

**B.Tech
(ECE)
R23 Course Structure**



VISHNU INSTITUTE OF TECHNOLOGY (AUTONOMOUS):: BHIMAVARAM
Approved by AICTE, Accredited by NAAC-A⁺⁺, NBA & Affiliated to JNTUK
DEPARTMENT OF ELECTRONICS AND COMMUNICATION ENGINEERING

R23 Course Structure for B.Tech with effect from 2023-24

I B.Tech I Sem (Semester - I)

S.No	Category (Course Code)	Course Title	Hours Per week			Credits	Examinations		
			L	T	P		I	E	T
1	BS&H (23BS1T04)	Engineering Physics	3	0	0	3	30	70	100
2	BS&H (23BS1T05)	Linear Algebra & Calculus	3	0	0	3	30	70	100
3	Engineering Science (23EE1T01)	Basic Electrical & Electronics Engineering	3	0	0	3	30	70	100
4	Engineering Science (23ME1T01)	Engineering Graphics	1	0	4	3	30	70	100
5	Engineering Science (23CS1T01)	Introduction to Programming	3	0	0	3	30	70	100
6	Engineering Science (23IT1P01)	IT Workshop	0	0	2	1	30	70	100
7	BS&H (23BS1P04)	Engineering Physics Lab	0	0	2	1	30	70	100
8	Engineering Science (23EE1P01)	Electrical & Electronics Engineering Workshop	0	0	3	1.5	30	70	100
9	Engineering Science (23CS1P01)	Computer Programming Lab	0	0	3	1.5	30	70	100
10	BS&H (23BS1P05)	Health and wellness, Yoga and Sports	-	-	1	0.5	100	-	-
Total						20.5	370	630	1000



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R23 Course Structure for B.Tech with effect from 2023-24

I B.Tech II Sem (Semester - II)

S.No	Category (Course Code)	Course Title	Hours Per week			Credits	Examinations		
			L	T	P		I	E	T
1	BS&H (23BS2T01)	Communicative English	2	0	0	2	30	70	100
2	BS&H (23BS2T03)	Chemistry	3	0	0	3	30	70	100
3	EngineeringScience (23BS2T05)	Differential Equations & Vector Calculus	3	0	0	3	30	70	100
4	EngineeringScience (23CE2T01)	Basic Civil & Mechanical Engineering	3	0	0	3	30	70	100
5	Professional Core (23EE2T03)	Network Analysis	3	0	0	3	30	70	100
6	BS&H (23BS2P01)	Communicative English Lab	0	0	2	1	30	70	100
7	BS&H (23BS2P03)	Chemistry Lab	0	0	2	1	30	70	100
8	EngineeringScience (23ME2P02)	Engineering Workshop	0	0	3	1.5	30	70	100
9	ProfessionalCore (23EE2P03)	Network Analysis and Simulation Lab	0	0	3	1.5	30	70	100
10	BS&H (23BS2P06)	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5	100	-	-
Total						19.5	370	630	1000

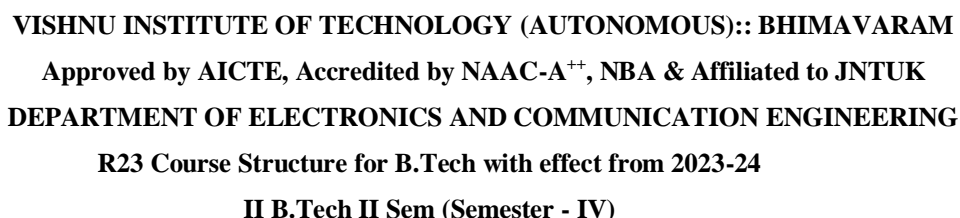


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II B.Tech I Sem (Semester - III)

