

COURSE STRUCTURE

For

B.Tech.

Electrical and Electronics Engineering

(from 2024 Admitted batch onwards)



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)



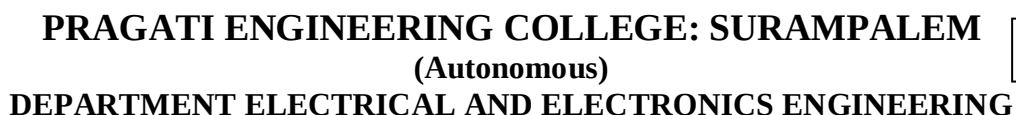
PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

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

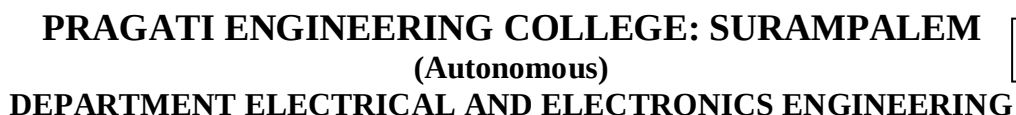


2024-2025 Admitted Batch

COURSE STRUCTURE

I YEAR – I SEMESTER

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	24EE202T	Electrical Circuit Analysis-I	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	24EE202P	Electrical Circuits 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



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

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PRAGATI ENGINEERING COLLEGE

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(AUTONOMOUS)

Department of Electrical and Electronics Engineering

Course Structure

B.Tech. III Year I Semester

S.No.	Course Code	Category	Title	L	T	P	C
1	24EE501T	Professional Core	Power Electronics	3	0	0	3
2	24EE502T	Professional Core	Digital Circuits	3	0	0	3
3	24EE503T	Professional Core	Power Systems-II	3	0	0	3
4	1. 24EE504T 2. 24EE505T 3. 24EC512T MOOCs 24EE506T	Professional Elective – I	1. Signals and Systems 2. Computer Architecture and Organization 3. Communication systems 4. Any one of 12 – WEEK SWAYAM NPTEL(MOOCs) * i. Charging Infrastructure ii. Phase –Locked Loops iii. Power Electronics Applications in Power Systems	3	0	0	3
5	1. 24CE508T 2. 24ME509T 3. 24EC514T 4. 24CS506T	Open Elective-I	1. Construction Project and Management 2. Sustainable Energy Technologies 3. Electronic Devices and Circuits 4. Introduction to Cloud Computing	3	0	0	3
6	24EE501P	Professional Core	Power Electronics Laboratory	0	0	3	1.5
7	24EE509P	Professional Core	Analog and Digital Circuits Laboratory	0	0	3	1.5
8	24HE501S/ 24CS501S	Skill Enhancement course	Soft skills / Sales force Administrator Explorer	0	1	2	2
9	24EC518P	Engineering Science	Tinkering Laboratory	0	0	2	1
10	24EE501I	Community Service Project Internship		-	-	-	2
Total				15	1	10	23

OPEN ELECTIVE COURSES OFFERED TO OTHER DEPARTMENTS:

Sl. No	Course Code	Category	Course Title	L	T	P	Credits
1.	24EE507T	Open Elective-I	Renewable Energy Sources	3	0	0	3
2.	24EE508T	Open Elective-I	Concept of Energy Audit and Management	3	0	0	3



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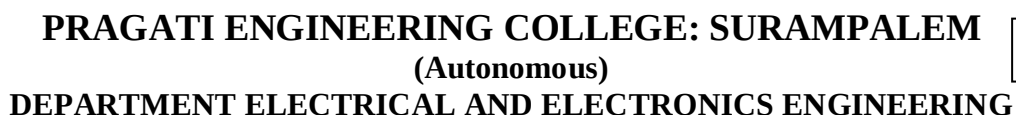
Department of Electrical and Electronics Engineering

B.Tech. III Year II Semester

S.No.	Course Code	Category	Title	L	T	P	C
1	24EE601T	Professional Core	Electrical Measurements and Instrumentation	3	0	0	3
2	24EE602T	Professional Core	Microprocessors and Microcontrollers	3	0	0	3
3	24EE603T	Professional Core	Power System Analysis	3	0	0	3
4	1. 24EE604T 2. 24EE605T 3. 24EE606T MOOCs 24EE607T	Professional Elective-II	1. Switchgear and Protection 2. Advanced Control Systems 3. Renewable and Distributed Energy Technologies 4. MOOCs /SWAYAM 12 Weeks Course*. i. Modeling and TCAD Simulation of Solar Cell ii. Control and Tuning methods in Switched mode power converters iii. Electronics system design : Hands on circuits and PCB Design with CAD Software	3	0	0	3
5	1. 24EE608T 2. 24EE609T 3. 24EE610T MOOCs 24EE611T	Professional Elective-III	1. Electric Drives 2. Digital Signal Processing 3. High Voltage Engineering 4. MOOCs /SWAYAM 12 Weeks Course.* i. Sliding Mode Control and Applications ii. Modeling , Analysis and Estimation of Three phase Unbalanced Power Network iii. Line Commutated and PWM Rectifiers	3	0	0	3
6	1. 24CE612T 2. 24ME615T 3. 24EC613T 4. 24CS606T 5. 24EC518P	Open Elective – II	1. Disaster Management 2. Additive manufacturing 3. Principles of Communication 4. Object Oriented Programming Through Java 5. Entrepreneurship and Venture Creation	3	0	0	3
7	24EE601P	Professional Core	Electrical Measurements and Instrumentation Laboratory	0	0	3	1.5
8	24EE602P	Professional Core	Microprocessors and Microcontrollers Laboratory	0	0	3	1.5
9	24EE601S/ 24CS601S	Skill Enhancement course	IoT Applications of Electrical Engineering Laboratory / Salesforce Developer Catalyst	0	1	2	2
10	24EA601T	Audit Course	Research Methodology and IPR	2	0	0	-
Total				20	1	08	23
Mandatory Industry Internship of 08 weeks duration during summer vacation							

OPEN ELECTIVE COURSES OFFERED TO OTHER DEPARTMENTS:

Sl. No	Course Code	Category	Course Title	L	T	P	Credits
1	24EE612T	Open Elective – II	Fundamentals of Electric Vehicles	3	0	0	3
2.	24EE613T	Open Elective – II	Electrical Wiring Estimation and Costing	3	0	0	3



I Year I Semester
ENGINEERING PHYSICS
(Common to CSE, CSE (AI), 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

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.

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Analyze the intensity variation of light due to polarization, interference and diffraction	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

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

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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.



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TEXT BOOKS

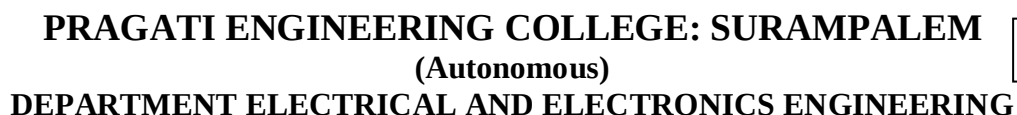
“A Text book of Engineering Physics” by M.N.Avadhanulu, P.G.Kshir sagar -S.Chand Publications,
“Engineering Physics” by Tirupati Naidu & Veeranjanyalu, V G S Publishers
“Engineering Physics” by P.K Palanisamy, Sci Tech Publication

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/>



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

(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

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.

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Develop and use of matrix algebra techniques that are needed by engineers for practical 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)**

[illegible]



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, Micheal 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>



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I Year I Semester
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CSE, CSE (AI), 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	30
		Semester End Examination	70
		Total Marks	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, Dhanpat Rai & 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. Bhattacharya, 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		Cognitive Level
Upon successful completion of the course, the student will be able to:		
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 - SEMICONDUCTOR DEVICES

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 - BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION

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-3 code, Gray code, 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:

- Robert.L. Boylestad & Louis Nashelsky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
- Digital Design by Morris Mano, 3E, Prentice Hall, India, 2001

Reference Books:

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

Web References:

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



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I Year I Semester
ENGINEERING GRAPHICS
(Common to CSE, CSE (AI), 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, Involute, 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. Kanniah, 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, Dhananjay Jolhe, 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
INTRODUCTION TO PROGRAMMING
(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

COURSE OBJECTIVES

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	To familiarize students with programming concepts such as data types, control structures, functions and arrays.
5	To encourage collaborative e learning and team work in coding projects.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to :		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	Develop problem-solving skills and the ability to debug and optimize the code.	K4

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

Contribution of Course Outcome 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	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,2016,2ndedition
3. C Programming, A ProblemSolvingApproach,Forouzan,Gilberg,Prasad,CENGAGE,3rdedition, 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 (AI), 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	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES

1	The student will have exposure to various experimental skills which is essential 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

A Textbook of Practical Physics - 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 (AI), 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, Dhanpat Rai & 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
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

R23

PART B: ELECTRONICS ENGINEERING LABORATORY

COURSE OBJECTIVES

To impart knowledge on the principles of digital electronics and fundamentals of electronic devices & 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, Multimeters, 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

- Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- Exposure to Turbo C, gcc
- 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

- Sum and average of 3 numbers
- Conversion of Fahrenheit to Celsius and vice versa
- 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.

- Finding the square root of a given number
- Finding compound interest
- Area of a triangle using heron's formulae
- 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

- Evaluate the following expressions.
 - $A+B*C+(D*E)+F*G$
 - $A/B*C-B+A*D/3$
 - $A+++B---A$
 - $J=(i++)+(++i)$
- Find the maximum of three numbers using conditional operator
- Take marks of 5 subjects in integers, 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.

- Write a C program to find them ax and m in off our numbers using if-else.
- Write a C program to generate electricity bill.
- Find the roots of the quadratic equation.
- Write a C program to simulate a calculator using switch case.
- 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: Iterative problems e.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-D and more generically n-D arrays and referencing individual array elements from the defined array. Using integer 1-D arrays, explore search solution linear search.

Suggested Experiments/Activities:

Tutorial 7: 1D Arrays: searching.

Lab 7: 1D Array manipulation, linear search

- i) Find the min and max of a 1-D integer array.
- ii) Perform linear search on 1 D array.
- iii) Reverse 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.

Lab 8: 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 & 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 a 1D array using malloc()
- ii) Write a C program to find the total, average of n students using structures
- iii) Enter students data using calloc() and display failed students list
- iv) Read student name and marks from the command line and display the student details along with 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 using `f 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 (AI), 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	30
		Semester End Examination	70
		Total Marks	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 etiquette: 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 IAS 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 (AI), CE, EEE ME)

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

COURSE OBJECTIVES

The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.

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	Solve some societal issues by applying acquired knowledge, facts, and techniques.	
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.



I Year II Semester
COMMUNICATIVE ENGLISH
(Common to CSE, CSE (AI), 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

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.

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

[illegible]



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: Elon Musk

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 of 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

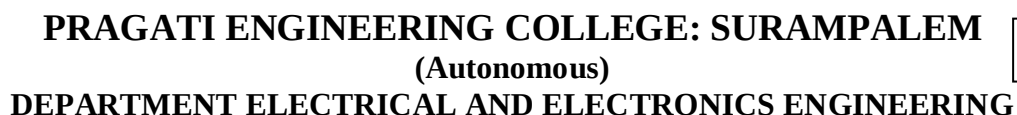
1. Dubey, Shamji & Co. English for Engineers, Vikas Publishers, 2020
2. Bailey, Stephen. Academic writing: A Handbook for International Students. Routledge, 2014
3. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge University Press, 2019.
4. Lewis, Norman. Word Power Made Easy- The Complete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



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

[illegible]



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 5th 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 (AI), EEE)

Course Category	Basic Sciences	Course Code	24BC201T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	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, Dhanpat Rai, 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 Inorganic Chemistry, 5th Edition, Wiley Publications, Feb. 2008
3. Text book of Polymer Science, Fred W. Billmeyer Jr, 3rd Edition

WEB RESOURCES

UNIT -I

Structure and Bonding Models: <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 (AI), 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	30
		Semester End Examination	70
		Total Marks	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
(Autonomous)
DEPARTMENT ELECTRICAL AND ELECTRONICS ENGINEERING

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 Text 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/>



I Year II Semester
ELECTRICAL CIRCUIT ANALYSIS - I
(EEE)

Course Category	Professional Core	Course Code	24EE202T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

To develop an understanding of the fundamental laws, elements of electrical circuits and to apply circuit analysis to DC and AC circuits.

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Remembering the basic electrical elements and different fundamental laws.	K2
CO2	Understand the network reduction techniques, transformations, concept of self-inductance and mutual inductance, phasor diagrams, resonance and network theorems.	K3
CO3	Apply the concepts to obtain various mathematical and graphical representations.	K3
CO4	Analyse nodal and mesh networks, series and parallel circuits, steady state response, different circuit topologies (with R, L and C components).	K4
CO5	Analyze the performance of various electrical, magnetic and single-phase circuits.	K4

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

(1 – Low, 2 - Medium, 3 – High)

[illegible]



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CO4	2	2	2	-	-	-	-	-	-	-	-	-
CO5	2	2	2	-	-	-	-	-	-	-	-	-

COURSE CONTENT

UNIT - I

INTRODUCTION TO ELECTRICAL CIRCUITS

Basic Concepts of passive elements of R, L, C and their V-I relations, Sources (dependent and independent), Kirchoff's laws, Network reduction techniques (series, parallel, series - parallel, star-to-delta and delta-to-star transformation), source transformation technique, nodal analysis and mesh analysis to DC networks with dependent and independent voltage and current sources, node and mesh analysis.

UNIT - II

MAGNETIC CIRCUITS

Basic definition of MMF, flux and reluctance, analogy between electrical and magnetic circuits, Faraday's laws of electromagnetic induction – concept of self and mutual inductance, Dot convention – coefficient of coupling and composite magnetic circuit, analysis of series and parallel magnetic circuits.

UNIT - III

SINGLE PHASE CIRCUITS

Characteristics of periodic functions, Average value, R.M.S. value, form factor, representation of a sine function, concept of phasor, phasor diagrams, node and mesh analysis. Steady state analysis of R, L and C circuits to sinusoidal excitations-response of pure resistance, inductance, capacitance, series RL circuit, series RC circuit, series RLC circuit, parallel RL circuit, parallel RC circuit. Impedance, Power triangle, real, reactive, apparent power, instantaneous power, complex power.

UNIT - IV

RESONANCE AND LOCUS DIAGRAMS

Series Resonance: Characteristics of a series resonant circuit, Q-factor, selectivity and bandwidth, expression for half power frequencies; Parallel resonance: Q-factor, selectivity and bandwidth; Locus diagram: RL, RC, RLC with R, L and C variables.

UNIT – V

NETWORK THEOREMS (DC & AC EXCITATIONS)

Superposition theorem, Thevenin's theorem, Norton's theorem, Maximum Power Transfer theorem, Reciprocity theorem, Millman's theorem, Tellegen's theorem and compensation theorem.

Textbooks:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata McGraw Hill Education, 2005, sixth edition.
2. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition



Reference Books:

1. Fundamentals of Electrical Circuits, Charles K. Alexander and Mathew N.O. Sadiku, McGraw Hill Education (India), 2013, Fifth Edition
2. Electric Circuits (Schaum's outline Series), Mahmood Nahvi, Joseph Edminister, and K. Rao, McGraw Hill Education, 2017, Fifth Edition.
3. Electric Circuits, David A. Bell, Oxford University Press, 2009, Seventh Edition.
4. Introductory Circuit Analysis, Robert L Boylestad, Pearson Publications, 2023, Fourteenth Edition.
5. Circuit Theory: Analysis and Synthesis, A. Chakrabarti, Dhanpat Rai & Co., 2018, Seventh Revised Edition.
6. Electrical Circuit Analysis, N. C. Jagan and C Lakshminarayana, B.S. Publications, First Edition.

Web Resources:

1. https://onlinecourses.nptel.ac.in/noc23_ee81/preview
2. <https://nptel.ac.in/courses/108104139>
3. <https://nptel.ac.in/courses/108106172>
4. <https://nptel.ac.in/courses/117106108>



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I Year II Semester
ENGINEERING WORKSHOP
(Common to CSE, CSE (AI), 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	30
		Semester End Examination	70
		Total Marks	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

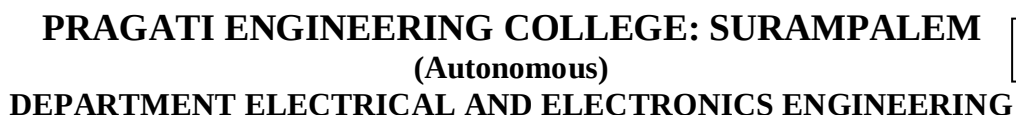
1. **Demonstration:** Safety practices and precautions to be observed in workshop.
 2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint
 3. **Sheet 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.
2. Workshop Processes, Practices and Materials; Bruce J. Black, Routledge publishers, 5th Edn. 2015.
3. A Course in Workshop Technology Vol I. & II, B.S. Raghuwanshi, Dhanpath Rai & Co., 2015 & 2017.

Reference Books:

1. Elements of Workshop Technology, Vol. I by S. K. Hajra Choudhury & 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.; Atul Prakashan, 2021-22.



I Year II Semester
COMMUNICATIVE ENGLISH LABORATORY
(Common to CSE, CSE (AI), 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

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.

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

[illegible]



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,(2ndEd),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/UCNfm92h83W2i2jc5Xwp_IA

Suggested Software:

1. Walden Infotech
2. Young India Films



I Year II Semester
ELECTRICAL CIRCUITS LABORATORY
(EEE)

Course Category	Professional Core	Course Code	24EE202P
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

To impart hands on experience in verification of circuit laws and theorems, measurement of circuit parameters, study of circuit characteristics. It also gives practical exposure to the usage of different circuits with different conditions.

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Understand the concepts of network theorems, node and mesh networks, series and parallel resonance and Locus diagrams.	K2
CO2	Apply various theorems to compare practical results obtained with theoretical calculations.	K3
CO3	Determine self, mutual inductances and coefficient of coupling values, parameters of choke coil.	K3
CO4	Analyse different circuit characteristics with the help of fundamental laws and various configurations.	K4
CO5	Create locus diagrams of RL, RC series circuits and examine series and parallel resonance.	K4

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

(1 – Low, 2 - Medium, 3 – High)

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

List of Experiments:

1. Verification of node and mesh analysis.
2. Verification of network reduction techniques.
3. Determination of cold and hot resistance of an electric lamp
4. Determination of Parameters of a choke coil.
5. Determination of self, mutual inductances, and coefficient of coupling
6. Series and parallel resonance
7. Locus diagrams of R-L (L Variable) and R-C (C Variable) series circuits
8. Verification of Superposition theorem
9. Verification of Thevenin's and Norton's Theorems
10. Verification of Maximum power transfer theorem
11. Verification of Compensation theorem
12. Verification of Reciprocity and Millman's Theorems
13. Verification of Tellegen's theorem.

