

1. Electronic Devices and Circuit Theory–Robert L.Boylestad and Lowis Nashelsky, Pearson Edition, 2021.
2. Electronic Devices and Circuits– G.K.Mithal, Khanna Publisher, 23rd Edition, 2017.2

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II YEAR II SEMESTER
POWER SYSTEMS – I

Course Category	Professional Core Courses	**Course Code**	**24EE401T**
Course Type	Theory	**L-T-P-C**	**3-0-0-3**
Prerequisites	**NIL**	**Internal Assessment** **Semester End Examination** **Total Marks**	**30** **70** **100**

COURSE OBJECTIVES	
1	To study principle of operation of different components of a hydro and thermal power stations.
2	To study principle of operation of different components of a nuclear power stations.
3	To study constructional and operation of different components of an Air and Gas Insulated substations.
4	To study different types of cables and distribution systems.
5	To study different types of load curves and tariffs applicable to consumers.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Understand principle of operation of hydro and thermal power stations.	K2
CO2	Identify the different components of nuclear Power plants.	K2
CO3	Describe the different components of air and gas insulated substations.	K2
CO4	Discuss the construction of single core and three core cables and describe distribution system configurations.	K2
CO5	Analyse different economic factors of power generation and tariffs.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)													
	PO 1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO 2**
CO1	3	1	1	-	-	-	-	-	-	-	-	1	1	1
CO2	3	1	1	-	-	-	-	-	-	-	-	1	1	1
CO3	3	1	1	-	-	-	-	-	-	-	-	2	1	1
CO4	3	2	2	-	-	-	-	-	-	-	-	1	2	2
CO5	3	2	2	-	-	-	-	-	-	-	-	1	2	2

COURSE CONTENT

UNIT 1

Hydroelectric Power Stations:

Selection of site, general layout of a hydroelectric power plant with brief description of major components and principle of operation

Thermal Power Stations:

Selection of site, general layout of a thermal power plant. Brief description of components: boilers, super heaters, economizers and electrostatic precipitators, steam turbines: impulse and reaction turbines, condensers, feed water circuit, cooling towers and chimney.

UNIT 2

Nuclear Power Stations:

Location of nuclear power plant, working principle, nuclear fission, nuclear fuels, nuclear chain reaction, nuclear reactor components: moderators, control rods, reflectors and coolants, types of nuclear reactors and brief description of PWR, BWR and FBR. Radiation: radiation hazards and shielding, nuclear waste disposal.

UNIT 3

Substations:

Air Insulated Substations – indoor & outdoor substations, substations layouts of 33/11 kV showing the location of all the substation equipment. Bus bar arrangements in the sub-stations: simple arrangements like single bus bar, sectionalized single bus bar, double bus bar with one and two circuit breakers, main and transfer bus bar system with relevant diagrams.

Gas Insulated Substations (GIS) – advantages of gas insulated substations, constructional aspects of GIS, comparison of air insulated substations and gas insulated substations.

UNIT 4

Underground Cables:

Types of cables, construction, types of insulating materials, calculation of insulation resistance, stress in insulation and power factor of cable. Capacitance of single and 3-Core belted Cables. Grading of cables: capacitance grading and inter sheath grading.

Distribution Systems:

Classification of Distribution systems, A.C Distribution, Overhead versus Underground system, Connection schemes of Distribution system, Requirements of Distribution system, Design considerations in Distribution system.

UNIT 5

Economic Aspects & Tariff:

Economic Aspects – load curve, load duration and integrated load duration curves, discussion on economic aspects: connected load, maximum demand, demand factor, load factor, diversity factor, plant capacity factor and plant use factor, base and peak load plants.

Tariff Methods– Costs of generation and their division into fixed, semi-fixed and running costs, desirable characteristics of a tariff method, tariff methods: simple rate, flat rate, block-rate, two-part, three–part, and power factor tariff methods.