S.No	Category (Course Code)	Course Title	Hours Per week			Credits	Examinations		
			L	T	P		I	E	T
1	BS (23BS3T04)	Probability theory and stochastic process	3	0	0	3	30	70	100
2	HSMC (23HS3T01)	Universal Human Values-II: Understanding Harmony	2	1	0	3	30	70	100
3	Engineering Science (23EC3T03)	Signals and Systems	3	0	0	3	30	70	100
4	Professional Core (23EC3T01)	Electronic Devices and Circuits	3	0	0	3	30	70	100
5	Professional Core (23EC3T02)	Switching Theory and Logic Design	3	0	0	3	30	70	100
6	Professional Core (23EC3P01)	Electronic Devices and Circuits Lab	0	0	3	1.5	30	70	100
7	Professional Core (23EC3P02)	Switching Theory and Logic Design Lab	0	0	3	1.5	30	70	100
8	Skill Enhancement Course (23CS3P04)	Data Structures using Python	0	1	2	2	30	70	100
9	Audit Course (23HS3A01)	Environmental Science	2	0	0	-	30	-	30
Total						20	270	560	830



S.No	Category (Course Code)	Course Title	Hours Per week			Credits	Examinations		
			L	T	P	C	I	E	T
1	Management Course- I (23HS4T01)	Managerial Economics and Financial Analysis	2	0	0	2	30	70	100
2	Engineering Science (23EC4T02)	Linear Control Systems	3	0	0	3	30	70	100
3	Professional Core (23EC4T03)	Electromagnetic Waves and Transmission Lines	3	0	0	3	30	70	100
4	Professional Core (23EC4T01)	Electronic Circuit Analysis	3	0	0	3	30	70	100
5	Professional Core (23EC4T04)	Analog Communications	3	0	0	3	30	70	100
6	Professional Core (23EC4P02)	Signals and Systems Lab	0	0	3	1.5	30	70	100
7	Professional Core (23EC4P01)	Electronic Circuit Analysis Lab	0	0	3	1.5	30	70	100
8	Skill Enhancement course (23BS4P01)	Soft Skills	0	1	2	2	30	70	100
9	Engineering Science (23ME4P03)	Design Thinking & Innovation	1	0	2	2	30	70	100
Total						21	270	630	900
Mandatory Community Service Project Internship of 08 weeks duration during summer Vacation									



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I Year - I Semester

L	T	P	C
3	0	0	3

ENGINEERING PHYSICS

Course Objectives:

To bridge the gap between the Physics in school at 10+2 level and UG level engineering courses by identifying the importance of the optical phenomenon like interference, diffraction etc, enlightening the periodic arrangement of atoms in crystalline solids and concepts of quantum mechanics, introduce novel concepts of dielectric and magnetic materials, physics of semiconductors.

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). Polarization: Introduction -Types of polarization - Polarization by reflection, refraction and Double refraction - Nicol's Prism -Half wave and Quarter wave plates.

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.

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UNIT – IV: QUANTUM MECHANICS AND FREE ELECTRON THEORY

Quantum Mechanics: 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: 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: SEMICONDUCTORS

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

Textbooks:

1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS Arun Murthy, S. Chand Publications, 11th Edition 2019.
2. Engineering Physics - D.K.Bhattacharya and Poonam Tandon, Oxford press (2015)

Reference Books:

1. Engineering Physics - B.K. Pandey and S. Chaturvedi, Cengage Learning 2021.
2. Engineering Physics - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
3. Engineering Physics” - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press. 2010.
4. Engineering Physics - M.R. Srinivasan, New Age international publishers (2009).

Web Resources: <https://www.loc.gov/rr/scitech/selected-internet/physics.html>

Course Outcomes:

After completing this course, the students will be able to

- Analyze the intensity variation of light due to polarization, interference and diffraction.
- Familiarize with the basics of crystals and their structures.
- Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.
- Summarize various types of polarization of dielectrics and classify the magnetic materials.
- Explain the basic concepts of Quantum Mechanics and the band theory of solids.
- Identify the type of semiconductor using Hall effect.



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I Year - I Semester

L	T	P	C
3	0	0	3

LINEAR ALGEBRA & CALCULUS

Course Objectives:

To equip the students with standard concepts and tools at an intermediate to advanced level mathematics to develop the confidence and ability among the students to handle various real-world problems and their applications.

UNIT – I: MATRICES

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

UNIT- II:EIGENVALUES, EIGENVECTORS AND ORTHOGONAL TRANSFORMATION

Eigen values, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, 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's theorems with remainders (without proof), Problems and applications on the above theorems.