Reference Books:

1. Engineering Circuits Analysis, Jack Kemmerly, William Hayt and Steven Durbin, Tata McGraw Hill Education, 2005, sixth edition.
2. Network Analysis, M. E. Van Valkenburg, Pearson Education, 2019, Revised Third Edition



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I Year II Semester
CHEMISTRY LABORATORY
(Common to CSE, CSE (AI), EEE)

Course Category	Basic Sciences	Course Code	24BC201P
Course Type	Laboratory	L-T-P-C	0-0-2-1
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	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 Publications by J. Mendham, R.C. Denney, J.D. Barnes and B. Sivasankar



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

Course Category	Humanities	Course Code	24MH201P
Course Type	Theory	L-T-P-C	0-0-1-0.5
Prerequisites		Continuous Evaluation	90
		Viva Voce	10
		Total Marks	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	Understand the importance of yoga and sports for Physical fitness and sound health.	
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 Asana 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:

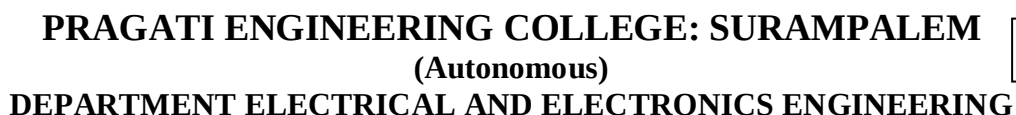
1. Gordon Edlin, Eric Golanty. Health and Wellness, 14th Edn. Jones & Bartlett Learning, 2022
2. T.K.V.Desikachar. The Heart of Yoga: Developing a Personal Practice
3. Archie J.Bahm. Yoga Sutras of Patanjali, Jain Publishing Company, 1993
4. Wiseman, John Lofty, SAS Survival Handbook: The Ultimate Guide 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.



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

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

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	Apply numerical integral techniques to different Engineering problems. 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)**

[illegible]



COURSE CONTENT

UNIT I

Iterative Methods:

Introduction–Solutionsof algebraicandtranscendentalequations: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 $1/3^{\text{rd}}$ and $3/8^{\text{th}}$ rule– Solution of initial value problems by Taylor’s series– Picard’s method of successive approximations–Euler’s method–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.

Complex integration:Lineintegral–Cauchy’s integral theorem–Cauchy’s integral formula –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 $e^z, \ln z, z^2, z^n$ (n positive integer), $\sin z, \cos z, z+a/z$. 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**, Higher Engineering Mathematics, 44th Edition, Khanna Publishers.
2. Micheael Greenberg, Advanced Engineering Mathematics, Second Edition, Pearson’s edition.

REFERENCE BOOKS

1. **Erwin Kreyszig**, Advanced Engineering Mathematics, 10th Edition, Wiley-India.
2. **B.V.Ramana**, Higher Engineering Mathematics, 2007 Edition, Tata Mc.Graw Hill Education.
3. **Steven C. Chapra**, Applied Numerical Methods with MATLAB for Engineering and Science, Tata Mc. Graw Hill Education.
4. **M.K.Jain, S.R.K.Iyengar and R.K.Jain**, Numerical Methods for Scientific and Engineering Computation, New Age International Publications.
5. **J. W. Brown and R. V. Churchill**, Complex Variables and Applications, 9th 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	30
		Semester End Examination	70
		Total Marks	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

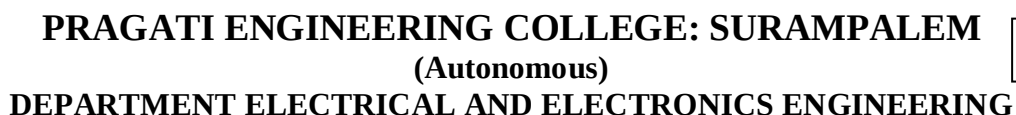


Reference Books

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



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

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.

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 dipole 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

[illegible]



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, $\nabla \cdot \vec{D} = \rho_v$), 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 Poisson'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 ($\nabla \cdot \vec{B} = 0$), 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 ($\nabla \times \vec{E} = -\frac{\partial \vec{B}}{\partial t}$), integral and point forms of Maxwell'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 Edition. 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, Mahamood Navi, 4th Edition, 2014.
- 5 Electromagnetism : 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 Antennas and wave propagation), by K.A. Gangadhar, P.M. Ramanathan, 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



II YEAR – I SEMESTER

ELECTRICAL CIRCUIT ANALYSIS-II

[illegible]



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

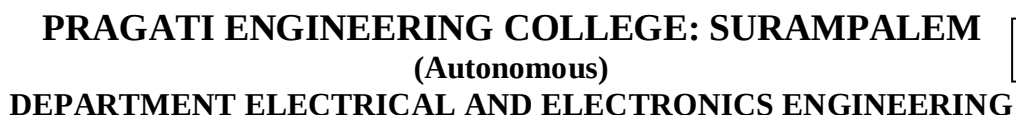


REFERENCE BOOKS

- 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/>



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

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.

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

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

[illegible]



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/](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/>



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

R23

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	15
		Semester End Examination	35
		Total Marks	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>



PRAGATI ENGINEERING COLLEGE: SURAMPALEM
(Autonomous)
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

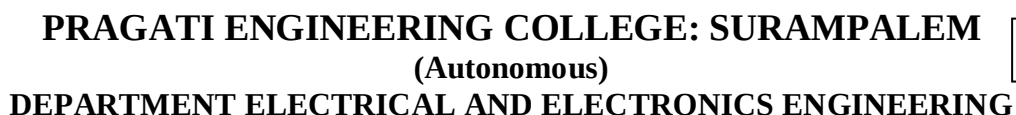
Outcomes (1 – Low, 2 - Medium, 3 – High)

	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



II YEAR I SEMESTER DATA STRUCTURES LAB

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 efficient programs
3	To develop skills to apply appropriate data structures in problem solving.

At the end of the course, Student will be able to :

Contribution of Course Outcomes towards achievement of Program

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

[illegible]



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 and circular linked 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 circular double 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 arrays and linked lists, Applications of stacks in expression evaluation, backtracking, reversing list etc.

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 queues using arrays and linked lists, Applications of queues scheduling, etc.

Deque: Introduction to deque (double-ended queues), Operations on deque 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-order traversal of 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 Peter Sanders.
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 David Ranum.
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



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	30
		Semester End Examination	70
		Total Marks	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

[illegible]



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- Isoquants and 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>



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

R23

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

COURSE OBJECTIVES

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	Analyze diode clipping and clamping circuits. Understand different types of biasing circuits of a transistor	K2
CO2	Use small signal modeling for transistor circuit analysis and illustrate the operation of 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 and I to V Converter, Sample and Hold Circuit, Log and Antilog Amplifier, Multiplier and Divider, Differentiator, integrator.

Comparators and Waveform Generators: Introduction, Comparator, Square Wave Generator, Monostable Multivibrator, Triangular Wave Generator, Sine Wave Generators

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).

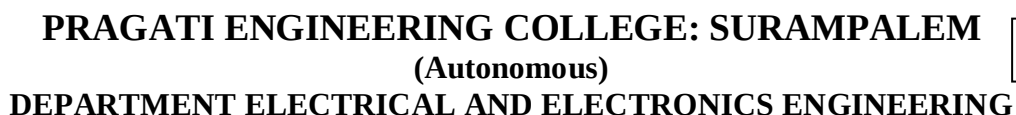
Digital to Analog And Analog to Digital Converters: Introduction, basic DAC techniques, weighted resistor DAC, R-2R ladder DAC, inverted R-2R DAC, A-D Converters – parallel Comparator type ADC, counter type ADC, successive approximation ADC and dual slope ADC, DAC and ADC Specifications

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



**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	30
		Semester End Examination	70
		Total Marks	100

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.

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

Contribution of Course Outcomes towards achievement of Program

[illegible]



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/



II YEAR II SEMESTER INDUCTION AND SYNCHRONOUS MACHINES

COURSE OBJECTIVES

COURSE OUTCOMES

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)

[illegible]



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



II YEAR II SEMESTER CONTROL SYSTEMS

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.

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

[illegible]



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>



II YEAR II SEMESTER

INDUCTION AND SYNCHRONOUS MACHINES LAB

[illegible]



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%20experiments.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	15
		Semester End Examination	35
		Total Marks	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	PS O1	PSO 2
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
(Autonomous)
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

UNIT-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



COURSE CONTENT

UNIT 1

Power Semi-Conductor Devices - Silicon controlled rectifier (SCR) – Two transistor analogy - Static and Dynamic characteristics – Turn on and Turn off Methods - Triggering Methods (R, RC and UJT) – Snubber circuit design. Static and Dynamic Characteristics of Power MOSFET and Power IGBT-Numerical problems.

UNIT 2

Single-phase AC-DC Converters - Single-phase half-wave controlled rectifiers - R and RL loads with and without freewheeling diode - Single-phase fully controlled mid-point and bridge converter with R load, RL load and RLE load - Continuous and Discontinuous conduction - Effect of source inductance in Single-phase fully controlled bridge rectifier – Expression for output voltages – Single-phase Semi-Converter with R load-RL load and RLE load – Continuous and Discontinuous conduction - Dual converter and its mode of operation - Numerical Problems.

UNIT 3

Three-phase AC-DC Converters & AC – AC Converters

Three-phase half-wave Rectifier with R and RL load - Three-phase fully controlled rectifier with R and RL load - Three-phase semi converter with R and RL load - Expression for Output Voltage - Numerical Problems. Single-phase AC-AC power control by phase control with R and RL loads – Expression for rms output voltage – Single-phase step down and step up Cycloconverter – Numerical Problems.

UNIT 4

DC–DC Converters - Operation of Basic Chopper – Analysis of Buck, Boost and Buck-Boost converters in Continuous Conduction Mode (CCM) and Discontinuous Conduction Modes (DCM) -Output voltage equations using volt-sec balance in CCM & DCM – Expressions for output voltage ripple and inductor current ripple – control techniques – Introduction to PWM control-Numerical Problems.

UNIT 5

DC–AC Converters - Introduction - Single-phase half-bridge and full-bridge inverters with R and RL loads – Phase Displacement Control – PWM with bipolar voltage switching, PWM with unipolar voltage switching - Three-phase square wave inverters - 120° conduction and 180° conduction modes of operation - Sinusoidal Pulse Width Modulation - Current Source Inverter (CSI) –Numerical Problems.

TEXT BOOKS

- 1 Power Electronics: Converters, Applications and Design by Ned Mohan, Tore M Undeland, William P Robbins, John Wiley & Sons, 2002.
- 2 Power Electronics: Circuits, Devices and Applications – by M. H. Rashid, Prentice Hall of India, 2nd edition, 2017.
- 3 Power Electronics: Essentials & Applications by L.Umanand, Wiley, Pvt. Limited, India, 2009.

REFERENCE BOOKS

- 1 Elements of Power Electronics–Philip T.Krein. Oxford University Press; Second edition, 2014.
- 2 Power Electronics – by P.S.Bhimbra, Khanna Publishers.
- 3 Thyristorised Power Controllers – by G. K. Dubey, S. R. Doradla, A. Joshi and R. M. K.Sinha, New Age International (P) Limited Publishers, 1996.
- 4 Power Electronics: by Daniel W.Hart, Mc Graw Hill, 2011.

WEB RESOURCES (Suggested)

- 1 <https://ocw.mit.edu/courses/6-334-power-electronics-spring-2007>
- 2 <https://archive.nptel.ac.in/courses/108/101/108101126>

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

3	https://nptel.ac.in/courses/108/102/108102145/
4	https://nptel.ac.in/courses/108/101/108101038/

III Year I Semester

DIGITAL CIRCUITS

(For Electrical and Electronics Engineering)

Course Category	Professional Core Courses	Course Code	24EE502T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Knowledge of electronic components and semiconductor devices, number systems, binary arithmetic, Boolean or switching algebra and logic gates.	Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES

1	To know the simplification methods of Boolean functions
2	To understand the realization of arithmetic, data routing and memory logic circuits.
3	To know the operation and design of various counters and registers.
4	To understand the analysis and design of synchronous sequential circuits.
5	To understand the basic concepts of digital integrated circuits.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Use the concepts of Boolean algebra, K-map, tabulation method in Minimization of switching functions and able to design the arithmetic combinational circuits.	K3
CO2	Realize different types of data routing combinational circuits and PLDs.	K4
CO3	Apply knowledge of flip-flops in designing of registers and counters.	K3
CO4	Analyze synchronous sequential circuits and apply different methods for the design of synchronous sequential circuits.	K4
CO5	Understand the logic families in the form of digital integrated 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)

[illegible]



COURSE CONTENT

UNIT 1

Combinational logic circuits – I - Definition of combinational logic, canonical forms, Generation of switching equations from truth tables, simplification of logic functions using Boolean theorems, NAND and NOR implementations, Karnaugh maps – 3,4,5 variables, Incompletely specified functions (Don't care terms), Simplifying Max term equations, Quine- McCluskey minimization technique, General approach to combinational logic design, Look ahead carry adder, Cascading full adders, 4-bit adder-subtractor circuit, BCD adder circuit, Excess 3 adder, Binary comparators.

UNIT 2

Combinational logic circuits – II - Decoders, BCD decoders, 7 segment decoder, higher order decoder, multiplexer, higher order multiplexing, de-multiplexers, higher order de-multiplexing, realization of Boolean functions using decoders, multiplexers, encoders, priority encoder, Read only and Read/Write Memories, Programmable ROM, PAL, PLA-Basics structures, programming tables of PROM, PAL, PLA, realization of Boolean functions.

UNIT 3

Sequential logic circuits - Timing considerations of flip-flops, master-slave flip-flop, edge triggered flip-flops, characteristic equations, flip-flops with reset and clear terminals, excitation tables, conversion from one flip-flop to another flip-flop, design of asynchronous and synchronous counters, design of modulus-N counters, Johnson counter, ring counter, design of registers - buffer register, control buffer register, shift register, bi-directional shift register, universal shift register.

UNIT 4

Sequential Circuit Design - Mealy and Moore models, State machine notation, Synchronous Sequential circuit analysis, Construction of state diagrams, Analysis of clocked sequential circuits, realization of sequence detector circuit, state reduction and assignments, design procedure.

UNIT 5

Digital integrated circuits: - Logic levels, propagation delay time, power dissipation, fan-out and fan-in, noise margin, logic families – RTL and DTL Circuits, TTL, Emitter-Coupled Logic, Metal-Oxide Semiconductor, Complementary MOS, CMOS Transmission Gate Circuits.

TEXT BOOKS

- 1 Switching and finite automata theory Zvi. Kohavi, 3rd edition, Cambridge University Press, 2010.
- 2 M. Morris Mano and M. D. Ciletti, "Digital Design", 4th Edition, Pearson Education, 2006
- 3 "Digital Electronics" by Ray Ryan and Lisa A Doyle
- 4 "Digital Circuits and Design" by Salivahanan S

REFERENCE BOOKS

- 1 Fundamentals of Logic Design by Charles H. Roth Jr, Jaico Publishers, 5th Edition, 1992.
- 2 Switching Theory and Logic Design by A. Anand Kumar, Prentice Hall India Pvt., Limited, Third Edition, 2016.
- 3 Floyd & Jain, "Digital Fundamentals", Pearson Education, 2007.
- 4 Switching Theory and Logic Design by A. Anand Kumar.
- 5 William Gothmann, "Digital Electronics, An Introduction to Theory and Practice", 2nd edition, PHI-2008.

WEB RESOURCES (Suggested)

- 1 <https://nptel.ac.in/courses/117106086>.
- 2 <https://nptel.ac.in/courses/108105113>.

PRAGATI ENGINEERING COLLEGE



COURSE CONTENT

UNIT 1

Transmission Line Parameters Calculations - Conductor materials – Types of conductors – Calculation of resistance for solid conductors – Calculation of inductance for Single-phase and Three-phase single and double circuit lines– Concept of GMR and GMD–Symmetrical and asymmetrical conductor configuration with and without transposition– Bundled conductors, Skin and Proximity effects. Calculation of capacitance for 2 wire and 3 wire systems – Effect of ground on capacitance – Capacitance calculations for symmetrical and asymmetrical single and Three-phase single and double circuit lines without and with Bundled conductors.

UNIT 2

Performance Analysis of Transmission Lines - Classification of Transmission Lines – Short, medium, long lines and their model representation –Nominal-T, Nominal- π and A, B, C, D Constants for symmetrical Networks. Rigorous Solution for long line equations –Representation of Long lines – Equivalent T and Equivalent π network models - Surge Impedance and Surge Impedance Loading of Long Lines - Regulation and efficiency for all types of lines – Ferranti effect.

UNIT 3

Power System Transients - Types of System Transients – Propagation of Surges – Attenuation–Distortion– Reflection and Refraction Coefficients. Termination of lines with different types of conditions: Open Circuited Line– Short Circuited Line, Line terminated through a resistance and line connected to a cable. Reflection and Refraction at a T-Junction.

UNIT 4

Corona & Effects of transmission lines - Description of the phenomenon – Types of Corona - critical voltages and power loss – Advantages and Disadvantages of Corona - Factors affecting corona - Radio Interference.

UNIT 5

Sag and Tension Calculations and Overhead Line Insulators: Sag and Tension calculations with equal and unequal heights of towers–Effect of Wind and Ice weight on conductor – Stringing chart and sag template and its applications. Types of Insulators – Voltage distribution in suspension insulators–Calculation of string efficiency and Methods for String efficiency improvement – Capacitance grading and Static Shielding.

TEXT BOOKS

- 1 Electrical Power Systems – by C.L.Wadhwa, New Age International (P) Limited, 1998.
- 2 Power System Engineering by I.J.Nagarath and D.P.Kothari, Tata McGraw Hill, 3rd Edition, 2019.

REFERENCE BOOKS

- 1 Power system Analysis–by John J Grainger William D Stevenson, TMC Companies, 4th edition.
- 2 Power System Analysis and Design by B.R.Gupta, Wheeler Publishing.
- 3 A Text Book on Power System Engineering by M.L.Soni, P.V.Gupta, U.S.Bhatnagar A.Chakrabarthy, Dhanpat Rai Co Pvt. Ltd. 2016.
- 4 Electrical Power Systems by P.S.R. Murthy, B.S. Publications, 2017.