TEXT BOOKS

1 S. N. Singh, Electric Power Generation, Transmission and Distribution, PHI Learning Pvt Ltd, New Delhi, 2nd Edition, 2010
2 J.B.Gupta, Transmission and Distribution of Electrical Power, S.K.Kataria and sons,10th Edition, 201

REFERENCE BOOKS

1 I.J. Nagarath & D.P. Kothari, Power System Engineering, McGraw-Hill Education, 3rd Edition, 2019.
2 C.L.Wadhwa, Generation, Distribution and Utilization of Electrical Energy, New Age International Publishers, 6th Edition, 2018.
3 V. K. Mehta and Rohit Mehta, Principles of Power System, S. Chand, 4th Edition, 2005.
4 Turan Gonen, Electric Power Distribution System Engineering, McGraw-Hill, 1985.
5 Handbook of switchgear, BHEL, McGraw-Hill Education, 2007.
6 Electrical Power Systems, Dr.S.L.Uppal, Prof.S.Rao, Khanna Publishers.
7 Generation of Electrical Energy by B.R.Gupta S.Chand Publications 7th Edition
8 Elements of Electrical Power Station Design by M V Deshpande, PHI, New Delhi, 2009.

WEB RESOURCES (Suggested)

1 https://nptel.ac.in/courses/108102047
2 https://archive.nptel.ac.in/courses/108/105/108105104/
3 https://onlinecourses-archive.nptel.ac.in/noc18_ee15/preview
4 https://onlinecourses.nptel.ac.in/noc21_ee15/

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II YEAR II SEMESTER
INDUCTION AND SYNCHRONOUS MACHINES

Course Category		**Course Code**	**24EE402T**
Course Type	Theory	**L-T-P-C**	**3-0-0-3**
Prerequisites	**NIL**	**Internal Assessment** **Semester End Examination** **Total Marks**	**30** **70** **100**

COURSE OBJECTIVES	
1	Characteristics, starting and testing methods of Induction Motor
2	Torque production and performance of Induction Motor.
3	In determining the performance parameters of Induction Motor.
4	Working of synchronous generators
5	To understand the operation, performance and starting methods of synchronous motors.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Explain the construction and operation of three-phase induction motor.	K2
CO2	Analyze the performance of three-phase induction motor.	K4
CO3	Describe the working of single-phase induction motors.	K2
CO4	Analyze the performance of Synchronous generators.	K4
CO5	Explain hunting phenomenon, implement methods of staring and correction Of power factor with synchronous motor.	K2

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)													
	PO1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PSO 2**
CO1	3	2	2	-	-	-	-	-	-	-	-	-	-	2
CO2	1	1	2	1	-	-	-	-	-	-	-	-	-	2
CO3	3	1	2	-	-	-	-	-	-	-	1	-	1	2
CO4	2	2	2	-	-	-	-	-	-	-	-	-	-	2
CO5	2	2	2	-	-	-	-	-	-	-	-	-	1	1

COURSE CONTENT

UNIT 1
3-phase induction motors:
Construction of Squirrel cage and Slipring induction motors– production of rotating magnetic field – principle of operation – rotor emf and rotor frequency – rotor current and power factor at standstill and during running conditions– rotor power input, rotor copper loss and mechanical power developed and their inter-relationship –equivalent circuit – phasor diagram

UNIT 2
Performance of 3-Phase induction motors:
Torque equation – expressions for maximum torque and starting torque – torque-slip characteristics – double cage and deep bar rotors –No load, Brake test and Blocked rotor tests – circle diagram for predetermination of performance- methods of starting –starting current and torque calculations -speed control of induction motor with V/f control method, rotor resistance control and rotor emf injection technique –crawling and cogging – induction generator operation.

UNIT 3
Single Phase Motors:
Single phase induction motors – constructional features – double revolving field theory, Cross field theory – equivalent circuit.
Starting methods: capacitor start capacitor run, capacitor start induction run, split phase & shaded pole, AC series motor.

UNIT 4
Synchronous Generator:
Constructional features of non-salient and salient pole type alternators- armature windings – distributed and concentrated windings – distribution& pitch factors – E.M.F equation –armature reaction – voltage regulation by synchronous impedance method – MMF method and Potier triangle method –two reaction analysis of salient pole machines -methods of synchronization- Slip test – Parallel operation of alternators.

UNIT 5
Synchronous Motor:
Synchronous motor principle and theory of operation – Effect of excitation on current and power factor– synchronous condenser –expression for power developed –hunting and its suppression – methods of starting.

TEXT BOOKS

1 Electrical Machinery, Dr. P.S. Bhimbra, Khanna Publishing, 2021,First Edition.
2 Performance and analysis of AC machines by M.G. Say, CBS, 2002.