UNIT –IV: PARTIAL DIFFERENTIATION AND APPLICATIONS

(MULTI VARIABLE CALCULUS)

Functions of several variables: Continuity and Differentiability, Partial derivatives, total derivatives, chain rule, Directional derivative, 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, triple integrals, change of order of integration, change of variables to polar, cylindrical and spherical coordinates. Finding areas (by double integrals) and volumes (by double integrals and triple integrals).



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Textbooks:

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

Reference Books:

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

Course Outcomes:

After completing this course, the students will be able to

- Analyze the intensity variation of light due to polarization, interference and diffraction.
- Familiarize with the basics of crystals and their structures.
- Explain fundamentals of quantum mechanics and apply it to one dimensional motion of particles.
- Summarize various types of polarization of dielectrics and classify the magnetic materials.
- Explain the basic concepts of Quantum Mechanics and the band theory of solids.
- Identify the type of semiconductor using Hall effect.



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L	T	P	C
3	0	0	3

I Year - I Semester

BASIC ELECTRICAL & ELECTRONICS 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.

PART A: BASIC ELECTRICAL ENGINEERING

UNIT – I: DC & AC CIRCUITS

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 (for sinusoidal waveform only), 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, 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 (Non-Renewable) and non-conventional (Renewable) energy resources; Layout and operation of various Power Generation systems: Hydel, Nuclear power generation.

Electricity bill & Equipment Safety: 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. 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.



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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, hanpat 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, Mc Graw 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>

Course Outcomes:

After completing this course, the students will be able to

- Describe fundamental laws, operating principles of motors/generators, MC/MI instruments (L2)
- Demonstrate the working of electrical machines, measuring instruments and power generation stations. (L2)
- Apply mathematical tools and fundamental concepts to derive various equations related to electrical circuits and machines. (L3)
- Calculate electrical load and electricity bill of residential and commercial buildings. (L4)

PART B: BASIC ELECTRONICS ENGINEERING

Course Objectives:

To teach the fundamentals of semiconductor devices and its applications, principles of digital electronics.

UNIT – I: SEMICONDUCTOR DEVICES

Introduction - Characteristics of PN Junction Diode — Zener Effect — Zener Diode and its Characteristics. Bipolar Junction Transistor — CB, CE, CC Configurations and Characteristics



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UNIT II : BASIC ELECTRONIC CIRCUITS

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, Circuit diagram and working of common emitter (RC coupled) amplifier with its frequency response

UNIT III : DIGITAL ELECTRONICS

Overview of Number Systems, Logic, BCD codes, Excess-3 code, Gray code. Boolean Algebra, Basic Theorems and properties of Boolean Algebra, Truth Tables and Functionality of Logic Gates – NOT, OR, AND, NOR, NAND, XOR and XNOR. Simple combinational circuits–Half and Full Adders.

Textbooks:

- 1.R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
- 2.Electronic Devices and Circuits- David A.Bell, 5th Edition, Oxford University Press
- 3.R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009
- 4.Switching Theory and Logic Design by Hill and Peterson Mc-Graw Hill TMH edition.

Reference Books:

- 1.R. S. Sedha, A Textbook of Electronic Devices and Circuits, S. Chand & Co, 2010.
- 2.Santiram Kal, Basic Electronics- Devices, Circuits and IT Fundamentals, Prentice Hall, India. 2002.
- 3.R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education,2009.
- 4.Electronic Devices and Circuits-Salivahanan, Kumar, Vallavaraj, Tata Mc-Graw Hill, Second Edition
- 5.Switching Theory and Logic Design by A. Anand Kumar

Web Resources:

- 1.<https://archive.nptel.ac.in/courses/108/108/108108112/>
- 2.<https://archive.nptel.ac.in/courses/108/105/108105132/>
- 3.<https://archive.nptel.ac.in/courses/106/105/106105185/>



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Course Outcomes:

After completing this course, the students will be able to

- Demonstrate the working and characteristics of semiconductor diodes and Transistors
- Know the working principles of rectifier, filter, regulator and amplifier
- Understand the number systems, Implement and apply the digital logic gates

End examination pattern:

1. Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35marks each.
2. In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1 mark.
3. In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
4. The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.