WEB RESOURCES (Suggested)

- 1 <https://archive.nptel.ac.in/courses/108/105/108105104>
- 2 <https://archive.nptel.ac.in/courses/108/102/108102047>
- 3 <https://circuitglobe.com/calculation-of-sag-and-tension.html>

(AUTONOMOUS)

Course Category	Professional Elective Courses	Course Code	24EE504T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Transform techniques	Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

**COURSE CONTENT****UNIT 1**

INTRODUCTION: - Definition of Signals and Systems, Classification of Signals, Classification of Systems, Operations on signals: time-shifting, time-scaling, amplitude shifting, amplitude-scaling. Problems on classification and characteristics of Signals and Systems, Complex exponential and sinusoidal signals, Singularity functions and related functions: impulse function, step function signum function and ramp function.

UNIT 2

FOURIER SERIES AND FOURIER TRANSFORM: - Fourier series representation of continuous time periodic signals, Dirichlet's conditions, Trigonometric Fourier series and Exponential Fourier series, Relation between Trigonometric and Exponential Fourier series, Complex Fourier spectrum. Deriving Fourier transform from Fourier series, Fourier transform of standard signals, properties of Fourier transforms, Fourier transforms involving impulse function and Signum function. Related problems

UNIT 3

CORRELATION: - Auto-correlation and cross-correlation of functions, properties of correlation function, Energy density spectrum, Parseval's theorem, Power density spectrum, Relation between Convolution and correlation, Detection of periodic signals in the presence of noise by correlation.

SAMPLING THEOREM: Graphical and analytical proof of Band Limited Signals, impulse sampling, Natural and Flat top Sampling, Reconstruction of signal from its samples, Aliasing, Related problems.

UNIT 4

LAPLACE TRANSFORMS: - Introduction, Concept of region of convergence (ROC) for Laplace transforms, constraints on ROC for various classes of signals, Properties of L.T's, Inverse Laplace transform, Relation between L.T's, and F.T. of a signal. Laplace transform of certain signals using waveform synthesis.

UNIT 5

Z-TRANSFORMS: - Concept of Z-Transform of a discrete sequence. Region of convergence in Z-Transform, constraints on ROC for various classes of signals, Inverse Transform, properties of Z-transforms, Distinction between Laplace, Fourier and Z Transforms.

TEXT BOOKS

- 1 Signals, Systems & Communications-B.P. Lathi, BS Publications,2003.
- 2 Signals and Systems-A.V. Oppenheim, A.S. Willsky and S.H. Nawab,PHI,2ndEdn,1997
- 3 Signals & Systems – Simon Haykin and Van Veen, Wiley, 2nd Edition.

REFERENCE BOOKS

- 1 Principles of Linear Systems and Signals–BPLathi, Oxford University Press,2015
- 2 Signals and Systems–TK Rawat, Oxford University press, 2011.
- 3 Signals and Systems – A. Anand Kumar PHI, 2nd Edn 2012
- 4 Fundamentals of Signals and Systems- Michel J. Robert, MGH International Edition, 2008.
- 5 Signals & Systems- Narayan Iyer and K Satya Prasad, Cenage Pub 2011
- 6 Signals and Systems – Signals and Systems – M.J. Roberts,3rd Edition,MC Graw-Hill,2019

WEB RESOURCES (Suggested)

- 1 <https://nptel.ac.in/downloads/117101055/>
- 2 <http://fourier.eng.hmc.edu/e102/lectures/FourierTransforms/>
- 3 <http://fourier.eng.hmc.edu/e102/lectures/Laplace Transform/>

III Year I Semester
COMPUTER ARCHITECTURE AND ORGANIZATION
(For Electrical and Electronics Engineering)

Course Category	Professional Elective Courses	Course Code	24EE505T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Basic knowledge in digital electronics, fundamentals of computers.	Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES

1	To explain the basic working of a digital computer.
2	To understand the register transfer language and micro operators.
3	To learn various addressing modes supported by the processors.
4	To be familiar with peripheral interfacing with processors.
5	To understand memory hierarchy in computers

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Demonstrate the instruction cycle of a computer.	K3
CO2	Understand various micro operations and register transfer language.	K2
CO3	Describe parallel processing and pipelining.	K3
CO4	Interface different peripherals with processors.	K4
CO5	Know the advantages of cache and virtual memory.	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)

[illegible]



COURSE CONTENT

UNIT 1

Basic Computer Organization and Design: Instruction Codes, Computer Registers, Computer Instructions, Timing and Control, Instruction Cycle, Memory-Reference Instructions, Input- Output and Interrupt, Complete Computer Description, Design of Basic Computer, Design of Accumulator Logic.

UNIT 2

Register Transfer and Micro operations: Register Transfer Language, Register Transfer, Bus and Memory Transfers, Arithmetic Micro operations, Logic Micro operations, Shift Micro operations, Arithmetic Logic Shift Unit. Micro programmed Control: Control Memory, Address Sequencing, Micro program Example, Design of Control Unit.

UNIT 3

Central Processing Unit: Introduction, General Register Organization, Stack Organization, Instruction Formats, Addressing Modes, Data Transfer and Manipulation, Program Control, Reduced Instruction Set Computer(RISC) Pipeline and Vector Processing: Parallel Processing, Pipelining, Arithmetic Pipeline, Instruction Pipeline, RISK Pipeline, Vector Processing, Array Processors.

UNIT 4

Input/output Organization: Peripheral Devices, I/O interface, Asynchronous data transfer, Modes of transfer, priority Interrupt, Direct memory access, Input-Output Processor (IOP), Serial Communication.

UNIT 5

Memory Organization: Memory Hierarchy, Main memory, Auxiliary memory, Associate Memory, Cache Memory, and Virtual memory, Memory Management Hardware.

TEXT BOOKS

- 1 Computer System Architecture, M. Morris Mano, Prentice Hall of India Pvt. Ltd., 3rd Edition, Sept. 2008.
- 2 Computer Organization, Carl Hamacher, ZvonksVranesic, Safea Zaky, 5/e, McGraw Hill

REFERENCE BOOKS

- 1 Computer Architecture and Organization, William Stallings, PHI Pvt. Ltd., Eastern Economy Edition, Sixth Edition, 2003.
- 2 Computer Organization and Architecture, Linda Null, Julia Lobur, Narosa Publications ISBN 81- 7319-609-5
- 3 Computer System Organization by John. P. Hayes
- 4 Structured Computer Organization – Andrew S. Tanenbaum, 4/e, PHI/Pearson
- 5 Computer Organization and Architecture-John P.Hayes, 5th edition, MC GrawHill

WEB RESOURCES (Suggested)

- 1 https://onlinecourses.nptel.ac.in/noc25_cs154/preview
- 2 https://onlinecourses.nptel.ac.in/noc25_cs83/preview

III Year I Semester

COMMUNICATION SYSTEMS

Course Category	Professional Elective	Course Code	24EC512T
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

The student will learn:

1	Basic components of a communication system and analyze different amplitude modulation schemes, transmitters, and receivers.
2	The principles, generation, and detection of frequency and phase modulation and evaluate their bandwidth requirements.
3	Sampling theorem for signal conversion, analyze pulse modulation techniques, and examine digital modulation methods for data transmission.
4	Error detection and correction coding techniques and apply them for reliable data communication
5	Modern communication systems and outline their working principles, features, and applications.

COURSE OUTCOMES

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Analyze the operation of basic communication system blocks and compare various amplitude modulation schemes with their transmitter and receiver characteristics	K4
CO2	Examine the principles of frequency and phase modulation, and evaluate their generation and detection methods with bandwidth considerations	K4
CO3	Apply sampling theorem to signal processing and distinguish between various pulse and digital modulation schemes for data transmission	K3
CO4	Implement linear block, cyclic, and convolution coding techniques for error detection and correction in communication systems	K3
CO5	Summarize the working principles, advantages, and limitations of modern communication systems such as microwave, optical, satellite, and mobile systems	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)

[illegible]



COURSE CONTENT

Unit – I:

Basic blocks of Communication System. Analog Modulation – Principles of Amplitude Modulation, DSBSC, SSB-SC and VSB-SC, AM transmitters and receivers.

Unit- II:

Angle Modulation – Frequency and Phase Modulation. Transmission Bandwidth of FM signals, Methods of generation and detection, FM Transmitters and Receivers.

Unit–III:

Sampling theorem – Pulse Modulation Techniques -PAM, PWM and PPM concepts - PCM system – Data transmission using analog carriers (BASK, BFSK, BPSK, QPSK).

UNIT -IV:

Error control coding techniques – Linear block codes- Encoder and decoder, Cyclic codes – Encoder, Syndrome Calculator, Convolution codes.

UNIT -V:

Modern Communication Systems – Microwave communication systems - Optical communication system - Satellite communication system - Mobile communication system

TEXTBOOKS:

1. Simon Haykins, 'Communication Systems', John Wiley, 3rd Edition, 1995.
2. D.Roddy & J.Coolen, 'Electronic Communications', Prentice Hall of India, 4th Edition, 1999.
3. Kennedy G, 'Electronic Communication System', McGraw Hill, 1987

REFERENCE BOOKS:

1. Shulin Daniel, 'Error Control Coding', Pearson, 2nd Edition, 2011.
2. B.P. Lathi and Zhi Ding, 'Modern Digital and Analog Communication Systems', OUP USA Publications, 4th Edition, 2009



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year– I Semester Construction Project Management

Course Category	Open Elective	Course Code	24CE508T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Building materials Project management basics	Continuous Internal assessment	30
		Semester End Examination	70
		Total Marks	100

Course Objectives:

1.	To introduce to the student, the concept of project management including network drawing and monitoring
2.	To introduce the various equipment related to construction like earth moving equipment, trucks and handling equipment, aggregate production and construction equipment and machinery
3.	To introduce the importance of safety in construction projects

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Explain the principles of construction project management, including planning, scheduling, monitoring, and coordination using CPM and PERT techniques.	K2
CO2	Apply project evaluation methods, cost analysis, and resource optimization techniques using construction management software like Primavera.	K3
CO3	Analyze the selection, capacity, and productivity of various construction equipment for earthwork, compaction, hoisting, and concreting operations.	K4
CO4	Demonstrate the operation and application of concreting equipment, including batching plants, mixers, and finishing tools for quality construction.	K3
CO5	Evaluate construction methods, formwork practices, and safety measures, incorporating BIM concepts for effective civil engineering project execution	K5

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)

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



COURSE CONTENT

UNIT-I

Construction project management and its relevance – qualities of project manager – project planning – coordination – scheduling – monitoring – bar charts – milestone charts – critical path method

UNIT-II

Project evaluation and review technique– cost analysis updating crashing for optimum cost–crashing for optimum resources–allocation of resources introduction to software's for construction management, project management using PRIMAVERA (or) equivalent

UNIT-III

Construction equipment – economical considerations – earthwork equipment – Trucks and handling equipment – rear dump trucks – capacities of trucks and handling equipment – calculation of truck production – compaction equipment – types of compaction rollers
Hoisting and earthwork equipment–hoists–cranes–tractors–bulldozers–graders–scrapers–draglines–clamshell buckets

UNIT – IV

Concreting equipment— concrete mixers–Batching plants, mobile using plants like“Ajax”etc.mixing and placing of concrete – consolidating and finishing.

UNIT – V

Construction methods – earthwork – piling – placing of concrete – form work – fabrication and erection–quality control and safety engineering. BIM for Civil Engineers (Building Information Modeling)

Text Books:

1. 'Construction Planning, Equipment and Methods' by Peurifoy and Schexnayder, Shapira, Tata Mc Graw hill.
2. 'Construction Project Management Theory and Practice'by Kumar Neeraj Jha (2011), Pearson.
3. 'Construction Technology'bySubirK.SarkarandSubhajitSarasvati,OxfordUniversity press

References:

1. 'Construction Project Management – An Integrated Approach'by Peter Fewings,Taylor and Francis
2. 'Construction Management Emerging Trends and Technologies' by Trefor Williams , Cengage learning

Web References:

1. [NPTEL :: Civil Engineering - NOC:Principles of Construction Management](#)



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year I Semester SUSTAINABLE ENERGY TECHNOLOGIES

Course Category	Open Elective-I	Course Code	24ME509T
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 demonstrate the importance the impact of solar radiation, solar PV modules.
2	To understand the principles of storage in PV systems.
3	To discuss solar energy storage systems and their applications.
4	To get knowledge in wind energy and bio-mass.
5	To gain insights in geothermal energy, ocean energy and fuel cells.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Illustrate solar radiation principles and the design of PV modules.	K3
CO2	Discuss battery technologies and storage methods in PV systems.	K2
CO3	Explain solar energy collection, storage methods, and applications.	K2
CO4	Describe the principles and utilization of wind and bio-mass energy systems.	K2
CO5	Analyze geothermal, ocean, and fuel cell energy technologies.	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
CO1	3	1	1	-	-	3	-	-	1	-	2
CO2	3	1	2	-	-	3	-	-	1	-	3
CO3	3	2	2	-	-	3	-	-	1	-	3
CO4	3	1	1	-	-	3	-	-	1	-	3
CO5	3	2	2	-	-	3	-	-	1	-	3



COURSE CONTENT

UNIT –I

SOLAR RADIATION: Role and potential of new and renewable sources, the solar energy option, Environmental impact of solar power, structure of the sun, the solar constant, sun-earth relationships, coordinate systems and coordinates of the sun, extraterrestrial and terrestrial solar radiation, solar radiation on tilted surface, instruments for measuring solar radiation and sun shine, solar radiation data, numerical problems.

SOLAR PV MODULES AND PV SYSTEMS:

PV Module Circuit Design, Module Structure, Packing Density, Interconnections, Mismatch and Temperature Effects, Electrical and Mechanical Insulation, Lifetime of PV Modules, Degradation and Failure, PV Module Parameters, Efficiency of PV Module, Solar PV Systems-Design of Off Grid Solar Power Plant, Installation and Maintenance, Real-time PV monitoring systems, Maximum Power Point Tracking algorithms in PV systems.

UNIT –II

STORAGE IN PV SYSTEMS:

Battery Operation, Types of Batteries, Battery Parameters, Application and Selection of Batteries for Solar PV System, Battery Maintenance and Measurements, Battery Installation for PV System.

UNIT –III

SOLAR ENERGY COLLECTION: Flat plate and concentrating collectors, classification of concentrating collectors, orientation.

SOLAR ENERGY STORAGE AND APPLICATIONS: Different methods, sensible, latent heat and stratified storage, solar ponds, solar applications- solar heating/cooling technique, solar distillation and drying, solar cookers, central power tower concept and solar chimney, Solar-assisted heat pump systems.

UNIT – IV

WIND ENERGY: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, betz criteria, types of winds, wind data measurement.

BIO-MASS: Principles of bio-conversion, anaerobic/aerobic digestion, types of bio-gas digesters, gas yield, utilization for cooking, bio fuels, I.C. engine operation and economic aspects.

UNIT – V

GEOTHERMAL ENERGY: Origin, Applications, Types of Geothermal Resources, Relative Merits

OCEAN ENERGY: Ocean Thermal Energy; Open Cycle & Closed Cycle OTEC Plants, Environmental Impacts, Challenges.

FUEL CELLS: Introduction, Applications, Classification, Different Types of Fuel Cells Such as Phosphoric Acid Fuel Cell, Alkaline Fuel Cell, PEM Fuel Cell, MC Fuel Cell.

Text books:

1. Solar Energy – Principles of Thermal Collection and Storage/Sukhatme S.P. and J.K.Nayak/TMH.
2. Non-Conventional Energy Resources- Khan B.H/ Tata McGraw Hill, New Delhi, 2006.
3. Green Manufacturing Processes and Systems - J. Paulo Davim/Springer 2013.

Reference Books:

1. Principles of Solar Engineering - D.Yogi Goswami, Frank Kreith& John F Kreider / Taylor & Francis.
2. Non-Conventional Energy - Ashok V Desai /New Age International (P) Ltd.
3. Renewable Energy Technologies -Ramesh & Kumar /Narosa.
4. Non-conventional Energy Source- G.D Roy/Standard Publishers.

Web References:

1. https://onlinecourses.nptel.ac.in/noc24_me144/preview
2. <https://archive.nptel.ac.in/courses/115/105/115105127/>
3. <https://archive.nptel.ac.in/courses/121/106/121106014/>

III Year I Semester

ELECTRONIC DEVICES AND CIRCUITS

Course Category	Open Elective 1	Course Code	24EC514T
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

The student will learn:

1	To learn and understand the basic concepts of semiconductor physics and study the physical phenomena of PN junction diode
2	Study the physical phenomena such as conduction, transport mechanism and electrical characteristics of different diodes, to learn and understand the application of diodes
3	Acquire knowledge about the principle of working and operation of Bipolar Junction Transistor, to learn and understand the purpose of transistor biasing and its significance
4	understand the small signal low frequency equivalent circuit analysis of BJT transistor amplifiers and compare different configurations
5	understand different types of FETs, their operation, characteristics, and analysis

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Apply the basic concepts of semiconductor physics and understand the formation of p-n junction and how it can be used as a p-n junction as diode in different modes of operation	K2
CO2	Know the construction, working principle of special diodes and applications of diodes	K3
CO3	Understand the construction of BJT, principle of operation of BJT with their V-I characteristics in different configurations. Apply the concepts of transistor biasing, various biasing techniques for BJT	K2
CO4	Perform the analysis of small signal low frequency transistor amplifier circuits using BJT	K3
CO5	Understand the construction of FET, principle of operation of FET with characteristics in different configurations	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)**

[illegible]



COURSE CONTENT

UNIT-I:

Review of Semi Conductor Physics: Hall effect, continuity equation, law of junction, Fermi Dirac function, Fermi level in intrinsic and extrinsic Semiconductors

Junction Diode Characteristics :Energy band diagram of PN junction Diode, Open circuited p-n junction, Biased p-n junction, p-n junction diode, current components in PN junction Diode, diode equation, V-I Characteristics, temperature dependence on V-I characteristics, Diode resistance, Diode capacitance.

UNIT-II:

Special Semiconductor Devices: Zener Diode, Breakdown mechanisms, Zener diode applications, LED, Varactor Diode, Photodiode, Tunnel Diode, UJT, PNP Diode, SCR. Construction, operation and V-I characteristics.

Rectifiers and Filters: Basic Rectifier setup, half wave rectifier, full wave rectifier, bridge rectifier, derivations of characteristics of rectifiers, rectifier circuits-operation, input and output waveforms, Filters, Inductor filter(Series inductor), Capacitor filter(Shunt inductor), π -Filter, comparison of various filter circuits in terms of ripple factors.

UNIT- III: Transistor Characteristics:

BJT: Junction transistor, transistor current components, transistor equation, transistor configurations, transistor as an amplifier, characteristics of transistor in Common Base, Common Emitter and Common Collector configurations, Ebers-Moll model of a transistor, punch through/ reach through, Photo transistor, typical transistor junction voltage values.

FET: FET types, construction, operation, characteristics μ , g_m , r_o parameters, MOSFET-types, construction, operation, characteristics, comparison between JFET and MOSFET.