REFERENCE BOOKS

1 Electrical machines, D.P. Kothari and I.J. Nagrath, McGraw Hill Education, 2017, Fifth Edition.
2 Theory & Performance of Electrical Machines by J.B.Gupta, S.K.Kataria& Sons, 2007.
3 Electric Machinery, A.E.Fitzgerald, Charles kingsley, Stephen D.Umans, McGraw-Hill, 2020, Seventh edition
4 Electric Machinery Fundamentals, Stephen J. Chapman, McGraw Hill Education, 1999.
5 Electrical Machines by R.K.Rajput, Lakshmi publications,5th edition.
6 Electrical Machines by Ashfaq Hussain, Second Edition, Dhanapat Rai & Sons.

WEB RESOURCES (Suggested)

1 https://archive.nptel.ac.in/courses/108/105/108105131/
2 https://nptel.ac.in/courses/108106072
3 http://www.electricaleasy.com/
4 http://electrical-engineering-portal.com/rotating-magnetic-field-ac-machines
5 http://nptel.ac.in/courses/108106072/pdf/2_6.pdf

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II YEAR II SEMESTER
CONTROL SYSTEMS

Course Category		**Course Code**	**24EE403T**
Course Type	Theory	**L-T-P-C**	**3-0-0-3**
Prerequisites	**NIL**	**Internal Assessment**	**30**
		Semester End Examination	**70**
		Total Marks	**100**

COURSE OBJECTIVES	
1	To obtain the mathematical models of physical systems and derive transfer function.
2	To determine the time response of systems and analyse system stability.
3	To analyse system stability using frequency response methods.
4	To design compensators using Bode diagrams.
5	To obtain the mathematical models of physical systems using state space approach and determine the response.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Derive the transfer function of physical systems and determine overall transfer function using block diagram algebra and signal flow graphs.	K4
CO2	Obtain the time response of first and specifications of second order systems and determine error constants. Analyze the absolute and relative stability of LTI systems using Routh's stability criterion and root locus method.	K2
CO3	Analyze the stability of LTI systems using frequency response methods.	K4
CO4	Design Lag, Lead, Lag-Lead compensators to improve system performance using Bode Diagrams.	K4
CO5	Apply state space analysis concepts to represent physical systems as state models, derive transfer function and determine the response. Understand the concepts of controllability and observability	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)													
	PO1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PSO 2**
CO1	3	3	2	1	-	-	-	-	-	-	-	-	-	2
CO2	3	3	2	1		-	-	-	-	-	-	-	1	2
CO3	3	2	2	2	-	-	-	-	-	-	-	-	-	2
CO4	3	2	2	2	-	-	-	-	-	-	-	-	1	2
CO5	3	3	2	1	-	-	-	-	-	-	-	-	-	2

COURSE CONTENT

UNIT 1

Mathematical Modelling of Control Systems

Classification of control systems - open loop and closed loop control systems and their differences - Feedback characteristics - transfer function of linear system, differential equations of electrical networks- translational and rotational mechanical systems - transfer function of Armature voltage controlled DC servo motor - block diagram algebra – representation by signal flow graph – reduction using Mason's gain formula

UNIT 2

Time Response Analysis

Standard test signals – time response of first and second order systems – time domain specifications - steady state errors and error constants - effects of proportional (P) - proportional integral (PI) - proportional derivative (PD) proportional integral derivative (PID) systems.

Stability And Root Locus Technique

The concept of stability – Routh's stability criterion – limitations of Routh's stability, root locus concept – construction of root loci (simple problems) - Effect of addition of Poles and Zeros to the transfer function.

UNIT 3

Frequency Response Analysis

Introduction to frequency domain specifications – Bode diagrams – transfer function from the Bode diagram.

Polar plots, Nyquist stability criterion- stability analysis using Bode plots (phase margin and gain margin).

UNIT 4

Classical Control Design Techniques

Lag, lead, lag-lead compensators - physical realisation - design of compensators using Bode plots.

5

State Space Analysis of LTI Systems

Concepts of state - state variables and state model - state space representation of transfer function: Controllable Canonical Form - Observable Canonical Form - Diagonal Canonical Form - diagonalization using linear transformation - solving the time invariant state equations State Transition Matrix and its properties- concepts of controllability and observability.