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L	T	P	C
1	0	4	3

I Year - I Semester

ENGINEERING GRAPHICS

Course Objectives

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

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: Polyhedra and Solids of revolution. Projections of solids in simple positions: Axis perpendicular to horizontal plane, Axis perpendicular to vertical plane



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and Axis parallel to both the reference planes, Projection of Solids with axis inclined to one reference plane and parallel to another plane.

UNIT - IV

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

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

UNIT - V

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

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

Textbook:

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

Reference Books:

1.Engineering Drawing, K.L. Narayana and P. Kannaiah, Tata McGraw Hill, 2013.

2.Engineering Drawing, M.B.Shah and B.C. Rana, Pearson Education Inc, 2009.

3.Engineering Drawing with an Introduction to AutoCAD, Dhananjay Jolhe, Tata McGraw Hill, 2017.

Course Outcomes:

After completing this course, the students will be able to

- Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.
- Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.
- Understand and draw projection of solids in various positions in first quadrant.
- Explain principles behind development of surfaces.
- Prepare isometric and perspective sections of simple solids.



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I Year - I Semester

L	T	P	C
3	0	0	3

INTRODUCTION TO PROGRAMMING**Course Objectives:**

- To introduce students to the fundamentals of computer programming.
- To provide hands-on experience with coding and debugging.
- To foster logical thinking and problem-solving skills using programming.
- To familiarize students with programming concepts such as data types, control structures, functions, and arrays.
- To encourage collaborative learning and teamwork in coding projects

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.

UNIT – III

Arrays and Strings: Arrays indexing, memory model, programs with array of integers, two dimensional arrays, Introduction to Strings.

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 Lifetime of Variables, Basics of File Handling.

Note: The syllabus is designed with C Language as the fundamental language of implementation.



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Textbooks:

1. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice- Hall, 1988.
2. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996.

Reference Books:

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2nd edition.
3. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition.



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I Year - I Semester

L	T	P	C
0	0	2	1

INTRODUCTION TO PROGRAMMING

Course Objectives:

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

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.

Task 2: 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 on the personal computer. Lab instructor should verify the installation and follow it up with a Viva.

Task 4: Every student should install Linux on the computer. This computer should have windows installed. The system should be configured as dual boot (VMWare) with both Windows and Linux. Lab instructors should verify the installation and follow it up with a Viva

Task 5: Every student should install BOSS on the computer. The system should be configured as dual boot (VMWare) with both Windows and BOSS. Lab instructors should verify the installation and follow it up with a Viva

Internet & World Wide Web:

Task 1: 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.



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Task 2: Web Browsers, Surfing the Web: Students customize their web browsers with the LAN proxy settings, bookmarks, search toolbars and pop up blockers. Also, plug-ins like Macromedia Flash and JRE for applets should be configured.

Task 3: Search Engines & Netiquette: 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 pop ups, block active x downloads to avoid viruses and/or worms.

LaTeX and WORD:

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

Task 2: Using La TeX and 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 both La TeX and Word.

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

Task 4: Creating a Newsletter: Features to be covered:- Table of Content, Newspaper columns, Images from files and clipart, Drawing toolbar and Word Art, Formatting Images, Textboxes, 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 toolbars, 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, LOOKUP/VLOOKUP

Task 3: Split cells, freeze panes, group and outline, Sorting, Boolean and logical operators, Conditional formatting.



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POWER POINT:

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, Word Art, Formatting Text, Bullets and Numbering, Auto Shapes, Lines and Arrows in PowerPoint.

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 – Background, textures, Design Templates, Hidden slides.

AI TOOLS – ChatGPT:

Task 1: 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 a knowledgeable AI. Please answer the following question: What is the capital of France?"

Task 2: 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 tool kit, Vikas Gupta, WILEY Dream tech, 2003
2. The Complete Computer upgrade and repair book, Cheryl A Schmidt, WILEY Dream tech, 2013, 3rd edition
3. Introduction to Information Technology, ITL Education Solutions limited, Pearson Education, 2012, 2nd edition
4. PC Hardware - A Handbook, Kate J. Chase, PHI (Microsoft)
5. LaTeX Companion, Leslie Lamport, PHI/Pearson.
6. IT Essentials PC Hardware and Software Companion Guide, David Anfinson and Ken Quamme. – CISCO Press, Pearson Education, 3rd edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3rd edition.