UNIT- IV:

Transistor Biasing and Thermal Stabilization :Need for biasing, operating point, load line analysis, BJT biasing-methods, basic stability, fixed bias, collector to base bias, self bias, Stabilization against variations in V_{BE} , I_c , and β , Stability factors, (S, S', S'') , Bias compensation, Thermal runaway, Thermal stability.FET Biasing- methods and stabilization.

UNIT- V: Small Signal Low Frequency Transistor Amplifier Models:

BJT: Two port network, Transistor hybrid model, determination of h-parameters, conversion of h-parameters, generalized analysis of transistor amplifier model using h-parameters, Analysis of CB, CE and CC amplifiers using exact and approximate analysis, Comparison of transistor amplifiers.

FET: Generalized analysis of small signal model, Analysis of CG, CS and CD amplifiers, comparison of FET amplifiers.

Text Books:

1. Electronic Devices and Circuits- J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition, 2007
2. Electronic Devices and Circuits by David A. Bell, Oxford University Press
3. Electronics devices & circuit theory- Robert L. Boylestad and Louis Nashelsky, Pearson/Prentice hall, tenth edition, 2009

References:

1. Integrated Electronics-J. Millman, C. Halkias, Tata Mc-Graw Hill, Second Edition, 2009
2. Electronic Devices and Circuits-K. Lal Kishore, BS Publications, Fourth Edition, 2016



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year I Semester INTRODUCTION TO CLOUD COMPUTING (Common to CE, EEE, ME & ECE)

Course Category	Open Elective - 1	Course Code	24CS506T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To explain the evolving utility computing model called cloud computing.
2	To introduce the various levels of services offered by cloud.
3	To discuss the fundamentals of cloud enabling technologies such as distributed computing, service-oriented architecture and virtualization.
4	To emphasize the security and other challenges in cloud computing.
5	To introduce the advanced concepts such as containers, serverless computing and cloud-centric Internet of Things.

COURSE OUTCOMES		
Up on successful completion of the course, the student will be able to:		Cognitive Level
CO1	Understand cloud computing fundamentals, service models, and deployment types.	K2
CO2	Understand enabling technologies including distributed systems and virtualization techniques.	K2
CO3	Demonstrate virtualization, containers, and orchestration using modern cloud tools.	K4
CO4	Analyze cloud challenges including security, scalability, and interoperability issues.	K4
CO5	Apply advanced cloud concepts like serverless, IoT, and DevOps.	K2

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

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	2	0	2	0	0	0	0	0	0
CO2	3	2	3	0	2	0	0	0	0	0	0
CO3	3	3	3	0	2	0	0	0	0	0	0
CO4	3	3	3	0	3	0	0	0	0	0	0
CO5	3	2	3	0	3	0	0	0	0	0	0

**COURSE CONTENT****UNIT -I: Introduction to Cloud Computing Fundamentals**

Cloud computing at a glance, defining a cloud, cloud computing reference model, types of services (IaaS, PaaS, SaaS), cloud deployment models (public, private, hybrid), utility computing, cloud computing characteristics and benefits, cloud service providers (Amazon Web Services, Microsoft Azure, Google AppEngine).

UNIT-II: Cloud Enabling Technologies

Ubiquitous Internet, parallel and distributed computing, elements of parallel computing, hardware architectures for parallel computing (SISD, SIMD, MISD, MIMD), elements of distributed computing, Inter-process communication, technologies for distributed computing, remote procedure calls (RPC), service-oriented architecture (SOA), Web services, virtualization.

UNIT-III: Virtualization and Containers

Characteristics of virtualized environments, taxonomy of virtualization techniques, virtualization and cloud Computing, pros and cons of virtualization, technology examples (XEN, VMware), building blocks of containers, container platforms (LXC, Docker), container orchestration, Docker Swarm and Kubernetes, public cloud VM (e.g. Amazon EC2) and container (e.g. Amazon Elastic Container Service) offerings.

UNIT-IV: Cloud computing challenges

Economics of the cloud, cloud interoperability and standards, scalability and fault tolerance, energy efficiency in clouds, federated clouds, cloud computing security, fundamentals of computer security, cloud security architecture, cloud shared responsibility model, security in cloud deployment models.

UNIT -V: Advanced concepts in cloud computing

Serverless computing, Function-as-a-Service, serverless computing architecture, public cloud (e.g. AWS Lambda) and open-source (e.g. OpenFaaS) serverless platforms, Internet of Things (IoT), applications, cloud-centric IoT and layers, edge and fog computing, DevOps, infrastructure-as-code, quantum cloud computing.

Text Books:

1. Mastering Cloud Computing, 2nd edition, RajkumarBuyya, Christian Vecchiola, ThamaraiSelvi, ShivanandaPoojara, Satish N. Srirama, McGraw Hill, 2024.
2. Distributed and Cloud Computing, Kai Hwang, Geoffery C. Fox, Jack J. Dongarra, Elsevier, 2012.

Reference Books:

1. Cloud Computing, Theory and Practice, Dan C Marinescu, 2nd edition, MK Elsevier, 2018.
2. Essentials of cloud Computing, K. Chandrasekhran, CRC press, 2014.
3. Online documentation and tutorials from cloud service providers (e.g., AWS, Azure, GCP)

e-Resources:https://onlinecourses.nptel.ac.in/noc21_cs14/preview



PRAGATI ENGINEERING COLLEGE

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(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year I Semester

POWER ELECTRONICS LABORATORY

(For Electrical and Electronics Engineering)

Course Category	Lab Course	Course Code	24EE501P
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites	NIL	Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES

1	To learn the characteristics of various power electronic devices and analyze firing circuits and commutation circuits of SCR.
2	To analyze the performance of single-phase and three-phase full-wave bridge converters with both resistive and inductive loads. To understand the working of single-phase & three-phase inverters.
3	To understand the operation of AC voltage regulator with resistive and inductive loads. To understand the working of Buck converter and Boost converter.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Analyze characteristics of various power electronic devices and design firing circuits for SCR.	K4
CO2	Analyze the performance of single-phase dual, three-phase full-wave bridge converters and dual converter with both resistive and inductive loads. Differentiate the working & control of Square wave inverter and PWM inverter.	K4
CO3	Examine the operation of Single-phase AC voltage regulator and Cyclo converter with resistive and inductive loads. Differentiate the working and control of Buck converter and Boost converter.	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	PSO1	PSO2
CO1	2	2	-	-	1	-	-	-	2	-	-	2	1
CO2	2	3	-	-	1	-	-	-	2	-	-	2	1
CO3	2	2	-	-	1	-	-	-	2	-	-	1	1

Exp. No	CONTENTS (Any 10 of the following experiments are to be conducted)
1	Characteristics of SCR - Power MOSFET & Power IGBT
2	R, RC & UJT firing circuits for SCR.
3	Single -Phase semi-converter with R & RL loads.
4	Single -Phase full-converter with R & RL loads.
5	Three- Phase full-converter with R & RL loads
6	Single-phase dual converter in circulating current & non circulating current mode of operation.
7	Single-Phase AC Voltage Regulator with R & RL Loads.
8	Single-phase step down Cyclo converter with R & RL Loads.
9	Boost converter in Continuous Conduction Mode operation.
10	Buck converter in Continuous Conduction Mode operation.
11	Single -Phase square wave bridge inverter with R & RL Loads.
12	Single - Phase PWM inverter.
13	Three-phase bridge inverter with 120° and 180° conduction mode.
14	SPWM control of Three-phase bridge inverter.



PRAGATI ENGINEERING COLLEGE

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(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year I Semester

ANALOG AND DIGITAL CIRCUITS LABORATORY

(For Electrical and Electronics Engineering)

Course Category	Lab Course	Course Code	24EE509P
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites	NIL	Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES

1	Analysis of transistor amplifiers
2	Analysis of feedback amplifiers and oscillators
3	Realization of digital circuits such data routing, registers and counters.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Analyse diode clipper/clamper circuits and transistor biasing.	K4
CO2	Illustrate the operation of feedback amplifiers and oscillator circuits.	K3
CO3	Demonstrate the operation of digital circuits such as arithmetic, data routing, registers and counters.	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	PSO1	PSO2
CO1	2	1	-	-	-	-	-	-	1	-	-	1	1
CO2	2	1	-	-	-	-	-	-	1	-	-	1	1
CO3	3	2	-	-	-	-	-	-	1	-	-	1	1

Exp. No	CONTENTS (Any 5 of the Following Experiments are to be conducted from each PART.)
PART-A	
1	Analysis of clipper and clamper circuits.
2	Analysis of self-bias to a transistor.
3	Analysis of voltage series and current series feedback amplifiers.
4	Analysis of Wien Bridge oscillator and RC-phase shift oscillator.
5	Analysis of Integrator and Differentiator Circuits using IC 741.
6	Analysis of Monostable and Astable multivibrator operation using IC 555 Timer.
7	Analysis of Schmitt Trigger Circuits using IC 741 and IC 555.
8	Verify the PLL characteristics using IC 565.
9	Analysis of 8 bit A to D and D to A circuits
PART-B	
1	Design of Full adder and Full Subtractor using logic gates
2	Realization of parallel adder/ subtractor using IC 7483.
3	Implementation of 3 to 8 line decoder using logic gates and IC 7445.
4	Implementation of 8 to 1 multiplexer using logic gates and IC 74151.
5	Verify the operation of master-slave JK flip-flop using IC7476.
6	Realization of the following shift registers using IC7495. a) SISO b) SIPO c) PISO d) PIPO
7	Implementation of Mod-10 ripples counter using flip-flops and IC 7490.
8	Implementation of Mod-8 synchronous up/down counters using flip-flops.
9	Implementation of 4 bit Ring Counter and Johnson Counter using D flip-flops/J-K flip-flops.



PRAGATI ENGINEERING COLLEGE

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Department of Electrical and Electronics Engineering

III Year I Semester

Soft Skills

Course Category	Humanities	Course Code	24HE501S
Course Type	Laboratory	L-T-P-C	0-1-2-2
Prerequisites	LSRW Skills	Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To equip the students with the skills to effectively communicate in English
2	To train the students in interview skills, group discussions and presentation skills
3	To motivate the students to develop confidence
4	To enhance the students' interpersonal skills
5	To improve the students' writing skills

S.NO	COURSE OUTCOME		Cognitive Level
1	CO1	Demonstrate effective verbal and non-verbal communication skills in English in academic and professional contexts.	K1
2	CO2	Participate confidently and constructively in interviews, group discussions, and presentations.	K2
3	CO3	Exhibit increased self-confidence in expressing ideas and opinions.	K3
4	CO4	Apply interpersonal skills to collaborate productively in team-based activities.	K6
5	CO5	Produce clear, coherent, and grammatically accurate written communication for various purposes.	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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PSO 1	PSO 2	PSO 3
CO1	-	-	-	-	-	-	-	-	3	2	-	-	-	-
CO2	-	-	-	-	-	-	-	-	3	2	-	-	-	-
CO3	-	-	-	-	-	-	-	-	3	3	-	-	-	-
CO4	-	-	-	-	-	-	-	-	2	3	-	-	-	-
CO5	-	-	-	-	-	-	-	-	3	2	-	-	-	-



PRAGATI ENGINEERING COLLEGE

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Department of Electrical and Electronics Engineering

COURSE CONTENT

UNIT I

Analytical Thinking & Listening Skills: Self-Introduction, Shaping Young Minds - A Talk by Azim Premji (Listening Activity), Self – Analysis, Developing Positive Attitude, Perception.

Communication Skills: Verbal Communication; Non Verbal Communication (Body Language)

UNIT II

Self-Management Skills: Anger Management, Stress Management, Time Management, Six Thinking Hats, Team Building, Leadership Qualities

Etiquette: Social Etiquette, Business Etiquette, Telephone Etiquette, Dining Etiquette

UNIT III

Standard Operation Methods : Basic Grammars, Tenses, Prepositions, Pronunciation, Letter Writing; Note Making, Note Taking, Minutes Preparation, Email & Letter Writing

UNIT IV

Job-Oriented Skills: Group Discussion, Mock Group Discussions, Resume Preparation, Interview Skills, Mock Interviews

UNIT V

Interpersonal relationships: Introduction, Importance, Types, Uses, Factors affecting interpersonal relationships, Accommodating different styles, Consequences of interpersonal relationships

Text books:

1. Barun K. Mitra, Personality Development and Soft Skills, Oxford University Press, 2011.
2. S.P. Dhanavel, English and Soft Skills, Orient Blackswan, 2010.

Reference books:

1. R.S. Aggarwal, A Modern Approach to Verbal & Non-Verbal Reasoning, S.Chand & Company Ltd., 2018.
2. Raman, Meenakshi & Sharma, Sangeeta, Technical Communication Principles and Practice, Oxford University Press, 2011.

Online Learning Resources:

https://swayam-plus.swayam2.ac.in/courses/course-details?id=P_CAMBR_01



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year I Semester Salesforce Administrator Explorer (Common to All Branches)

Course Category	Skill Enhancement Course	Course Code	24CS501S
Course Type	Laboratory	L-T-P-C	0-1-2-2
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES

1	Help in collaborating with business and technical stake holders to design, configure, and implement Salesforce
2	Develop a mind set in solving business problems using the Salesforce Platform
3	Hands on practice on provide reporting on a regular basis to help users and executives gain insights and make decisions from Salesforce data
4	Learn how to create human-centered user experiences in Salesforce
5	Understand how to Create, maintain, and enhance automated business processes

COURSE OUTCOMES

Up on successful completion of the course, the student will be able to:		Cognitive Level
CO1	Be able to understand how to manage changes to business processes, technology, and people with Salesforce.	K1
CO2	Be able to improve the efficiency of business operations by proactively undertaking regular process analysis and documentation.	K2
CO3	Be able to manage the end-to-end implementation of Salesforce, including the overall strategy and day-to-day activities involved in administering Salesforce.	K3

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

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	2	0	3	1	1	1	2	3	2
CO2	2	3	2	0	2	1	1	1	2	2	1
CO3	3	3	3	0	3	1	1	2	3	3	2

COURSE CONTENT

Experiment 1:

Salesforce Platform Basics: Get Started with the Salesforce Platform, Discover Use Cases for the Platform, Understand the Salesforce Architecture, Navigate Setup, Power Up with AppExchange.

Prepare Your Salesforce Org for Users: Set Up the Exchange Rate, Update the Exchange Rate with ACM, Customize the Home Page, Create a Unique Account List View, Create Chatter Groups.

User Management: Add New Users, Control What Your Users Can Access — (3 Sessions)

Experiment 2:

Customize an Org to Support a New Business Unit: Manage User Access, Manage Chatter, Modify Your Data Model, Configure an Email Letterhead and Template, Automate Your Business Process.

Identity Basics: Get to Know Salesforce Identity, Get to Know Your Salesforce Identity Users, Learn the Language of Identity — (4 Sessions)



Experiment 3:

Data Security: Overview of Data Security, Control Access to the Org, Control Access to Objects, Control Access to Fields, Control Access to Records, Create a Role Hierarchy, Define Sharing Rules.

Permission Set Groups: Get Started with Permission Set Groups, Create a Permission Set Group, Mute Permissions in Permission Set Groups.

Protect Your Data in Salesforce: Restrict Login Hours and IP Ranges, Create New Users and Allow a User to Delete Accounts, Set Organization-Wide Defaults and Create a Role Hierarchy, Create Sharing Rules, Set Up Account Teams — (5 Sessions)

Experiment 4:

Data Modeling: Understand Custom & Standard Objects, Create Object Relationships, Work with Schema Builder.

Lightning Experience Customization: Set Up Your Org, Create and Customize Lightning Apps, Create and Customize List Views, Customize Record Highlights with Compact Layouts, Customize Record Details with Page Layouts, Create Custom Buttons and Links, Empower Your Users with Quick Actions.

Customize a Salesforce Object: Work with Standard and Custom Fields, Create Picklists and Field Dependencies, Create Lookup Filters, Create Formula Fields, Create Record Types, Create Account Page Layouts, Enable Account Field History Tracking, Create Validation Rules — (5 Sessions)

Experiment 5:

Lightning App Builder: Get Started with the Lightning App Builder, Build a Custom Home Page for Lightning Experience, Build a Custom Record Page for Lightning Experience and Salesforce Mobile App, Build an App Home Lightning Page, Work with Custom Lightning Components.

Formulas and Validations: Use Formula Fields, Implement Roll-Up Summary Fields, Create Validation Rules — (4 Sessions)

Experiment 6:

Accounts & Contacts for Lightning Experience: Store Information About Your Customers, Understand Account and Contact Relationships.

Leads & Opportunities for Lightning Experience: Create and Convert Leads as Potential Customers, Work Your Opportunities, Sell as a Team and Split the Credit, Visualize Success with Path and Kanban.

Products, Quotes, & Contracts: Create Price Books to Track Your Products, Configure Quotes for Your Customers, and Track Contracts.

Campaign Basics: Meet Salesforce Campaigns, Organize Campaigns, Determine Who You're Marketing To, Report on Your Campaigns.

Customize a Sales Path for Your Team: Customize a Sales Path, Customize Opportunity Stages, Work with Opportunities in the Kanban View — (5 Sessions)

Experiment 7:

Service Cloud for Lightning Experience: Begin Your Customer Service Journey, Administer Service Cloud, Automate Case Management, Create Digital Engagement on Multiple Channels.

Set Up the Service Console: Set Up the Lightning Service Console, Customize Your Lightning Service Console Pages, Add the Softphone Utility to Your App, Set Up Web Chats for Your Console.

Create a Process for Managing Support Cases: Create Support Processes, Create Record Types, Create an Escalation Rule.

Set Up Case Escalation and Entitlements: Create Support Processes, Create Case Queues and Assignment Rules, Create a Case Escalation Rule, Create an Automation with Flow Builder, Enable Entitlements and Set Up Service Contracts, Create an Entitlement Process, Create Service Contracts with Entitlements — (5 Sessions)

Experiment 8:

Chatter Administration for Lightning Experience: Get Started with Chatter, Work with Chatter Groups, Enable Feed Tracking, Approve Records from a Chatter Feed, Develop a Rollout Strategy.

App Exchange Basics: Get Started with AppExchange, Navigate AppExchange, Explore App Exchange Listings, Install App Exchange Packages, Connect and Contribute to the AppExchange Community — (3 Sessions)



Experiment 9:

Data Management: Import Data, Export Data.

Duplicate Management: Improve Data Quality in Salesforce, Resolve and Prevent Duplicate Data in Salesforce.