TEXT BOOKS

1 Modern Control Engineering by Kotsuhiko Ogata, Prentice Hall of India, 2010.

2 Automatic control systems by Benjamin C.Kuo, Prentice Hall of India, 2nd Edition.

REFERENCE BOOKS

1 Control Systems principles and design by M.Gopal, Tata Mc Graw Hill education Pvt Ltd., 4th Edition.

2 Control Systems Engineering by Norman S. Nise, Wiley Publications, 7th edition

3 Control Systems by Manik Dhanesh N, Cengage publications.

4 Control Systems Engineering by I.J.Nagarath and M.Gopal, Newage International Publications, 5th Edition

5 Control Systems Engineering by S.Palani, Tata Mc Graw Hill Publications.

6 Control Systems by A. Nagoor Kani, second edition, RBA Publications.

7 Control Systems by A. Ananad Kumar, second edition, PHI Publications.

WEB RESOURCES (Suggested)

1 https://archive.nptel.ac.in/courses/107/106/107106081/

2 https://archive.nptel.ac.in/courses/108/106/108106098/

3 https://nptelvideos.com/video.php?id=1423&c=14

4 http://www.digimat.in/nptel/courses/video/108102043/L03.html

5 https://nptel.ac.in/courses/108102043

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

II YEAR II SEMESTER
INDUCTION AND SYNCHRONOUS MACHINES LAB

Course Category	Lab Course	**Course Code**	**24EE402P**
Course Type	Laboratory	**L-T-P-C**	**3-0-0-3**
Prerequisites	**NIL**	**Internal Assessment**	**15**
		Semester End Examination	**35**
		Total Marks	**50**

COURSE OBJECTIVES	
1	To apply the concepts of speed control methods in 3-phase Induction Motor.
2	To experimentally develop circle diagram and obtain equivalent circuit to analyse the performance of 3-phase induction motor
3	To apply the concepts of power factor improvement on single phase Induction Motor
4	To perform various testing methods on alternators for experimentally predetermine the regulation
5	Performance curves of three-phase synchronous motor.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Analyze the speed control methods on 3-phase Induction Motor.	K4
CO2	Evaluate the performance of 3-phase Induction Motor by obtaining the locus diagram and equivalent circuit of 3-phase Induction Motor	K5
CO3	Adapt the power factor improvement methods for single phase Induction Motor.	K3
CO4	Pre-determine the regulation of 3-phase alternator	K3
CO5	Determine the synchronous machine reactance of 3-phase alternator	K3

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)														
	PO1	**PO2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PS O1**	**PSO 2**
CO1	3	2	-	-	-	-	-	-	-	-	-	-	1	1
CO2	2	1	-	1	-	-	-	-	-	-	-	1	-	1
CO3	-	1	-	-	-	-	-	-	-	-	-	-	-	-
CO4	3	2	2	-	-	-	-	-	-	-	-	-	1	-
CO5	1	2	1	-	-	-	-	-	-	-	-	-	-	-

Exp. No.	CONTENTS (Any 10 of the following experiments are to be conducted)
1	Brake test on three phase Induction Motor.
2	Circle diagram of three phase induction motor.
3	Speed control of three phase induction motor by V/f method.
4	Equivalent circuit of single-phase induction motor.
5	Power factor improvement of single-phase induction motor by using capacitors.
6	Load test on single phase induction motor.
7	Regulation of a three -phase alternator by synchronous impedance &MMF methods.
8	Regulation of three-phase alternator by Potier triangle method.
9	V and Inverted V curves of a three-phase synchronous motor.
10	Determination of X_d, X_q& Regulation of a salient pole synchronous generator.
11	Determination of efficiency of three phase alternator by loading with three phase induction motor.
12	Parallel operation of three-phase alternator under no-load and load conditions.
13	Determination of efficiency of a single-phase AC series Motor by conducting Brake test.

Online Learning Resources:
1. https://em-coep.vlabs.ac.in/List%20of%20ecperiments.html

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

II YEAR II SEMETSER
CONTROL SYSTEMS LAB

Course Category	Lab Course	**Course Code**	**24EE403P**
Course Type	Laboratory	**L-T-P-C**	**3-0-0-3**
Prerequisites	**NIL**	**Internal Assessment** **Semester End Examination** **Total Marks**	**15** **35** **50**

COURSE OBJECTIVES	
1	To impart hands on experience to understand the performance of basic control system components such as magnetic amplifiers, D.C. servo motors, A.C. Servo motors and Synchros.
2	To understand time and frequency responses of control system with and without controllers and compensators.
3	To know the different logic gates and boolean expressions using PLC.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		**Cognitive Level**
CO1	Analyze the performance of Magnetic amplifier, D.C and A.C. servo motors and synchros.	K4
CO2	Design of PID controllers and compensators.	K4
CO3	Evaluate temperature control of an oven using PID controller	K5
CO4	Determine the transfer function of D.C Motor and examine the truth table of logic gates using PLC.	K4
CO5	Judge the stability in time and frequency domain and Kalman's test for controllability and observability.	K4