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I Year - I Semester

L	T	P	C
0	0	2	1

ENGINEERING PHYSICS LAB

Course Objectives:

To study the concepts of optical phenomenon like interference, diffraction etc., recognize the importance of energy gap in the study of conductivity and Hall effect in semiconductors and study the parameters and applications of dielectric and magnetic materials by conducting experiments.

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

List of Experiments:

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 dielectric constant using charging and discharging method.
5. Study the variation of B versus H by magnetizing the magnetic material (B-H curve).
6. Determination of wavelength of Laser light using diffraction grating.
7. Estimation of Planck's constant using photoelectric effect.
8. Determination of the resistivity of semiconductors by four probe methods.
9. Determination of energy gap of a semiconductor using p-n junction diode.
10. Magnetic field along the axis of a current carrying circular coil by Stewart Gee's Method.
11. Determination of Hall voltage and Hall coefficient of a given semiconductor using Hall effect.
12. Determination of temperature coefficients of a thermistor.
13. Determination of acceleration due to gravity and radius of Gyration by using a compound pendulum.
14. Determination of magnetic susceptibility by Kundt's tube method.
15. Determination of rigidity modulus of the material of the given wire using Torsional pendulum.
16. Sonometer: Verification of laws of stretched string.
17. Determination of young's modulus for the given material of wooden scale by non- uniform bending (or double cantilever) method.
18. Determination of Frequency of electrically maintained tuning fork by Melde's experiment.



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References:

1. A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.

Web Resources:

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

Course Outcomes:

The students will be able to

- Operate optical instruments like travelling microscope and spectrometer.
- Estimate the wavelengths of different colours using diffraction grating.
- Plot the intensity of the magnetic field of circular coil carrying current with distance.
- Evaluate dielectric constant and magnetic susceptibility for dielectric and magnetic materials respectively.
- Calculate the band gap of a given semiconductor.
- Identify the type of semiconductor using Hall effect.



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I Year - I Semester

L	T	P	C
0	0	3	1.5

ELECTRICAL & ELECTRONICS ENGINEERING WORKSHOP

Course Objectives:

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

Activities:

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.

- Provide some exercises so that hardware tools and instruments are learned to be used by the students.

2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.

- Provide some exercises so that measuring instruments are learned to be used by the students.

3. Components:

- Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
- Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

PART A: ELECTRICAL ENGINEERING LAB

List of experiments:

1. Verification of KCL and KVL
2. Verification of Superposition theorem
3. Measurement of Resistance using Wheat stone bridge
4. Magnetization Characteristics of DC shunt Generator
5. Measurement of Power and Power factor using Single-phase wattmeter
6. Measurement of Earth Resistance using Megger
7. Calculation of Electrical Energy for Domestic Premises



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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.

Course Outcomes:

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

- Measure voltage, current and power in an electrical circuit. (L3)
- Measure of Resistance using Wheat stone bridge (L4)
- Discover critical field resistance and critical speed of DC shunt generators. (L4)
- Investigate the effect of reactive power and power factor in electrical loads. (L5)

PART B: ELECTRONICS ENGINEERING LAB

Course Objectives:

To impart knowledge on the principles of digital electronics and fundamentals of electron devices & its applications.

List of Experiments:

1. Plot V-I characteristics of PN Junction diode A) Forward bias B) Reverse bias.
2. Plot V – I characteristics of Zener Diode and its application as voltage Regulator.
3. Implementation of half wave and full wave rectifiers
4. Plot Input & Output characteristics of BJT in CE and CB configurations
5. Frequency response of CE amplifier.
6. Simulation of RC coupled amplifier with the design supplied
7. Verification of Truth Table of AND, OR, NOT, NAND, NOR, Ex-OR, Ex-NOR gates using ICs.
8. Verification of Truth Tables of Half and Full Adders using respective ICs.