Import and Export with Data Management Tools: Use the Data Import Wizard, Use Data Loader.io to Export Data, Use Data Loader.io to Update Data — (3 Sessions)

Experiment 10:

Reports & Dashboards for Lightning Experience: Introduction to Reports and Dashboards in Lightning Experience, Create Reports with the Report Builder, Format Reports, Visualize Your Data with the Lightning Dashboard Builder, Extend Your Reporting Strategy with AppExchange.

Create Reports and Dashboards for Sales and Marketing Managers: Create Report and Dashboard Folders, Create a Simple Custom Report, Filter Your Reports, Group and Categorize Your Data, Use Summary Formulas in Your Reports, Manage Reported Data, Visualize Your Data — (3 Sessions)

Experiment 11:

Approve Records with Approval Processes: Customize How Records Get Approved, Build an Approval Process.

Build a Discount Approval Process: Prepare Your Org, Create an Approval Process, Create Initial Submission Actions, Specify Final Approval and Rejection Actions.

Build a Simple Flow: Collect Contact Info from Your User, Check for a Matching Contact in Your Org, Branch the Flow, Create or Update a Contact.

Flow Builder Basics: Get Started with Automation, Go with the Flow, Meet Flow Builder, Learn About Flow Variables — (3 Sessions)

Experiment 12:

Case Studies and Capstone Project: Complete the Capstone Project by taking a user case and working on the Trailhead Playground — (5 Sessions)

Text Books:

1. Sharif Shaalan and Timothy Royer, “*Salesforce for Beginners: A Step-by-Step Guide to Optimize Sales and Marketing and Automate Business Processes with the Salesforce Platform*”, 2nd Ed, 2022, PACKT Publishers.
2. Sharif Shaalan, “*Salesforce for Beginners: A Step-by-Step Guide to Creating, Managing, and Automating Sales and Marketing Processes*”, 2020, PACKT Publishers.
3. Paul Goodey, “*Salesforce CRM – The Definitive Admin Handbook: Build, Configure, and Customize Salesforce CRM and Mobile Solutions*”, 5th Ed, 2019, PACKT Publishers.
4. Rakesh Gupta, “*Mastering Salesforce CRM Administration*”, 2017, PACKT Publishers.
5. Felicia Duarte, Rachelle Hoffman, “*Learn Salesforce Lightning: The Visual Guide to the Lightning UI*”, 2018, Wiley Apress.

Reference Books:

1. Johan Yu, “*Salesforce Lightning Reporting and Dashboards: Create, Customize, and Manage Your Salesforce Reports and Dashboards in Depth with Lightning Experience*”, 2017, PACKT Publishers.
2. Ahsan Zafar, “*Salesforce Data Architecture and Management: A Pragmatic Guide for Aspiring Salesforce Architects and Developers to Manage, Govern, and Secure Their Data Effectively*”, 2021, PACKT Publishers.
3. Saifullah Saifi and Ashwini Kumar Raj, “*Cloud Computing Using Salesforce*”, 2021, BPB.

e-Resources:

1. Use the Trailhead Platform: <https://www.salesforce.com/blog/what-is-trailhead/>
2. The Salesforce Administrator Trailmix: <https://trailhead.salesforce.com/users/srebello7/trailmixes/salesforce-administrator-explorer>



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

COURSE CONTENT

These labs bridge the gap between academia and industry, providing students with the practical experience. Some students may also develop entrepreneurial skills, potentially leading to start-ups or innovation-driven careers. Tinkering labs aim to cultivate the next generation of engineers by giving them the tools, space, and mind-set to experiment, innovate, and solve real-world challenges.

List of experiments:

1. Make your own parallel and series circuits using breadboard for any application of your choice.
2. Demonstrate a traffic light circuit using breadboard.
3. Build and demonstrate automatic Street Light using LDR.
4. Simulate the Arduino LED blinking activity in Tinkercad.
5. Build and demonstrate an Arduino LED blinking activity using Arduino IDE.
6. Interfacing IR Sensor and Servo Motor with Arduino.
7. Blink LED using ESP32.
8. LDR Interfacing with ESP32.
9. Control an LED using Mobile App.
10. Design and 3D print a Walking Robot
11. Design and 3D Print a Rocket.
12. Build a live soil moisture monitoring project, and monitor soil moisture levels of a remote plan in your computer dashboard.
13. Demonstrate all the steps in design thinking to redesign a motor bike. Students need to refer to the following links:
 - i. <https://aim.gov.in/pdf/equipment-manual-pdf.pdf>
 - ii. <https://atl.aim.gov.in/ATL-Equipment-Manual/>
 - iii. <https://aim.gov.in/pdf/Level-1.pdf>
 - iv. <https://aim.gov.in/pdf/Level-2.pdf>
 - v. <https://aim.gov.in/pdf/Level-3.pdf>



COURSE CONTENT

UNIT 1

Analog Ammeter and Voltmeters: - Classification – deflecting - control and damping torques - PMMC - moving iron type and electrostatic instruments - Construction - Torque equation - Range extension - Errors and compensations - advantages and disadvantages. Instrument transformers: Current Transformer and Potential Transformer-construction - theory - errors-Numerical Problems.

UNIT 2

Analog Wattmeter's and Power Factor Meters: - Electrodynamometer type wattmeter (LPF and UPF) - Power factor meters: Dynamometer and M.I type (Single phase and Three phase) - Construction - theory - torque equation - advantages and disadvantages. Potentiometers: Introduction to DC and AC Potentiometers – Construction-working – Applications - Numerical Problems.

UNIT 3

Measurements of Electrical parameters: - DC Bridges: Method of measuring low - medium and high resistance - sensitivity of Wheat stone's bridge - Kelvin's double bridge for measuring low resistance - Loss of charge method for measurement of high resistance - Megger – measurement of earth resistance - Numerical Problems.

AC Bridges: - Measurement of inductance and quality factor - - Maxwell's bridge - - Hay's bridge - - Anderson's bridge. Measurement of capacitance and loss angle - - Desauty's bridge - Schering Bridge - Wien's bridge - Wagner's earthing device - - Numerical Problems

UNIT 4

Transducers: - Definition - Classification - Resistive - Inductive and Capacitive Transducer - LVDT - Strain Gauge - Thermistors - Thermocouples - Piezo electric and Photo Diode Transducers - Hall effect sensors- Numerical Problems.

UNIT 5

Digital meters: - Digital Voltmeters – Successive approximation DVM - Ramp type DVM and Integrating type DVM – Digital frequency meter - Digital multimeter - Digital tachometer - Digital Energy Meter - Q meter - Power Analyzer. CRO- measurement of phase difference & Frequency using lissajous patterns - Numerical Problems.

TEXT BOOKS

- 1 Electrical Measurements and measuring Instruments by E.W. Golding and F.C.Widdis - 5th Edition - Wheeler Publishing.
- 2 Modern Electronic Instrumentation and Measurement Techniques by A.D. Helfrick and W.D. Cooper - PHI - 5th Edition - 2002

REFERENCE BOOKS

- 1 Electrical & Electronic Measurement & Instruments by A.K.Sawhney Dhanpat Rai & Co. Publications - 19th revised edition - 2011.
- 2 Electrical and Electronic Measurements and instrumentation by R.K.Rajput - S.Chand - 3rd edition
- 3 Electrical Measurements by Buckingham and Price - Prentice – Hall
- 4 Electrical Measurements by Forest K. Harris. John Wiley and Sons

WEB RESOURCES (Suggested)

- 1 https://onlinecourses.nptel.ac.in/noc19_ee44/preview
- 2 <https://www.codrey.com/electrical/types-of-electrical-and-electronic-instruments/>



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

COURSE CONTENT

UNIT 1

Introduction to Microprocessor Architecture - Introduction and evolution of Microprocessors – Architecture of 8086 – Memory Organization of 8086 – Register Organization of 8086– Introduction to 80286 - 80386 - 80486 and Pentium (brief description about architectural advancements only).

UNIT 2

Minimum and Maximum Mode Operations - Instruction sets of 8086 - Addressing modes – Assembler directives – Simple Programs-General bus operation of 8086 – Minimum and Maximum mode operations of 8086 – 8086 Control signal interfacing – Read and write cycle timing diagrams.

UNIT 3

Microprocessors I/O interfacing - 8255 PPI– Architecture of 8255–Modes of operation– Interfacing I/O devices to 8086 using 8255–Interfacing A to D converters– Interfacing D to A converters– Stepper motor interfacing– Static memory interfacing with 8086 – Architecture and interfacing of DMA controller (8257).

UNIT 4

8051 Microcontroller - Overview of 8051 Microcontroller – Architecture– Memory Organization – Register set – Instruction set – Simple Programs - I/O ports and Interrupts – Timers and Counters – Serial Communication – Interfacing of peripherals.

UNIT 5

PIC Architecture - Block diagram of basic PIC 18 micro controller – registers I/O ports – Programming in C for PIC: Data types - I/O programming - logical operations - data conversion.

TEXT BOOKS

- 1 Ray and Burchandi - “Advanced Microprocessors and Interfacing”- Tata McGraw–Hill - 3rd edition - 2006.
- 2 Kenneth J Ayala - “The 8051 Microcontroller Architecture- Programming and Applications” - Thomson Publishers - 2nd Edition.
- 3 PIC Microcontroller and Embedded Systems using Assembly and C for PIC 18 - -Muhammad Ali Mazidi - RolindD.Mckinay - Danny causey -Pearson Publisher 21st Impression.

REFERENCE BOOKS

- 1 Microprocessors and Interfacing - Douglas V Hall - Mc–Graw Hill - 2nd Edition.
- 2 R.S. Kaler- “A Text book of Microprocessors and Micro Controllers” - I.K. International Publishing House Pvt. Ltd.
- 3 Ajay V. Deshmukh- “Microcontrollers – Theory and Applications” - Tata McGraw–Hill Companies –2005.
- 4 Ajit Pal - “Microcontrollers – Principles and Applications” - PHI Learning Pvt Ltd - 2011.

WEB RESOURCES (Suggested)

- 1 <https://archive.nptel.ac.in/courses/108/105/108105102>
- 2 <https://archive.nptel.ac.in/courses/108/103/108103157>
- 3 <https://nptel.ac.in/courses/106108100>



COURSE CONTENT

UNIT 1

Circuit Topology - Graph theory definitions – Formation of element node incidence and bus incidence matrices – Primitive network representation – Formation of Ybus matrix by singular transformation and direct inspection methods.

Per Unit Representation - Per Unit Quantities–Single line diagram – Impedance diagram of a power system – Numerical Problems.

UNIT 2

Power Flow Studies - Necessity of power flow studies – Derivation of static power flow equations –Power flow solution using Gauss-Seidel Method – Newton Raphson Method (Rectangular and polar coordinates form) – Decoupled and Fast Decoupled methods – Algorithmic approach – Numerical Problems on 3–bus system only.

UNIT 3

Z-Bus –Algorithm - Formation of Zbus: Algorithm for the Modification of Zbus Matrix (without mutual impedance) – Numerical Problems.

Symmetrical Fault Analysis - Reactance's of Synchronous Machine – Three Phase Short Circuit Currents – Short circuit MVA calculations for Power Systems – Numerical Problems.

UNIT 4

Symmetrical Components - Definition of symmetrical components – symmetrical components of unbalanced three phase systems – Power in symmetrical components – Sequence impedances and Sequence networks of Synchronous generator, Transformers and Transmission line–Numerical Problems.

Unsymmetrical Fault analysis - Various types of faults: LG– LL– LLG and LLL on unloaded alternator Numerical problems.

UNIT 5

Power System Stability Analysis - Elementary concepts of Steady state – Dynamic and Transient Stabilities – Swing equation – Steady state stability – Equal area criterion of stability – Applications of Equal area criterion – Factors affecting transient stability – Methods to improve steady state and transient stability – Numerical problems.

TEXT BOOKS

- 1 Power System Analysis by Grainger and Stevenson - Tata McGraw Hill.2003
- 2 Modern Power system Analysis – by I.J.Nagrath & D .P.Kothari: Tata McGraw–Hill Publishing Company - 3rd edition - 2007.

REFERENCE BOOKS

- 1 Power System Analysis – by A.R.Bergen - Prentice Hall - 2nd edition -2009.
- 2 Power System Analysis by HadiSaadat – Tata McGraw–Hill 3rd edition -2010.
- 3 Power System Analysis by B.R.Gupta - A H Wheeler Publishing Company Limited -1998.
- 4 Power System Analysis and Design by J.Duncan Glover - M.S.Sarma - T.J.Overbye – Cengage Learning publications - 5th edition - 2011.

WEB RESOURCES (Suggested)

- 1 <https://archive.nptel.ac.in/courses/117/105/117105140>
- 2 <https://archive.nptel.ac.in/courses/108/105/108105104>
- 3 https://onlinecourses.nptel.ac.in/noc20_ee72/preview

III Year II Semester
SWITCHGEAR AND PROTECTION
(For Electrical and Electronics Engineering)

Course Category	Professional Elective Courses	Course Code	24EE604T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Basic concepts of Electrical Machines and Power Systems	Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES

1	To explain the working principles and applications of circuit breakers in power systems, including MCBs, oil, SF6, and vacuum breakers.
2	To provide an understanding of electromagnetic protection mechanisms, particularly relays used in fault detection and system protection (over current, under voltage, directional, differential)
3	To analyze protection techniques for generators and transformers, including fault protection schemes like percentage differential protection and Buchholz relays.
4	To explore feeder and bus bar protection methods using systems such as distance and static relays.
5	To study over-voltage protection systems including lightning arresters and neutral grounding methods to safeguard the power system.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Understand and describe the operation of circuit breakers, including their ratings, principles of arc interruption, and types.	K2
CO2	Analyze relay-based protection systems, identifying and explaining their roles in over current, under voltage, and fault detection.	K4
CO3	Design protection schemes for generators and transformers, addressing faults like restricted earth faults and inter-turn faults.	K1
CO4	Implement feeder and busbar protection using advanced relays such as distance, impedance, and static relays.	K3
CO5	Evaluate over-voltage protection strategies, including the use of lightning arresters, and understand various neutral grounding techniques.	K5

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

[illegible]



COURSE CONTENT

UNIT 1

Circuit Breakers - Miniature Circuit Breaker(MCB)– Elementary principles of arc interruption– Restriking Voltage and Recovery voltages– Restriking phenomenon - RRRV– Average and Max. RRRV– Current chopping and Resistance switching– Concept of oil circuit breakers –Description and operation of Air Blast– Vacuum and SF6 circuit breakers–Circuit Breaker ratings and specifications– Concept of Auto reclosing.

UNIT 2

Electromagnetic Protection - Relay connection – Balanced beam type attracted armature relay - induction disc and induction cup relays–Torque equation - Relays classification–Instantaneous– DMT and IDMT types– Applications of relays: Over current and under voltage relays– Directional relays– Differential relays and percentage differential relays– Universal torque equation–Distance relays: Impedance– Reactance– Mho and offset mho relays– Characteristics of distance relays and comparison.

UNIT 3

Generator Protection - Protection of generators against stator faults– Rotor faults and abnormal conditions–restricted earth fault and inter turn fault protection– Numerical examples.

Transformer Protection - Percentage differential protection– Design of CT's ratio– Buchholz relay protection– Numerical examples.

UNIT 4

Feeder and Bus bar Protection & Static Relays: - Over current Protection schemes – PSM - TMS – Numerical examples – Carrier current and three zone distance relay using impedance relays. Protection of bus bars by using Differential protection.

Static relays: Introduction – Classification of Static Relays–Basic Components of Static Relays.

UNIT 5

Protection against over voltage and grounding: - Generation of over voltages in power systems– Protection against lightning over voltages–Valve type and zinc oxide lightning arresters. Grounded and ungrounded neutral systems– Effects of ungrounded neutral on system performance – Methods of neutral grounding: Solid–resistance–Reactance– Arcing grounds and grounding Practices.

TEXT BOOKS

- 1 Power System Protection and Switchgear by Badri Ram and D.N Viswakarma - Tata McGraw Hill Publications - 2nd edition - 2011.
- 2 Power system protection- Static Relays with microprocessor applications by T.S.Madhava Rao - Tata McGraw Hill - 2nd edition.

REFERENCE BOOKS

- 1 Fundamentals of Power System Protection by Paithankar and S.R.Bhide. - PHI - 2003
- 2 Art & Science of Protective Relaying – by C R Mason - Wiley Eastern Ltd.
- 3 Protection and SwitchGear by BhaveshBhalja - R.P. Maheshwari - Nilesh G.Chothani-Oxford University Press - 2013.

WEB RESOURCES (Suggested)

- 1 <https://archive.nptel.ac.in/courses/108/107/108107167>
- 2 <https://archive.nptel.ac.in/courses/108/105/108105167>
- 3 <http://www.electrical4u.com/protection-system-in-power-system/>
- 4 <http://nptel.ac.in/downloads/108101039/>



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year II Semester ADVANCED CONTROL SYSTEMS (For Electrical and Electronics Engineering)

Course Category	Professional Elective Courses	Course Code	24EE605T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Basic concepts of Control Systems	Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES

1	To understand the concept of controllability, observability, and their tests for continuous-time systems, as well as the principle of duality in state-space analysis.
2	To understand the state-space methods to assess controllability, observability, and design state feedback controllers via pole placement.
3	To know the stability of nonlinear systems using phase-plane analysis, describing functions, and Lyapunov's stability theorems.
4	To Learn optimal control strategies using the calculus of variations, including constrained minimization and the minimum principle.
5	To learn Optimal control and state regulator problems.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Explain controllability, observability, and the principle of duality in state-space systems.	K2
CO2	Apply state-space methods to analyze controllability, observability, and design state feedback controllers.	K3
CO3	Analyze the stability of nonlinear systems using phase-plane analysis and Lyapunov's stability theorems.	K4
CO4	Examine the minimization of functional and control variable inequality constraints.	K4
CO5	Formulate and solve the optimal regulator 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)

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

**COURSE CONTENT****UNIT 1****Controllability - Observability and Design of Pole Placement**

General concepts of controllability and observability - Tests for controllability and observability for continuous time systems - Principle of duality - Effect of state feedback on controllability and observability - Design of state feedback control through pole placement, full order and reduced order observers.

UNIT 2**Nonlinear Systems**

Introduction to nonlinear systems - Types of nonlinearities. Introduction to phase plane analysis, construction of phase trajectories - Analytical and Isocline method, Describing function - Describing functions of on-off nonlinearity, on-off nonlinearity with hysteresis, and relay with dead zone.

UNIT 3**Stability analysis by Lyapunov Method**

Stability in the sense of Lyapunov – Lyapunov's stability and Lyapunov's instability theorems – Direct method of Lyapunov for the linear and nonlinear continuous time autonomous systems.

UNIT 4**Calculus of Variations**

Minimization of functionals - functionals of single function – Constrained minimization – Minimum principle – Control variable inequality constraints – Control and state variable inequality constraints.