K1- Remembering, K2- Understanding, K3-Applying, K4- Analyzing, K5- Evaluating, K6- Creating

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)													
	PO 1	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO 10**	**PO 11**	**PO 12**	**PSO1**	**PSO2**
CO1	2	1	-	-	-	-	-	-	2	2	-	-	1	1
CO2	3	2	2	1	-	-	-	-	2	2	-	1	2	2
CO3	3	3	-	-	-	-	-	-	2	2	-	1	1	2
CO4	2	1	-	-	-	-	-	-	2	2	-	-	1	-
CO5	3	3	2	1	2	-	-	-	2	2	-	1	2	2

Exp. No.	CONTENTS (Any 10 of the following experiments are to be conducted)
1	Analysis of Second order system in time domain
2	Characteristics of Synchros
3	Effect of P, PD, PI, PID Controller on a second order systems
4	Design of Lag and lead compensation – Magnitude and phase plot
5	Transfer function of DC motor
6	Root locus, Bode Plot and Nyquist Plot for the transfer function of systems up to 5^{th} order using MATLAB.
7	Kalman's test of Controllability and Observability using MAT LAB.
8	Temperature controller using PID
9	Characteristics of magnetic amplifiers
10	Characteristics of AC servo motor
11	Characteristics of DC servo motor
12	Study and verify the truth table of logic gates and simple Boolean expressions using PLC
13	Effect of feedback on DC servo motor.

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
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DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

II YEAR II SEMETSER
PYTHON PROGRAMMING
(Only EEE)

Course Category	Skill Enhanced Course	**Course Code**	**24AI401S**
Course Type		**L-T-P-C**	**0-1-2-2**
Prerequisites		**Continuous Internal Assessment** **Semester End Examination** **Total Marks**	

COURSE OBJECTIVES	
1	Introduce core programming concepts of Python programming language
2	Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
3	Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications using these

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to :		**Cognitive Level**
CO1	Develop essential programming skills in computer programming concepts like data types, control statements.	K3
CO2	Apply the basics of programming in the Python language.	K3
CO3	Solve coding tasks related Dictionaries, tuples and sets.	K3
CO4	Solve coding tasks related to the fundamental notions and techniques used in object- oriented programming.	K3
CO5	Apply the basics of Numpy and pandas related to the Data Science	K3

K1: Remember, K2: Understand, K3: Apply, K4: Analyze, K5: Evaluate, K6: Create.

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO1	3	2	1	1	1	-	-	-	-	-	-	1	3	3	2
CO2	3	2	1	1	1	-	-	-	-	-	-	1	3	3	2
CO3	3	2	1	1	1	-	-	-	-	-	-	1	3	3	2
CO4	3	2	2	3	3	-	-	-	-	-	-	1	3	3	2
CO5	3	2	2	3	3	-	-	-	-	-	-	1	3	3	2

COURSE CONTENT

UNTI-I:
Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.
Parts of Python Programming Language: Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.
Control Flow Statements: if statement, if-else statement, if...elif…else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

Sample Experiments:
1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.
4. Write a program to add and multiply complex numbers
5. Write a program to print multiplication table of a given number.

UNIT – II
Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, *args and **kwargs, Command Line Arguments.
Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.
Lists: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

Sample Experiments:
1. Write a program to define a function with multiple return values.
2. Write a program to define a function using default arguments.
3. Write a program to find the length of the string without using any library functions.
4. Write a program to check if the substring is present in a given string or not.
5. Write a program to perform the given operations on a list:
i. Addition ii. Insertion iii. slicing
6. Write a program to perform any 5 built-in functions by taking any list.

UNIT – III
Dictionaries: Creating Dictionary, Accessing and Modifying key:value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.
Tuples and Sets: Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

Sample Experiments:
1. Write a program to create tuples (name, age, address, college) for at least two members and concatenate the tuples and print the concatenated tuples.
2. Write a program to count the number of vowels in a string (No control flow allowed).
3. Write a program to check if a given key exists in a dictionary or not.
4. Write a program to add a new key-value pair to an existing dictionary.
5. Write a program to sum all the items in a given dictionary.

UNIT – IV

Files: Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Reading and Writing Binary Files, Pickle Module, Reading and Writing CSV Files, Python os and os.path Modules.

Object-Oriented Programming: Classes and Objects, Creating Classes in Python, Creating Objects in Python, Constructor Method, Classes with Multiple Objects, Class Attributes Vs Data Attributes, Encapsulation, Inheritance, Polymorphism.