Tools / Equipment Required: DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

References:

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4th Edition, Tata Mc Graw Hill, 2009



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3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

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

Course Outcomes:

At the end of the course, the student will be able to

- Identify & testing of various electronic components.
- Understand the usage of electronic measuring instruments.
- Plot and discuss the characteristics of various electron devices.
- Explain the operation of a digital circuit.



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I Year - I Semester

L	T	P	C
0	0	3	1.5

COMPUTER PROGRAMMING LAB

Course Objectives:

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

WEEK 1

Objective: Getting familiar with the programming environment on the computer and writing the first program.

Suggested Experiments/Activities:

Tutorial 1: Problem-solving using Computers.

Lab1: Familiarization with programming environment

- i) Basic Linux environment and its editors like Vi, Vim & Emacs etc.
- ii) Exposure to Turbo C, gcc
- iii) Writing simple programs using printf(), scanf()

WEEK 2

Objective: Getting familiar with how to formally describe a solution to a problem in a series of finite steps both using textual notation and graphic notation.

Suggested Experiments /Activities:

Tutorial 2: Problem-solving using Algorithms and Flow charts.

Lab 1: Converting algorithms/flow charts into C Source code.

Developing the algorithms/flowcharts for the following sample programs

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

WEEK 3

Objective: Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

Suggested Experiments/Activities:

Tutorial 3: Variable types and type conversions:

Lab 3: Simple computational problems using arithmetic expressions.



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

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I Year - I Semester

L	T	P	C
0	0	1	1.5

HEALTH AND WELLNESS, YOGA AND SPORTS

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.

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 Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

Activities:

Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar

UNIT – III

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth 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.
- ii) Practicing general and specific warm up, aerobics
- iii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.



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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 Timetable 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:

1. Evaluated for a total of 100 marks.
2. 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.
3. A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce

Course Outcomes: After completion of the course the student will be able to

1. Understand the importance of yoga and sports for Physical fitness and sound health.
2. Demonstrate an understanding of health-related fitness components.
3. Compare and contrast various activities that help enhance their health.
4. Assess current personal fitness levels.
5. Develop Positive Personality



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I Year - II Semester

L	T	P	C
2	0	0	2

COMMUNICATIVE ENGLISH

Course Objectives:

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

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.



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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

Textbooks:

- 1.Pathfinder: Communicative English for Undergraduate Students, 1st Edition, Orient Black Swan, 2023 (Units 1, 2 & 3).
- 2.Empowering with Language by Cengage Publications, 2023 (Units 4 & 5)



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Reference Books:

1. Dubey, Sham Ji & 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:

GRAMMAR:

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

Course Outcomes:

1. Understand the context, topic, and pieces of specific information from social or Transactional dialogues.
2. Apply grammatical structures to formulate sentences and correct word forms.
3. Analyze discourse markers to speak clearly on a specific topic in informal discussions.
4. Evaluate reading / listening texts and to write summaries based on global comprehension of these texts.



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L	T	P	C
2	0	0	2

I Year - II Semester

CHEMISTRY

Course Objectives:

- To familiarize Chemistry in Engineering and its applications
- To train the students on the principles and applications of Electrochemistry and Polymers
- To introduce few Spectroscopic and Chromatographic Instrumental methods.

UNIT I: Structure and Bonding Models

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of Ψ and Ψ^2 , particle in one dimensional box, molecular orbital theory - bonding in homo- and hetero nuclear diatomic molecules - energy level diagrams of O₂ and CO, etc., Π -molecular orbitals of butadiene and benzene, calculation of bond order.

UNIT II: Modern Engineering materials

Semiconductors - Introduction, basic concept, applications. Super conductors - Introduction, basic concept, applications.

Super capacitors - Introduction, Basic Concept, Classification, Applications.

Nano-materials - Introduction, classification, properties and applications of Fullerenes, carbon nano tubes and Graphene nanoparticles.

UNIT III :Electrochemistry and Applications

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems,

Potentiometry - Potentiometric titrations (redox titrations), concept of Conductivity,

Conductivity cell, Conductometric titrations (acid-base titrations).

Electrochemical sensors - potentiometric sensors with examples, amperometric sensors with examples.

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).



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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.