UNIT 5**Optimal Control**

Necessary conditions for optimal control, Formulation of the optimal control problem, minimum time problem, minimum energy problem, minimum fuel problem, state regulator problem, output regulator problem.

TEXT BOOKS

- 1 Modern Control Engineering – by K. Ogata - Prentice Hall of India - 3rd edition - 1998.
- 2 Automatic Control Systems by B.C. Kuo - Prentice Hall Publication.

REFERENCE BOOKS

- 1 Modern Control System Theory by M. Gopal New Age International Publishers 2nd edition 1996.
- 2 Optimal control theory: an Introduction by Donald E. Kirk by Dover publications.
- 3 Control Systems Engineering by I.J. Nagarath and M. Gopal - New Age International (P) Ltd.
- 4 Systems and Control by Stanislaw H. Zak - Oxford Press - 2003.
- 5 Digital Control and State Variable Methods – by M. Gopal - Tata Mc Graw-Hill Companies 1997.

WEB RESOURCES (Suggested)

- 1 <https://archive.nptel.ac.in/courses/108/103/108103007>
- 2 <https://archive.nptel.ac.in/courses/108/107/108107115>
- 3 <https://www.electrical4u.com/state>
- 4 <https://en.wikipedia.org/wiki/Observability>



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year II Semester

RENEWABLE AND DISTRIBUTED ENERGY TECHNOLOGIES

(For Electrical and Electronics Engineering)

Course Category	Professional Elective Courses	Course Code	24EE606T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Power system I	Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To understand the basic concepts on wind energy systems.
2	To understand the various relations between speed, power and energy in the wind systems.
3	To analyze the solar energy systems, various components of solar thermal systems, applications in the relevant fields and design of PV systems.
4	To design the Hydel system components and to get an idea on different other sources like tidal, geothermal and gas based units.
5	To understand the concepts of hybrid renewable energy systems.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Illustrate basic concepts of renewable and distributed sources of wind energy.	K3
CO2	Demonstrate the components of wind energy conversion systems.	K2
CO3	Model PV systems and analyze MPPT Techniques.	K4
CO4	Illustrate the concept of Energy Production from Hydro - Tidal and Geothermal.	K3
CO5	Explain the aspects of hybrid renewable energy systems.	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	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	-	-	1	-	-	-	-	2	1
CO2	3	2	1	-	-	-	1	-	-	-	-	2	1
CO3	3	1	1	-	-	-	1	-	-	-	-	3	2
CO4	3	1	1	-	-	-	1	-	-	-	-	2	1
CO5	3	1	1	-	-	-	1	-	-	-	-	2	1

**COURSE CONTENT****UNIT 1**

Introduction and Wind energy systems - Brief idea on renewable and distributed sources - their usefulness and advantages. Wind Energy Systems: Estimates of wind energy potential-wind maps Aerodynamic and mechanical aspects of wind machine design - Conversion to electrical energy - Aspects of location of wind farms.

UNIT 2

Wind power and energy - Wind speed and energy - Speed and power relations - Power extraction from wind - Tip speed ratio (TSR) - TSR characteristics- Functional structure of wind energy conversion systems - Pitch and speed control - Power vs speed characteristics - Fixed speed and variable speed wind turbine control - Power optimization - Electrical generators - Self-Excited and Doubly-Fed Induction Generators operation and control.

UNIT 3

Solar PV Systems - Present and new technological developments in photovoltaic - estimation of solar irradiance - components of solar energy systems – solar thermal system applications- Modelling of PV cell - current-voltage and power-voltage characteristics - Effects of temperature and irradiance - Solar array simulator - Sun tracking - Peak power operations - PV system - MPPT techniques: Perturb and observe method, hill climbing and incremental conductance methods-Effects of partial shading on the characteristic curves and associated MPPT techniques - Solar park design outline-Solar Pond-Types of PV systems.

UNIT 4

Small Hydro and other sources - Hydel:Small-Mini-Medium -Plant layouts Water power estimates -use of hydrographs -hydraulic turbine - characteristics and part load performance - design of wheels - draft tubes and penstocks. Other sources: Tidal - geothermal - gas-based generations.

UNIT 5

Hybrid Renewable systems - Requirements of hybrid/combined use of different renewable and distributed sources -Need of energy storage- Control of frequency and voltage of distributed generation in Stand-alone and Grid-connected mode - use of energy storage and power electronics interfaces for the connection to grid and loads - Design and optimization of size of renewable sources and their storages.

TEXT BOOKS

- 1 Math J. Bollen - Fainan Hassan 'Integration of Distributed Generation in the Power System' - IEEE Press - 2011.
- 2 G.D.Rai 'Non-Conventional Energy Sources' KHANNA PUBLISHERS.

REFERENCE BOOKS

- 1 Studies' Craig Anderson and Rudolf I. Howard 'Wind and Hydropower Integration: Concepts - Considerations and Case - Nova Publisher - 2012.
- 2 Amanda E. Niemi and Cory M. Fincher 'Hydropower from Small and LowHead Hydro Technologies' - Nova Publisher - 2011.
- 3 D. Yogi Goswami - Frank Kreith and Jan F. Kreider 'Principles of Solar Engineering' - Taylor & Francis 2000.
- 4 Loi Lei Lai and Tze Fun Chan 'Distributed Generation: Induction and Permanent Magnet Generators- Wiley-IEEE Press - 2007.
- 5 S. Heier and R. Waddington 'Grid Integration of Wind Energy Conversion Systems' – Wiley - 2006.
- 6 G.N. Tiwari 'Solar Energy Technology' - Nova Science Publishers - 2005

WEB RESOURCES (Suggested)

- 1 <https://archive.nptel.ac.in/courses/103/103/103103206>
- 2 <https://archive.nptel.ac.in/courses/103/107/103107157>
- 3 <https://nptel.ac.in/courses/121/106/121106014/>
- 4 <https://nptel.ac.in/courses/108/107/108107112/>



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year II Semester

ELECTRIC DRIVES

(For Electrical and Electronics Engineering)

Course Category	Professional Elective Courses	Course Code	24EE608T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Electrical Circuit Analysis, Power electronics, Electrical Machines and Control Systems.	Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To learn the fundamentals of electric drive and different electric braking methods.
2	To analyze the operation of three phase converter controlled dc motors and four quadrant operation of dc motors using dual converters.
3	To discuss the DC-DC converter control of dc motors.
4	To understand the concept of speed control of induction motor by using AC voltage controllers, voltage source inverters and slip power recovery scheme.
5	To learn the speed control mechanism of synchronous motors.

COURSE OUTCOMES		Cognitive Level
Upon successful completion of the course, the student will be able to:		
CO1	Explain the fundamentals of electric drive and different electric braking methods.	K2
CO2	Analyze the operation of three-phase converter fed dc motors and four quadrant operations of dc motors using dual converters.	K4
CO3	Describe the DC-DC converter fed control of dc motors in various quadrants of operation.	K2
CO4	Know the concept of speed control of induction motor by using AC voltage controllers and voltage source inverters and differentiate the stator side control and rotor side control.	K3
CO5	Learn the concepts of speed control of synchronous motor with different methods.	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	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	2	1	-	-	-	-	-	-	-	-	-	-
CO2	3	2	-	-	1	-	-	-	-	-	-	1	2
CO3	3	2	1	-	1	-	-	-	-	-	-	1	2
CO4	2	-	-	-	1	-	-	-	-	-	-	1	1
CO5	2	-	-	-	1	-	-	-	-	-	-	-	-



COURSE CONTENT

UNIT 1

Fundamentals of Electric Drives

Electric drive and its components– Fundamental torque equation – Load torque components – Nature and classification of load torques – Steady state stability – Load equalization– Four quadrant operation of drive (hoist control) – Braking methods: Dynamic Braking, Plugging and Regenerative Braking –Numerical problems.

UNIT 2

Converter Fed DC Motor Drives

3-phase half and fully-controlled converter fed separately and self-excited DC motor drive – Output voltage and current waveforms – Speed-torque characteristics and expressions – 3-phase Dual converter fed DC motor drives – Numerical problems.

UNIT 3

DC–DC Converter Fed DC Motor Drives

Single quadrant, two quadrant and four quadrant DC-DC converter fed separately excited and self-excited DC motors – Continuous Current Mode of operation - Output voltage and current waveforms – Speed-torque characteristics and expressions – Closed loop operation (qualitative treatment only) – Numerical problems.

UNIT 4

Control of 3-phase Induction motor Drives

Stator voltage control using 3-phase AC voltage regulators – Waveforms –Speed torque characteristics– Variable Voltage Variable Frequency control of induction motor by PWM voltage source inverter – Closed loop V/f control of induction motor drives (qualitative treatment only). Static rotor resistance control – Slip power recovery schemes – Static Scherbius drive – Static Kramer drive – Performance and speed torque characteristics– Numerical problems.

UNIT 5

Control of Synchronous Motor Drives

Separate control of synchronous motor – self-control of synchronous motor employing load commutated thyristor inverter - closed loop control of synchronous motor drive (qualitative treatment only)– PMSM: Basic operation and advantages – Numerical problems.

TEXT BOOKS

- 1 Fundamentals of Electric Drives – G K Dubey - Narosa Publications - 2nd edition – 2002.
- 2 Power Semiconductor Drives - S.B.Dewan - G.R.Slemon - A.Straughen - Wiley India - 1984.

REFERENCE BOOKS

- 1 Electric Motors and Drives Fundamentals - Types and Applications - by Austin Hughes and Bill Drury - Newnes.4th edition - 2013.
- 2 Thyristor Control of Electric drives – Vedam Subramanyam Tata McGraw Hill Publications - 1987.
- 3 Power Electronic Circuits - Devices and applications by M.H.Rashid - PHI - 3rd edition - 2009.

WEB RESOURCES (Suggested)

- 1 <https://archive.nptel.ac.in/courses/108/104/108104140>
- 2 <https://nptel.ac.in/courses/108104011>
- 3 <https://nptel.ac.in/courses/108/108/108108077/>
- 4 <https://www.youtube.com/watch?v=2Gjs7IPOCXs>

III Year II Semester
DIGITAL SIGNAL PROCESSING
(For Electrical and Electronics Engineering)

Course Category	Professional Elective Courses	Course Code	24EE609T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Laplace Transforms, Z-Transforms, Fourier series and transforms	Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES

1	To explore the basic concepts of digital signal processing.
2	To connect the time domain signal to frequency domain signals using Fourier transform.
3	To understand the basic structures of IRR systems.
4	To understand and design FIR Digital filters.
5	To explore the concepts of multiple sampling rates for DSP

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Know the concepts of Digital signal processing - frequency domain representation & z-transform.	K4
CO2	Compute discrete Fourier transform and fast Fourier transforms for different sequences.	K4
CO3	Design IIR filters through analog filter approximation and basic structure of IIR filters.	K6
CO4	Design FIR filters with window techniques and basic structure of FIR filters	K6
CO5	Learn the concepts of Multirate Signal Processing.	K2

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

Contribution of Course Outcomes towards achievement of Program

[illegible]



COURSE CONTENT

UNIT 1

Introduction to Digital Signal Processing

Discrete time signals & sequences - Classification of Discrete time systems - stability of LTI systems - Invertability - Response of LTI systems to arbitrary inputs. Solution of Linear constant coefficient difference equations. Frequency domain representation of discrete time signals and systems. Review of Z-transforms - solution of difference equations using Z-transforms - System function

UNIT 2

Discrete Fourier Transforms and FFT Algorithms

Discrete Fourier Series representation of periodic sequences - Properties of Discrete Fourier Series - Discrete Fourier transforms: Properties of DFT - linear filtering methods based on DFT - Fast Fourier transforms (FFT) - Radix-2 decimation in time and decimation infrequency FFT Algorithms - Inverse FFT

UNIT 3

Design and Realizations of IIR Digital Filters

Analog filter approximations – Butterworth and Chebyshev filters - Design of IIR Digital filters from analog filters with examples. Analog and Digital frequency transformations. Basic structures of IIR systems – Direct-Form Structures - Transposed Structures – Cascade Form Structures - Parallel-Form Structures Lattice and Lattice-Ladder Structures.

UNIT 4

Design and Realizations of FIR Digital Filters

Characteristics of FIR Filters with Linear Phase - Frequency Response of Linear Phase FIR Filters - Design of FIR Digital Filters using Window Techniques and Frequency Sampling technique - Comparison of IIR & FIR filters. Basic structures of FIR systems – Direct-Form Structure - Cascade-Form Structures Linear Phase Realizations - Lattice structures.

UNIT 5

Multi rate Digital Signal Processing

Decimation – Interpolation-Sampling Rate Conversion by a Rational Factor – Implementation of sampling rate converters – Applications of Multi rate Signal Processing-Digital Filter Banks.

TEXT BOOKS

- 1 Digital Signal Processing – Principles Algorithms and Applications: John G. Proakis - Dimitris G. Manolakis - 4th Edition - Pearson Education / PHI - 2007.
- 2 Discrete Time Signal Processing – A.V. Oppenheim and R.W. Schaffer - PHI.
- 3 Digital Signal Processing: A Computer based approach. Sanjit K Mitra - 4th Edition - TMH - 2014.

REFERENCE BOOKS

- 1 Digital Signal Processing: Andreas Antoniou - TATA McGraw Hill - 2006.
- 2 Digital Signal Processing: MH Hayes - Schaum's Outlines - TATA Mc-Graw Hill - 2007.
- 3 DSP Primer - C. Britton Rorabaugh - Tata McGraw Hill - 2005.
- 4 Fundamentals of Digital Signal Processing using Matlab – Robert J. Schilling - Sandra L. Harris - Thomson - 2007.
- 5 Digital Signal Processing – Alan V. Oppenheim - Ronald W. Schaffer - PHI Ed. - 2006.
- 6 Digital Signal Processing – K Raja Rajeswari - 1st edition - I.K. International Publishing - House - 2014.

WEB RESOURCES (Suggested)

- 1 <https://nptel.ac.in/courses/117102060>
- 2 <https://archive.nptel.ac.in/courses/108/101/108101174>



COURSE CONTENT

UNIT 1

Break down phenomenon in Gaseous and Vacuum:

Insulating Materials: Types, properties and its applications. Gases as insulating media – Collision process – Ionization process – Townsend's criteria of breakdown in gases and its limitations – Streamers Theory of breakdown – time lag – Paschen's law- Paschen's curve, Penning Effect. Breakdown mechanisms in Vacuum.

UNIT 2

Break down phenomenon in Liquids:

Liquid as Insulator – Pure and commercial liquids – Breakdown in pure and commercial liquids- Mechanisms.

Break down phenomenon in Solids:

Intrinsic breakdown – Electromechanical breakdown – Thermal breakdown – Breakdown of composite solid dielectrics.

UNIT 3

Generation of High DC voltages:

Voltage Doubler Circuit - Voltage Multiplier Circuit – Vande- Graaff Generator.

Generation of High AC voltages:

Cascaded Transformers – Resonant Transformers – Tesla Coil.

UNIT 4

Generation of Impulse voltages:

Specifications of impulse wave – Analysis of RLC circuits - Marx Circuit.

Generation of Impulse currents:

Definitions – Circuits for producing Impulse current waves – Wave shape control - Tripping and control of impulse generators.

UNIT 5

Measurement of High DC & AC Voltages:

Resistance potential divider - Generating Voltmeter - Capacitor Voltage Transformer (CVT) - Electrostatic Voltmeters – Sphere Gaps.

Measurement of Impulse Voltages & Currents:

Potential dividers with CRO - Hall Generator - Rogowski Coils.

TEXT BOOKS

- 1 High Voltage Engineering: Fundamentals by E.Kuffel - W.S.Zaengl - J.Kuffel by Elsevier - 2nd Edition
- 2 High Voltage Engineering by M.S.Naidu and V. Kamaraju – TMH Publications - 3rd Edition.

REFERENCE BOOKS

- 1 High Voltage Engineering and Technology by Ryan IET Publishers - 2nd edition.
- 2 High Voltage Engineering by C.L.Wadhwa - New Age International (P) Limited – 1997.
- 3 High Voltage Insulation Engineering by RavindraArora - Wolfgang Mosch - New Age International (P) Limited - 1995.

WEB RESOURCES (Suggested)

- 1 <https://archive.nptel.ac.in/courses/108/104/108104048>
- 2 <https://bharatsrajpuhrit.weebly.com/high-voltage-engineering-course.html>
- 3 <https://nptel.ac.in/courses/108/108/108108099/>
- 4 <https://www.youtube.com/watch?v=0as-VQq9igA>



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year II Semester
Disaster Management

Course Category	Engineering Science	Course Code	24CE612T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

Course Objectives:

1.	Develop an understanding of why and how the modern disaster manager is involved with pre- disaster and post-disaster activities
2.	Describe the three planning strategies useful in mitigation.
3.	Develop an awareness of the chronological phases of natural disaster response and refugee relief operations. Understand how the phases of each are parallel and how they differ.
4.	Describe public awareness and economic incentive possibilities.
5.	Understand the tools of post-disaster management.

Course Outcomes:

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Affirm the usefulness of integrating management principles in disaster mitigation work	K3
CO2	Distinguish between the different approaches needed to manage pre- during and post- disaster periods	K2
CO3	Understanding the functioning of national disaster management authority	K2
CO4	Explain the process of risk management	K3
CO5	Relate to risk transfer	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)

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



COURSE CONTENT

UNIT-I : Natural Hazards and Disaster Management: Introduction of DM – Inter disciplinary nature of the subject– Disaster Management cycle – Five priorities for action. Case study methods of the following: Vegetal Cover floods, droughts – Earthquakes – landslides – global warming, cyclones & Tsunamis – Post Tsunami hazards along the Indian coast.

UNIT-II: Man Made Disaster and Their Management Along With Case Study Methods Of The Following: Fire hazards – transport hazard dynamics – solid waste management – post disaster – bio terrorism - threat in mega cities, rail and aircraft accidents, ground water, industries - Emerging infectious diseases and Aids and their management.

UNIT-III: Risk and Vulnerability: Building codes and land use planning – Social Vulnerability – Environmental vulnerability – Macro-economic management and sustainable development, Climate change risk rendition – Financial management of disaster – related losses.

UNIT-IV: Role of Technology in Disaster Managements: Disaster management for infra structures, taxonomy of infra structure – treatment plants and process facilities-electrical substations- roads and bridges-mitigation programme for earth quakes – flowchart, geospatial information in agriculture drought assessment - Multimedia Technology in disaster risk management and training - Transformable Indigenous Knowledge in disaster reduction – Role of RS & GIS.