Sample Experiments:

1. Write a program to sort words in a file and put them in another file. The output file should have only lower-case words, so any upper-case words from source must be lowered.
2. Python program to print each line of a file in reverse order.
3. Python program to compute the number of characters, words and lines in a file.
4. Write a program to create, display, append, insert and reverse the order of the items in the array.
5. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

UNIT – V

Introduction to Data Science: Functional Programming, JSON and XML with Python, NumPy with Python, Pandas.

Visual Aids for EDA(Exploratory Data Analysis): Technical requirements, Line chart, Bar charts, Scatter plot using seaborn, Polar chart, Histogram, Choosing the best chart

Sample Experiments:

1. Python program to check whether a JSON string contains complex object or not.
2. Python Program to demonstrate NumPy arrays creation using array () function.
3. Python program to demonstrate use of ndim, shape, size, dtype.
4. Python program to demonstrate basic slicing, integer and Boolean indexing.
5. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:

a) Apply head () function to the pandas data frame
b) Perform various data selection operations on Data Frame

6. Apply different visualization techniques using sample dataset

a) Line Chart b) Bar Chart c) Scatter Plots d)Bubble Plot

7. Generate Scatter Plot using seaborn library for iris dataset
8. Apply following visualization Techniques for a sample dataset

a) Area Plot b) Stacked Plot c) Pie chart d) Table Chart

Reference Books:

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2ndEdition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.
4. Python : The Complete Reference, by Martin C Brown, McGraw Hill India.

Online Learning Resources/Virtual Labs:

1. https://www.coursera.org/learn/python-for-applied-data-science-ai
2. https://www.coursera.org/learn/python?specialization=python#syllabus

PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

II Year II Semester
DESIGN THINKING & INNOVATION
(Common to CE, EEE, ME, ECE, CSE, IT, CSE(AI&ML), CSE(AI), CSE(DS) and CSE(CYBER SECURITY)

Course Category	BS&H	**Course Code**	24HM401P
Course Type	Theory	**L-T-P-C**	1 -0 -2-2
Prerequisites		**Internal Assessment** **Semester End Examination** **Total Marks**	30 70 100

Course Outcomes		**Blooms Taxonomy Level**
Upon successful completion of the course, the student will be able to		
CO 1	Define the concepts related to design thinking.	K1
CO 2	Explain the fundamentals of Design Thinking and innovation.	K2
CO 3	Apply the design thinking techniques for solving problems in various sectors.	K3
CO 4	Analyze to work in a multidisciplinary environment.	K4
CO 5	Evaluate the value of creativity.	K5

Contribution of Course Outcomes towards achievement of Program Outcomes (1 – Low, 2 - Medium, 3 – High)

CO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	1	1	3		1	3					1	1
CO2			3		2	3						
CO3		1	3			3			1			1
CO4			3			3						
CO5			3			3					3	2

COURSE CONTENT

UNIT – I Introduction to Design Thinking

Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.

UNIT - II Design Thinking Process

Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development

Activity: Every student presents their idea in three minutes, Every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.

UNIT - III Innovation

Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations. Creativity to Innovation. Teams for innovation, Measuring the impact and value of creativity.

Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation.

UNIT - IV Product Design

Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications. Innovation towards product design Case studies.

Activity: Importance of modeling, how to set specifications, Explaining their own product design.

UNIT – V Design Thinking in Business Processes

Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs. Design thinking for Startups. Defining and testing Business Models and Business Cases. Developing & testing prototypes.

Activity: How to market our own product, about maintenance, Reliability and plan for startup.

Textbooks:

1. Tim Brown, Change by design, 1/e, Harper Bollins, 2009.
2. Idris Mootee, Design Thinking for Strategic Innovation, 1/e, Adams Media, 2014.

Reference Books:

1. David Lee, Design Thinking in the Classroom, Ulysses press, 2018.
2. Shrrutin N Shetty, Design the Future, 1/e, Norton Press, 2018.
3. William lidwell, Kritinaholden, &Jill butter, Universal principles of design, 2/e, Rockport Publishers, 2010.
4. Chesbrough.H, The era of open innovation, 2003.

Web Resources:

- https://nptel.ac.in/courses/110/106/110106124/
- https://nptel.ac.in/courses/109/104/109104109/
- https://swayam.gov.in/nd1_noc19_mg60/preview
- https://onlinecourses.nptel.ac.in/noc22_de16/preview