Plastics -Thermo and Thermosetting plastics, Preparation, properties, and applications of - PVC, Teflon, Bakelite, Nylon-6,6, carbon fibres.

Elastomers–Buna-S, Buna-N–preparation, properties, and applications.

Conducting polymers – poly-acetylene, poly-aniline, – mechanism of conduction and applications. Bio- Degradable polymers - Poly Glycolic Acid (PGA), Poly L- Lactic Acid (PLA).

UNIT V : Instrumental Methods and Applications

Electromagnetic Spectrum- Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transitions, Instrumentation.

IR spectroscopies, fundamental modes and selection rules, Instrumentation.

Chromatography-Basic Principle, Classification-HPLC: Principle, Instrumentation and Applications.

Textbooks:

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. Billmayer Jr., 3rd Edition
4. A text book of Engineering Chemistry by Sashi Chawala, Dhanpat Rai & Co. 2017



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Course Outcomes:

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

CO1: Understand the fundamentals of Quantum mechanics and Molecular Orbital Theory.

CO2: Apply the basic principles of semiconductors, super conductors, and nanomaterials in real world applications.

CO3: Compare the materials for construction of batteries and electrochemical sensors.

CO4: Explain the preparation, properties and applications of thermoplastics, thermosetting, elastomers and conducting polymers.

CO5: Summarize the concepts of Instrumental methods.



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L	T	P	C
2	0	0	2

I Year - II Semester

DIFFERENTIAL EQUATIONS & VECTOR CALCULUS

Course Objectives:

- To enlighten the learners in the concept of differential equations and multivariable calculus.
- To furnish the learners with basic concepts and techniques at plus two level to lead them into advanced level by handling various real-world applications.

UNIT - I

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, complimentary function, general solution, particular integral, 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, Directional derivative, del applied to vector point functions- Divergence and Curl, vector identities.

UNIT - V

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



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Textbooks:

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, Dennis G. Zill and Warren S. Wright, Jones and Bartlett, 2018.
3. Advanced Modern Engineering Mathematics, Glyn James, 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 Hill Education, 2017

Course Outcomes:

At the end of the course, the student will be able to

- 1.Solve the differential equations related to various engineering fields.
- 2.Identify solution methods for partial differential equations that model physical processes.
- 3.Interpret the physical meaning of different operators such as gradient, curl and divergence.
- 4.Estimate the work done against a field, circulation and flux using vector calculus.



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L	T	P	C
3	0	0	3

I Year - II Semester

BASIC CIVIL & MECHANICAL ENGINEERING

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:

On completion of the course, the student should be able to:

1. Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.
2. Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.
3. Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation.
4. Understand the importance of Water Storage and Conveyance Structures so that the social responsibilities of water conservation will be appreciated.
5. Understand the basic characteristics of Civil Engineering Materials and attain knowledge on prefabricated technology.

UNIT - I

Basics of Civil Engineering:

Role of Civil Engineers in Society

Introduction to Various Disciplines of Civil Engineering: Structural Engineering - Geotechnical Engineering - Transportation Engineering - Hydraulics and Water Resources Engineering - Environmental Engineering.

Construction Materials: Introduction & Types of Cement, Aggregate, Bricks, Cement concrete, Steel.

Introduction to building construction and planning: Types of building, Common Building Components, Principles of planning.



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Prefabricated construction Techniques: Introduction to Prefabricated construction Techniques.

UNIT - II

Introduction to Surveying: Objectives of Surveying – Horizontal Measurements (Chain Survey): Principle – Accessories, Angular Measurements (Compass Survey): Principle - Introduction to Bearings – Bearing systems, Levelling: Instruments, Simple problems on levelling - Contour mapping.

UNIT - III

Introduction to Transportation Engineering: Importance of Transportation in Nation's economic development - Types of Highway Pavements - Flexible Pavements and Rigid Pavements - Simple Differences. Harbour & Dock: Classification, Tunnel: Requirement - Main purpose, Airport Engineering: Introduction - Types of airports, Railway Engineering: Introduction – Permanent way components.

Introduction to Environmental Engineering and Water Resources: Sources of water - Quality & Specifications of water - Introduction to Hydrology – Rainwater Harvesting - Water Storage and Conveyance Structures (Simple introduction to Dams and Reservoirs).