UNIT-V: Multi-sectional Issues, Education and Community Preparedness: Impact of disaster on poverty and deprivation - Climate change adaptation and human health - Exposure, health hazards and environmental risk-Forest management and disaster risk reduction -The Red cross and red crescent movement - Corporate sector and disaster risk reduction- Education in disaster risk reduction- Essentials of school disaster education - Community capacity and disaster resilience-Community based disaster recovery - Community based disaster management and social capital-Designing resilience- building community capacity for action.

TEXT BOOKS:

1. An Introduction of Disaster Management- Natural Disasters & Vulnerable Hazards– S.Vaidyanathan: CBS Publishers& Distributors Pvt. Ltd.
2. Natural Hazards & Disaster Management, Vulnerability and Mitigation by RB Singh- Rawat Publications
3. ‘Disaster Science & Management’ by Tushar Bhattacharya, Tata McGraw Hill Education Pvt. Ltd., New Delhi.
4. ‘Disaster Management – Future Challenges and Opportunities’ by Jagbir Singh (2007), I K International Publishing House Pvt.Ltd.

REFERENCE BOOKS:

1. ‘Disaster Management’ edited by H K Gupta (2003), Universities press.
2. ‘Disaster Management – Global Challenges and Local Solutions’ by Rajib shah & R R Krishnamurthy (2009), Universities press.R. Nishith, Singh AK

WEBREFERENCE:

- 1) <https://archive.nptel.ac.in/courses/124/107/124107010/>



PRAGATI ENGINEERING COLLEGE

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Department of Electrical and Electronics Engineering

III Year II Semester ADDITIVE MANUFACTURING

Course Category	Open Elective -II	Course Code	24ME615T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites	Manufacturing Processes	Continuous Internal Assessment Semester End Examination Total Marks	30 70 100

COURSE OBJECTIVES

1	To understand the principles of prototyping, classification of Rapid Prototyping processes and liquid-based Rapid Prototyping systems
2	To understand and apply different types of solid-based Rapid Prototyping systems.
3	To understand and apply different types of powder-based Rapid Prototyping systems.
4	To understand and apply various rapid tooling techniques
5	To understand different types of data formats and to explore the applications of Additive Manufacturing processes in various fields.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Explain the principles, classification, and operation of liquid-based Rapid Prototyping systems.	K2
CO2	Describe various solid-based Rapid Prototyping systems.	K2
CO3	Analyze different powder-based Rapid Prototyping systems.	K4
CO4	Apply direct and indirect rapid tooling techniques.	K3
CO5	Interpret Rapid Prototyping data formats and applications of Additive Manufacturing.	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
CO1	2	2	1	-	-	-	-	-	-	-	1
CO2	2	2	1	-	-	-	-	-	-	-	1
CO3	2	2	1	-	-	-	-	-	-	-	1
CO4	2	2	1	-	-	-	-	-	-	-	1
CO5	1	-	-	-	1	-	-	-	-	-	1

**COURSE CONTENT****UNIT –I**

INTRODUCTION: Prototyping fundamentals, historical development, fundamentals of rapid prototyping, advantages and limitations of rapid prototyping, commonly used terms, classification of RP process.

LIQUID-BASED RAPID PROTOTYPING SYSTEMS: Stereo lithography Apparatus (SLA): models and specifications, process, working principle, photopolymers, photo polymerization, layering technology, laser and laser scanning, applications, advantages and disadvantages, case studies. Solid Ground Curing (SGC): models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

UNIT –II

SOLID-BASED RAPID PROTOTYPING SYSTEMS: Laminated object manufacturing (LOM) - models and specifications, process, working principle, applications, advantages and disadvantages, case studies. Fused deposition modeling (FDM) - models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

UNIT –III

POWDER BASED RAPID PROTOTYPING SYSTEMS: Selective laser sintering (SLS): models and specifications, process, working principle, applications, advantages and disadvantages, case studies. Three-dimensional printing (3DP): models and specifications, process, working principle, applications, advantages and disadvantages, case studies.

UNIT – IV

RAPID TOOLING: Introduction to rapid tooling (RT), conventional tooling Vs RT, Need for RT. rapid tooling classification: indirect rapid tooling methods: spray metal deposition, RTV epoxy tools, Ceramic tools, investment casting, spin casting, die casting, sand casting process. Direct rapid tooling: Direct AIM, LOM Tools, and Direct Metal Tooling using 3DP

UNIT – V

RAPID PROTOTYPING DATA FORMATS: STL Format, STL File Problems, consequence of building valid and invalid tessellated models, STL file Repairs: Generic Solution, other Translators, and Newly Proposed Formats.

RP APPLICATIONS: Application in engineering, analysis and planning, aerospace industry, automotive industry, jewelry industry, coin industry, GIS application, RP medical and bioengineering applications: customized implants and prosthesis, forensic sciences.

Textbooks:

1. Rapid prototyping: Principles and Applications /Chua C.K., Leong K.F. and LIM C.S/World Scientific publications
2. Gebhardt A., “Rapid prototyping”, Hanser Gardener Publications, 2003

Reference Books:

1. Liou L.W. and Liou F.W., “Rapid Prototyping and Engineering applications: A tool box for prototype development”, CRC Press, 2007.
2. Rapid Manufacturing / D.T. Pham and S.S. Dimov/Springer
3. Rapid Prototyping & Manufacturing / Paul F.Jacobs/ASME Press

Web References:

1. <https://www.ijeast.com/papers/254-260,Tesma505,IJEAST.pdf>
2. <https://theswissbay.ch/pdf/Books/Survival/Workshop/Rapid%20Tooling%20Technologies%20%26%20Industrial%20Applications.pdf>
3. <https://www.scribd.com/document/410103053/Patri-K-Venuvinod-Weiyyin-Ma-auth-Rapid-Prototyping-Laser-based-and-Other-Technologies-Springer-US-2004-pdf>
4. https://onlinecourses.nptel.ac.in/noc25_me151/preview

III Year II Semester Principles of Communication

Course Category	Open Elective	Course Code	24EC613T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment Semester End Examination Total Marks	30 70 100

COURSEOBJECTIVES

The student will learn:

1	Understand basic communication tools such as Fourier analysis, spectral properties, and AM concepts.
2	Know the principles and features of DSB-SC, SSB, and VSB modulation schemes.
3	Understand FM and PM systems, their bandwidth rules, and demodulation methods.
4	Understand sampling, quantization, and reconstruction techniques for digital signal representation.
5	Know probability and random processes for modeling noise in wireless communication.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Explain Fourier analysis, autocorrelation, and AM parameters for given communication signals.	K2
CO2	Apply DSB-SC, SSB, and VSB modulation schemes using spectrum and demodulation methods.	K3
CO3	Analyze FM and PM signals using modulation index and Carson's rule.	K4
CO4	Apply sampling and quantization to reconstruct signals meeting Nyquist and noise requirements.	K3
CO5	Evaluate wireless channel noise using probability theory and Gaussian process concepts.	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)**

[illegible]



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

COURSE CONTENT

UNIT1 : Basic tools for communication, Fourier Series/Transform, Properties, Autocorrelation, Energy Spectral Density, Parsevals Relation, Amplitude Modulation (AM), Spectrum of AM, Envelope Detection, Power Efficiency, Modulation Index.

UNIT2 : Double Sideband Suppressed Carrier (DSB-SC) Modulation, Demodulation, Costas Receiver, Single Sideband Modulation (SSB), Hilbert Transform, Complex Pre-envelope/ Envelope, Demodulation of SSB, Vestigial Sideband Modulation (VSB)

UNIT 3 : Angle Modulation, Frequency Modulation (FM), Phase Modulation (PM), Modulation Index, Instantaneous Frequency, Spectrum of FM Signals, Carsons Rule for FM Bandwidth, Narrowband FM Generation, Wideband FM Generation via Indirect Method, FM Demodulation

UNIT 4 : Introduction to Sampling, Spectrum of Sampled Signal, Aliasing, Nyquist Criterion, Signal Reconstruction from Sampled Signal, Pulse Amplitude Modulation, Quantization, Uniform Quantizers – Midrise and Midtread, Quantization noise, , Non uniform Quantizers, Delta Modulation, Differential Pulse Code Modulation (DPCM)

UNIT 5: : Basics of Probability, Conditional Probability, MAP Principle, Random Variables, Probability Density Functions, Applications in Wireless Channels, Basics of Random Processes ,Gaussian Random Process, Noise.

TEXTBOOKS:

1. Simon Haykin, Communications Systems, 4th Edition. John Wiley and Sons, Inc
Fundamentals of Wireless Communication by David Tse



PRAGATI ENGINEERING COLLEGE

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Department of Electrical and Electronics Engineering

III Year II Semester

OBJECT ORIENTED PROGRAMMING THROUGH JAVA

(Common to CE, EEE, ME & ECE)

Course Category	Open Elective - II	Course Code	24CS606T
Course Type	Theory	L-T-P-C	3-0-0-3
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES

The learning objectives of this course are to:

1	Identify Java language components and how they work together in applications
2	Learn the fundamentals of object-oriented programming in Java, including defining classes, invoking methods, using class libraries.
3	Learn how to extend Java classes with inheritance and dynamic binding and how to use exception handling in Java applications
4	Understand how to design applications with threads in Java
5	understand how to use Java APIs for program development

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:

		Cognitive Level
CO1	Apply the fundamentals of Java to solve problems	K3
CO2	Differentiate the application of decision and iteration control structures	K2
CO3	Implement classes and method overloading concepts	K3
CO4	Apply the concepts of inheritance and packages	K3
CO5	Implement Java programs using exceptions and multithreading	K3

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

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	3	3	3	0	3	0	0	0	0	0	0
CO2	3	3	3	0	3	0	0	0	0	0	0
CO3	3	3	3	0	3	0	0	0	0	0	0
CO4	3	3	3	0	3	0	0	0	0	0	0
CO5	3	3	3	0	3	0	0	0	0	0	0

COURSE CONTENT

UNIT I

Object Oriented Programming: Basic concepts, Principles,

Program Structure in Java: Introduction, Writing Simple Java Programs, Elements or Tokens in Java Programs, Java Statements, Command Line Arguments, User Input to Programs, Escape Sequences Comments, Programming Style.

Data Types, Variables, and Operators :Introduction, Data Types in Java, Declaration of Variables, Data Types, Type Casting, Scope of Variable Identifier, Literal Constants, Symbolic Constants, Formatted Output with printf() Method, Static Variables and Methods, Attribute Final, **Introduction to Operators**, Precedence and Associativity of Operators, Assignment Operator (=), Basic Arithmetic Operators, Increment (++) and Decrement (- -) Operators, Ternary Operator, Relational Operators,

Boolean Logical Operators, Bitwise Logical Operators.

Control Statements:Introduction, if Expression, Nested if Expressions, if-else Expressions, Ternary Operator?:, Switch Statement, Iteration Statements, while Expression, do-while Loop, for Loop, Nested for Loop, For-Each for Loop, Break Statement, Continue Statement.



UNIT II

Classes and Objects: Introduction, Class Declaration and Modifiers, Class Members, Declaration of Class Objects, Assigning One Object to Another, Access Control for Class Members, Accessing Private Members of Class, Constructor Methods for Class, Overloaded Constructor Methods, Nested Classes, Final Class and Methods, Passing Arguments by Value and by Reference, Keyword this.

Methods: Introduction, Defining Methods, Overloaded Methods, Overloaded Constructor Methods, Class Objects as Parameters in Methods, Access Control, Recursive Methods, Nesting of Methods, Overriding Methods, Attributes Final and Static.

UNIT III

Arrays: Introduction, Declaration and Initialization of Arrays, Storage of Array in Computer Memory, Accessing Elements of Arrays, Operations on Array Elements, Assigning Array to Another Array, Dynamic Change of Array Size, Sorting of Arrays, Search for Values in Arrays, Class Arrays, Two-dimensional Arrays, Arrays of Varying Lengths, Three-dimensional Arrays, Arrays as Vectors.

Inheritance: Introduction, Process of Inheritance, Types of Inheritances, Universal Super Class-Object Class, Inhibiting Inheritance of Class Using Final, Access Control and Inheritance, Multilevel Inheritance, Application of Keyword Super, Constructor Method and Inheritance, Method Overriding, Dynamic Method Dispatch, Abstract Classes, Interfaces and Inheritance.

Interfaces: Introduction, Declaration of Interface, Implementation of Interface, Multiple Interfaces, Nested Interfaces, Inheritance of Interfaces, Default Methods in Interfaces, Static Methods in Interface, Functional Interfaces, Annotations.

UNIT IV

Packages and Java Library: Introduction, Defining Package, Importing Packages and Classes into Programs, Path and Class Path, Access Control, Packages in Java SE, Java.lang Package and its Classes, Class Object, Enumeration, class Math, Wrapper Classes, Auto-boxing and Auto-unboxing, Java util Classes and Interfaces, Formatter Class, Random Class, Time Package, Class Instant (java.time.Instant), Formatting for Date/Time in Java, Temporal Adjusters Class, Temporal Adjusters Class.

Exception Handling: Introduction, Hierarchy of Standard Exception Classes, Keywords throws and throw, try, catch, and finally Blocks, Multiple Catch Clauses, Class Throwable, Unchecked Exceptions, Checked Exceptions.

Java I/O and File: Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java(Text Book 2)

UNIT V

String Handling in Java: Introduction, Interface Char Sequence, Class String, Methods for Extracting Characters from Strings, Comparison, Modifying, Searching; Class String Buffer.

Multithreaded Programming: Introduction, Need for Multiple Threads Multithreaded Programming for Multi-core Processor, Thread Class, Main Thread-Creation of New Threads, Thread States, Thread Priority-Synchronization, Deadlock and Race Situations, Inter-thread Communication - Suspending, Resuming, and Stopping of Threads. **Java**

Database Connectivity: Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, Result Set Interface **Java FX GUI:** Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events

Text Books:

- 1) JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
- 2) Joy with JAVA, Fundamentals of Object Oriented Programming, DebasisSamanta, MonalisaSarma, Cambridge, 2023.
- 3) JAVA 9 for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

References Books:

- 1) The complete Reference Java, 11thedition, Herbert Schildt,TMH
- 2) Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson

e- Resources:

- 1) <https://nptel.ac.in/courses/106/105/106105191/>
- 2) https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year II Semester

ENTREPRENEURSHIP AND VENTURE CREATION

(Common to CE, EEE, ME, ECE)

Course Category	Open Elective	Credits	24EC518P
Course Type	Theory	L-T-P-C	3 -0 -0-3
Prerequisites		Internal Assessment Semester End Examination Total Marks	30 70 100

Course Outcomes		BTL
Upon successful completion of the course, the student will be able to		
CO 1	Classify entrepreneurial and intrapreneurial concepts, attributes, and mindset to identify personal entrepreneurial potential using classroom discussions and case studies.	K2
CO 2	Apply design thinking principles to identify and validate problems and customer segments to achieve accurate problem–customer fit through field research and simulated venture activities.	K3
CO 3	Analyze solution designs and feasibility prototypes to determine their effectiveness in achieving proof-of-concept validation under iterative testing conditions.	K4
CO 4	Analyze business and revenue models along with financial plans to evaluate their potential for sustainability and profitability under simulated business planning scenarios.	K4
CO 5	Analyze investor pitch content to assess its effectiveness in communicating venture scale potential under simulated pitching conditions.	K4

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
CO1											
CO2		3	2	2						2	3
CO3		2	2	2						3	3
CO4										3	3
CO5			3							3	



COURSE CONTENT

Unit – I Entrepreneurship Fundamentals & Context: Meaning and concept, attributes and mindset of entrepreneurial and intrapreneurial leadership, role models in each and their role in economic development. An understanding of how to build entrepreneurial mindset, skillsets, attributes and networks while on campus.

Unit – II Problem & Customer Identification: Understanding and analysing the macro-Problem and Industry perspective, technological, socio economic and urbanization trends and their implication on new opportunities. Identifying passion, identifying and defining problem using Design thinking principles. Analysing problem and validating with the potential customer. Iterating problem-customer fit. Understanding customer segmentation, creating and validating customer personas. Competition and Industry trends mapping and assessing initial opportunity.

Unit – III Solution design, Prototyping & Opportunity Assessment and Sizing: Understanding Customer Jobs-to-be-done and crafting innovative solution design to map to customer's needs and create a strong value proposition. Developing Problem-solution fit in an iterative manner. Understanding prototyping and MVP. Developing a feasibility prototype with differentiating value, features and benefits. Initial testing for proof-of-concept and iterate on the prototype. Assess relative market position via competition analysis, sizing the market and assess scope and potential scale of the opportunity.

Unit – IV Business & Financial Model, Go-to-Market Plan: Introduction to Business model and types, Lean approach, 9 block lean canvas model, riskiest assumptions to Business models. Importance of Build - Measure – Lean approach. **Business planning:** components of Business plan- Sales plan, People plan and financial plan. **Financial Planning:** Types of costs, preparing a financial plan for profitability using financial template, understanding basics of Unit economics and analysing financial performance.

Introduction to Marketing and Sales, Selecting the Right Channel, creating digital presence, building customer acquisition strategy. Choosing a form of business organization specific to your venture, identifying sources of funds: Debt & Equity, Map the Start-up Lifecycle to Funding Options.

Unit – V Scale Outlook and Venture Pitch readiness: Understand and identify potential and aspiration for scale vis a vis your venture idea.

Persuasive Storytelling and its key components. Build an Investor ready pitch deck.

Textbooks:

1. Robert D. Hisrich, Michael P. Peters, Dean A. Shepherd, Sabyasachi Sinha (2020). Entrepreneurship, McGrawHill, 11th Edition.
2. Ries, E. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business

Reference Books :

1. Osterwalder, A., & Pigneur, Y. (2010). Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers. John Wiley & Sons.
2. Simon Sinek (2011) Start with Why, Penguin Books limited
3. Brown Tim (2019) Change by Design Revised & Updated: How Design Thinking Transforms Organizations and Inspires Innovation, Harper Business
4. Namita Thapar (2022) The Dolphin and the Shark: Stories on Entrepreneurship, Penguin Books Limited
5. Saras D. Sarasvathy, (2008) Effectuation: Elements of Entrepreneurial Expertise, Elgar Publishing Ltd

Web References:

Learning resource- Ignite 5.0 Course Wadhwani platform (Includes 200+ components of custom created modular content + 500+ components of the most relevant curated content)



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year II Semester

ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY (For Electrical and Electronics Engineering)

Course Category	Lab Course	Course Code	24EE601P
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites	NIL	Internal Assessment	30
		Semester End Examination Total Marks	70
			100

COURSE OBJECTIVES	
1	To understand students how different types of meters work and their construction.
2	To make the students understand how to measure resistance, inductance and capacitance by AC & DC bridges.
3	To understand the testing of CT and PT.
4	To Understand and the characteristics of Thermo couples, LVDT, Capacitive transducer, piezoelectric transducer and measurement of strain and choke coil parameters.
5	To study the procedure for standardization and calibration of various methods.

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Know about the phantom loading and calibration process.	K2
CO2	Measure the electrical parameters voltage - current - power- energy and electrical characteristics of resistance - inductance and capacitance. Learn the usage of CT's - PT's for measurement purpose.	K4
CO3	Gain the skill knowledge of various bridges and their applications. Know the characteristics of transducers and measure the strains - frequency and phase difference.	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	PSO1	PSO2
CO1	3	2	-	-	2	-	-	-	-	-	-	3	2
CO2	3	3	-	-	3	-	-	-	-	-	-	3	3
CO3	3	3	2	-	3	-	-	-	-	-	-	3	3



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Department of Electrical and Electronics Engineering

Exp. No	CONTENTS
	(Any 10 of the following experiments are to be conducted)
1	Calibration of dynamometer wattmeter using phantom loading
2	Measurement of resistance using Kelvin's double Bridge and Determination of its tolerance.
3	Measurement of Capacitance using Schering Bridge.
4	Measurement of Inductance using Anderson Bridge.
5	Calibration of LPF Wattmeter by direct loading.
6	Measurement of 3 phase reactive power using single wattmeter method for a balanced load.
7	Testing of C.T. using mutual inductor – Measurement of % ratio error and phase angle of given C.T. by Null deflection method.
8	P.T. testing by comparison – V.G as Null detector – Measurement of % ratio error and phase angle of the given P.T.
9	Determination of the characteristics of a Thermocouple.
10	Determination of the characteristics of a LVDT.
11	Determination of the characteristics for a capacitive transducer.
12	Measurement of strain for a bridge strain gauge.
13	Measurement of Choke coil parameters and single-phase power using three voltmeter and three ammeter methods
14	Calibration of single-phase Induction Type Energy Meter.
15	Calibration of DC ammeter and voltmeter using Crompton DC Potentiometer.
16	AC Potentiometer: Polar Form / Cartesian Form - Calibration of AC voltmeter - Parameters of choke.

(AUTONOMOUS)

III Year II Semester
MICROPROCESSORS AND MICROCONTROLLERS LABORATORY
(For Electrical and Electronics Engineering)

Course Category	Lab Course	Course Code	24EE602P
Course Type	Laboratory	L-T-P-C	0-0-3-1.5
Prerequisites	Concepts of Microprocessors and Microcontrollers	Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES

1	To study programming based on 8086 microprocessor and 8051 microcontroller.
2	To study 8086 microprocessor based ALP using arithmetic, logical and shift operations.
3	To study to interface 8086 with I/O and other devices.
4	To study parallel and serial communication using 8051& PIC 18 micro controllers.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Write assembly language program using 8086 microprocessor based on arithmetic - logical number systems and shift operations.	K3
CO2	Write assembly language programs for numeric operations and array handling problems. Interface 8086 with I/O and other devices.	K3
CO3	Write a assembly program on string operations. Do parallel and serial communication using 8051 & PIC 18 micro controllers.	K3

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

Contribution of Course Outcomes towards achievement of Program

[illegible]



PRAGATI ENGINEERING COLLEGE

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Department of Electrical and Electronics Engineering

Exp. No	CONTENTS (Any 10 of the following experiments are to be conducted)
8086 Microprocessor Programs	
1	Arithmetic operations – Two 16-bit numbers and multi byte numbers: addition - subtraction - multiplication and division – Signed and unsigned arithmetic operations - ASCII – Arithmetic operations.
2	Logic operations – Shift and rotate – Converting packed BCD to unpacked BCD - BCD to ASCII conversion – BCD numbers addition.
3	Arrange the given array in ascending and descending order
4	Determine the factorial of a given number
5	By using string operation and Instruction prefix: Move block - Reverse string Sorting - Inserting - Deleting - Length of the string - String comparison.
6	Find the first and n th number of 'n' natural numbers of a Fibonacci series.
7	Find the number and sum of even and odd numbers of a given array.
8	Find the sum of 'n' natural numbers and squares of 'n' natural number
9	Arithmetic operations on 8051
10	Conversion of decimal number to hexa equivalent and hexa equivalent to decimal number
11	Find the Sum of elements in an array and also identify the largest & smallest number of a given array using 8051
Programs on Interfacing	
12	Interfacing 8255–PPI with 8086.
13	Stepper motor control using 8253/8255.
14	Reading and Writing on a parallel port using 8051
15	Timer in different modes using 8051
16	Serial communication implementation using 8051
17	Understanding three memory areas of 00 – FF Using 8051 external interrupts.
18	Traffic Light Controller using 8051.



PRAGATI ENGINEERING COLLEGE

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(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year II Semester

IoT APPLICATIONS OF ELECTRICAL ENGINEERING LABORATORY (For Electrical and Electronics Engineering)

Course Category	Skill Enhancement course	Course Code	24EE601S
Course Type	Laboratory	L-T-P-C	0-1-2-2
Prerequisites	Concepts of Computer Organization, Computer Networks.	Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES	
1	To understand the working of Arduino.
2	To learn the programming of Raspberry Pi.
3	To know various sensors with Arduino/Raspberry Pi.
4	To interface various displays with Arduino/Raspberry Pi.
5	To connect with various wireless communication devices

COURSE OUTCOMES		
Upon successful completion of the course, the student will be able to:		Cognitive Level
CO1	Operate the Arduino Integrated Development Environment with embedded c.	K2
CO2	Program the embedded Python in Raspberry Pi OS. Connect different displays with Arduino /Raspberry Pi	K3
CO3	Interface various sensors with Arduino/Raspberry Pi in the IoT environment, Interconnect with wireless communication technologies.	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	PSO1	PSO2
CO1	1	3	-	-	2	-	-	-	-	-	-	2	2
CO2	2	3	-	-	2	-	-	-	-	-	-	1	2
CO3	2	1	-	-	-	-	-	-	-	-	-	3	3

CONTENTS	
Topics to be covered in Tutorials	
Module-1: Programming Arduino: (3 hrs)	
Arduino - Classification of Arduino Boards - Pin diagrams – Arduino Integrated Development Environment (IDE) – Programming Arduino.	
Module-2: Sensors: (5 hrs)	
Working of temperature sensor, proximity sensor, IR sensor, Light sensor, ultrasonic sensor, PIR Sensor, Colour sensor, Soil Sensor, Heart Beat Sensor, Fire Alarms etc. Actuators: Stepper Motor, Servo Motor and their integration with Arduino/Raspberry Pi.	
Module-3: Raspberry Pi: (2 hrs)	
Introduction, Classification of Raspberry Pi Series - Pin diagrams – Programming Raspberry Pi.	
Module-4: Display: (2 hrs)	
Working of LEDs, LED, OLED display, LCDs, Seven Segment Display, Touch Screen etc. Analog Input and Digital Output Converter etc. and their integration with Arduino/Raspberry Pi.	
Module-5: Wireless Communication Devices: (4 hrs)	
Working of Bluetooth, Wi-Fi, Radio Frequency Identification (RFID), GPRS/GSM Technology, ZigBee, etc and their integration with Arduino/Raspberry Pi. Features of Alexa.	



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Department of Electrical and Electronics Engineering

Exp. No	CONTENTS (Any 10 of the following experiments are to be conducted)
1	Familiarization with Arduino/Raspberry Pi and perform necessary software installation.
2	Interfacing of LED/Buzzer with Arduino/Raspberry Pi and write a program to turn ON LED for 1 sec after every 2 seconds.
3	Interfacing of Push button/Digital sensor (IR/LDR) with Arduino/Raspberry Pi and write a program to turn ON LED when push button is pressed or at sensor detection.
4	Interfacing of temperature sensor with Arduino/Raspberry Pi and write a program to print temperature and humidity readings.
5	Interfacing of Organic Light Emitting Diode (OLED) with Arduino/Raspberry Pi
6	Interfacing of Bluetooth with Arduino/Raspberry Pi and write a program to send sensor data to smartphone using Bluetooth.
7	Interfacing of Bluetooth with Arduino/Raspberry Pi and write a program to turn LED ON/OFF when '1'/'0' is received from smartphone using Bluetooth.
8	Write a program on Arduino/Raspberry Pi to upload and retrieve temperature and humidity data to thingspeak cloud.
9	Interfacing of 7 Segment Display with Arduino/Raspberry Pi
10	Interfacing of Joystick with Arduino/Raspberry Pi
11	Interfacing of Analog Input & Digital Output with Arduino/Raspberry Pi
12	Night Light Controlled & Monitoring System
13	Interfacing of Fire Alarm Using Arduino/Raspberry Pi
14	IR Remote Control for Home Appliances
15	A Heart Rate Monitoring System
16	Alexa based Home Automation System



PRAGATI ENGINEERING COLLEGE

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(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year II Semester

SALESFORCE DEVELOPER CATALYST

(Common to All Branches)

Course Category	Skill Enhancement Course	Course Code	24CS601S
Course Type	Laboratory	L-T-P-C	0-1-2-2
Prerequisites		Continuous Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES

1	To be intended for an individual who has experience developing and deploying basic business logic and user interfaces.
2	Train the individuals to the next level, who have the knowledge, skills, and experience in building custom applications on the Lightning Platform.
3	To learn the fundamental programmatic capabilities of the Lightning Platform to develop custom business logic and interfaces to extend Salesforce using Apex, Visualforce, and basic Lightning Components.
4	To use the programmatic capabilities in practice with the Lightning Platform, including practical application of the skills and concepts.

COURSE OUTCOMES

Up on successful completion of the course, the student will be able to:		Cognitive Level
CO1	Acquire a fundamental understanding of the CRM and Salesforce tools necessary to effectively generate useful applications on the Salesforce platform to support the customer requirements.	K3
CO2	Gain experience in using the Salesforce tools and techniques of CRM to complete projects focused on obtaining actionable insights from complex data.	K3
CO3	Dive deeply into a Salesforce Developer practice to fully prepare to use knowledge gained in the course to add significant value in a professional setting.	K3

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

CO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO1	2	2	1	0	2	0	0	0	0	0	1
CO2	2	2	1	0	1	0	0	0	0	0	1
CO3	2	2	1	0	1	0	0	0	0	0	1

COURSE CONTENT :

Experiment 1

Platform Developer I Exam Overview; Apex & .NET Basics: Map .NET Concepts to the Lightning Platform, Understand Execution Context, Use Asynchronous Apex, Debug and Run Diagnostics. Formulas and Validations: Use Formula Fields, Implement Roll-Up Summary Fields, Create Validation Rules.

Data Modeling: Understand Custom & Standard Objects, Create Object Relationships, Work with Schema Builder.

Data Management: Import Data, Export Data. (Sessions- 04)

Experiment-2

Approve Records with Approval Processes: Customize How Records Get Approved, Build an Approval Process.

Record-Triggered Flows: Triggered Flows, Build a Record-Triggered Flow, Add a Scheduled Task to Your Flow, Meet Flow Trigger Explorer.

Search Solution Basics: Choose the Right Search Solution, Build Search for Common Use Cases, Optimize Search Results.

Apex Basics & Database: Get Started with Apex, Uses Objects, Manipulate Records with DML, Write SOQL Queries, Write SOSL Queries.

Apex Triggers: Get Started with Apex Triggers, Bulk Apex Triggers. (Sessions-07)

**Experiment 3 :**

Triggers and Order of Execution: Performing a sequence of events in an order when a record is saved with an insert, update, or upsert statement.

Asynchronous Apex: Asynchronous Processing Basics, Use Future Methods, Use Batch Apex, Control Processes with Queueable Apex, Schedule Jobs Using the Apex Scheduler, Monitor Asynchronous Apex. (Sessions-06)

Experiment 4:

Visual force & Lightning Experience: Use Visualforce in Lightning Experience, Develop Visual force Pages for Lightning Experience, Explore the Visualforce App Container, Share Visual force Pages Between Classic and Lightning Experience, Manage Navigation, Understand Important Visual Design Considerations, Know Which Features to Avoid in Lightning Experience.

Visual force Basics: Get Started with Visual force, Create & Edit Visual force Pages, Use Simple Variables and Formulas, Use Standard Controllers, Display Records, Fields, and Tables, Input Data Using Forms, Use Standard List Controllers, Use Static Resources, Create & Use Custom Controllers. (Sessions-06)

Experiment 5:

Lightning Web Components Basics: Discover Lightning Web Components, Create Lightning Web Components, Deploy Lightning Web Component Files, Handle Events in Lightning Web Components, Add Styles and Data to a Lightning Web Component.

Secure Server-Side Development: Write Secure Apex Controllers, Mitigate SOQL Injection, Mitigate Cross-Site Request Forgery. (Sessions-04)

Experiment 6:

Developer Console Basics: Get Started with the Developer Console, Navigate and Edit Source Code, Generate and Analyze Logs, Inspect Objects at Checkpoints, Execute SOQL and SOSL Queries. Command-Line Interface: Learn About the Command-Line Interface, Explore Command Structure and Navigation, Set Up Command-Line Tools.

Org Development Model: Plan for Changes to Your Org, Develop and Test Changes Locally, Test and Deploy Changes. (Sessions-04)

Experiment 7:

Apex Testing: Get Started with Apex Unit Tests, Test Apex Triggers, Create Test Data for Apex Tests.

Find and Fix Bugs with Apex Replay Debugger: Launch Your Trailhead Playground, Set

Up Visual Studio Code, Set Up Apex Replay Debugger, Debug Your Code.

Debug Logs: Debug Log Details, Debug Log Order of Precedence, Debug Log Levels, Searching a Debug Log, Delete Debug Logs, Debug Log Filtering for Apex. (Sessions-05)

Experiment 8:

Project with Case Study:

Apex Specialist: Concepts Tested in This Superbadge, Apex Triggers, Asynchronous Apex, Apex Integration, Apex Testing. (Sessions-12)

TEXTBOOKS:

1. Michael Wicherski, "Beginning Salesforce Developer", 2018, Wiley Apress Publisher.
2. Paul Battison, "Learning Salesforce Development with Apex", 2020, BPB Publishers.
3. Dan Appleman, "Advanced Apex Programming in Salesforce", 2018, PACKT Publisher.
4. Paul Battison, "Mastering Apex Programming", 2020, PACKT Publisher.

REFERENCE BOOKS:

1. Mohith Shrivastava, "Learning Salesforce Lightning Application Development: Build and test Lightning Components for Salesforce Lightning Experience using Salesforce DX", 2018, PACKT.
2. Brian Cline, "Lightning Web Components (LWC) Development on the Salesforce Platform: A Salesforce developer's guide to building, testing, and deploying Lightning Web Components", 2023, PACKT Publisher.
3. Saifullah Saifi and Ashwini Kumar Raj, "Cloud Computing Using Salesforce", 2021 BPB.

e-Resources :

1. Use the Trailhead Platform: <https://www.salesforce.com/blog/what-is-trailhead/>
The Salesforce Developer Trailmix:
2. <https://trailhead.salesforce.com/users/trjha3/trailmixes/salesforce-developer-catalyst-v-3-0>



PRAGATI ENGINEERING COLLEGE

R23

(AUTONOMOUS)

Department of Electrical and Electronics Engineering

III Year II Semester

RESEARCH METHODOLOGY & IPR

(For Electrical and Electronics Engineering)

Course Category	Audit Course	Course Code	24EA601T
Course Type	Theory	L-T-P-C	2-0-0--
Prerequisites	Exposure to good communication skills, proficiency in Basic English, Science and good writing skills.	Internal Assessment	30
		Semester End Examination	70
		Total Marks	100

COURSE OBJECTIVES:

The objectives of the course are to

1	To understand the knowledge on basics of research and its types.
2	To impart the concept of Literature Review, Technical Reading, Attributions and Citations.
3	To know the Ethics in Engineering Research.
4	To know the concepts of Intellectual Property Rights in Engineering.

COURSE OUTCOMES

Upon successful completion of the course, the student will be able to:

		Cognitive Level
CO1	Explain the meaning of engineering research and apply to develop an appropriate framework for research studies.	K2
CO2	Identify the procedure of Literature Review, Technical Reading, etc. and apply to develop a research design during their project work.	K2
CO3	Explain and apply the fundamentals of patent laws and drafting procedure in their research works.	K2
CO4	Demonstrate the copyright laws, subject matters of copyrights, designs etc. to apply in patent filing.	K3
CO5	Identify the new developments in IPR and employ the applications of computer software in writing/filing patents in future.	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	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	-	-	-	-	-	2	-	2	-	1	-	-	-
CO2	-	-	-	-	-	1	-	2	1	1	-	-	-
CO3	-	-	-	-	-	1	-	1	1	1	-	-	-
CO4	-	-	-	-	-	2	-	1	1	1	-	-	-
CO5	-	-	-	-	-	1	-	2	1	2	-	-	-



COURSE CONTENT

UNIT – I:

Meaning of research problem, Sources of research problem, Criteria Characteristics of a good research problem, Errors in selecting a research problem, Scope and objectives of research problem. Approaches of investigation of solutions for research problem, data collection, analysis, interpretation, Necessary instrumentations.

UNIT – II:

Effective literature studies approaches, analysis Plagiarism, Research ethics, Effective technical writing, how to write report, Paper Developing a Research Proposal, Format of research proposal, a presentation and assessment by a review committee.

UNIT – III:

Nature of Intellectual Property: Patents, Designs, Trade and Copyright. Process of Patenting and Development: technological research, innovation, patenting, development. International Scenario: International cooperation on Intellectual Property. Procedure for grants of patents, Patenting under PCT.

UNIT – IV:

Patent Rights: Scope of Patent Rights. Licensing and transfer of technology. Patent information and databases. Geographical Indications.

UNIT – V:

New Developments in IPR: Administration of Patent System. New developments in IPR; IPR of Biological Systems, Computer Software etc. Traditional knowledge Case Studies, IPR.

TEXT BOOKS:

1. C.R. Kothari , 2nd Edition, “Research Methodology: Methods and Techniques”.
2. Ranjit Kumar, 2nd Edition, “Research Methodology: A Step-by-Step Guide for beginners”.

REFERENCE BOOKS:

1. Stuart Melville and Wayne Goddard, “Research methodology: an introduction for science & engineering students.
2. Wayne Goddard and Stuart Melville, “Research Methodology: An Introduction”.
3. Halbert, “Resisting Intellectual Property”, Taylor & Francis Ltd, 2007.
4. Mayall, “Industrial Design”, McGraw Hill, 1992.
5. Niebel, “Product Design”, McGraw Hill, 1974.

WEB REFERENCES:

1. <https://www.coursera.org/learn/research-methodologies>
2. <https://archive.nptel.ac.in/courses/127/106/127106227/>
3. <https://archive.nptel.ac.in/courses/121/106/121106007/>
4. <https://www.studocu.com/in/course/anna-university/research-methodology-and-ipr/5881061>.