Textbooks:

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, Satheesh Gopi, 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.



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PART B: BASIC MECHANICAL ENGINEERING

Course Objectives:

The students after completing the course are expected to

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: On completion of the course, the student should be able to

1. Understand the different manufacturing processes.
2. Explain the basics of thermal engineering and its applications.
3. Describe the working of different mechanical power transmission systems and power plants.
4. Describe the basics of robotics and its applications.

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: Introduction and Applications of - ferrous alloys and non-ferrous alloys. Introduction to heat treatment – Annealing, Normalizing, Hardening. Introduction, Advantages and Applications of - Ceramics, Composites and Smart materials.

UNIT – II

Manufacturing Processes: Basic principles and applications of -Casting, Forming, Joining processes and 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 and working 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.



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

End examination pattern:

1. Question paper shall be in two parts viz., Part A and Part B with equal weightage of 35 marks each.
2. In each part, question 1 shall contain 5 compulsory short answer questions for a total of 5 marks such that each question carries 1 mark.
3. In each part, questions from 2 to 4, there shall be either/or type questions of 10 marks each. Student shall answer any one of them.
4. The questions from 2 to 4 shall be set by covering one unit of the syllabus for each question.



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L	T	P	C
3	0	0	3

I Year - II Semester

NETWORK ANALYSIS

Course Objectives:

The students after completing the course are expected to

- To introduce basic laws, mesh & nodal analysis techniques for solving electrical circuits
- To impart knowledge on applying appropriate theorem for electrical circuit analysis
- To explain transient behavior of circuits in time and frequency domains
- To teach concepts of resonance
- To introduce open circuit, short circuit, transmission, hybrid parameters and their interrelationship.

Course Outcomes:

On completion of the course, the student should be able to

- Understand basic electrical circuits with nodal and mesh analysis.
- Analyze the circuit using network simplification theorems.
- Find Transient response and Steady state response of a network.
- Analyze electrical networks in the Laplace domain.
- Compute the parameters of a two-port network.

UNIT I

Types of Sources and Source Transformation, Mesh analysis and Nodal analysis, problems solving with resistances and independent sources. Principal of Duality with examples.

DC Network Theorems: Thevenin's, Norton's, Milliman's, Reciprocity, Compensation, Substitution, Superposition, Max Power Transfer, Tellegens - problem solving.

UNIT II

Transients: First order differential equations, Definition of time constants, R-L circuit, R-C circuit with DC excitation, evaluating initial conditions procedure, second order differential equations, homogeneous, non-homogenous and problem-solving using R-L-C elements with DC excitation.



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Laplace transform: Introduction, Laplace transformation, basic theorems, problem solving using Laplace transform, partial fraction expansion, problem solving using Laplace transform.

UNIT III

Steady State Analysis of A.C Circuits: Impedance concept, phase angle, series R-L, R-C, R-L- C circuits problem solving, Complex impedance and phasor notation for R-L, R-C, R-L-C problem solving using mesh and nodal analysis, problem solving using Laplace transforms also.

UNIT IV

Resonance: Introduction, Definition of Q, Series resonance, Bandwidth of series resonance, Parallel resonance, general case-resistance present in both branches, anti-resonance at all frequencies.

Coupled Circuits: Coupled Circuits: Self-inductance, Mutual inductance, Coefficient of coupling, analysis of coupled circuits, Dot rule of coupled circuits, conductively coupled equivalent circuits- problem solving.

UNIT V

Two-port Networks: Relationship of two port networks, Z-parameters, Y-parameters, Transmission line parameters, h- parameters, Relationships Between parameter Sets, Parallel & series connection of two port networks, cascading of two port networks, problem solving using independent sources only.

Textbooks:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9th Edition 2020.
3. Network lines and Fields by John. D. Ryder 2nd Edition, PHI

Reference Books:

1. D. Roy Choudhury, Networks and Systems, New Age International Publications, 2013.
2. Joseph Edminister and Mahmood Nahvi, Electric Circuits, Schaum's Outline Series, 7th Edition, Tata McGraw Hill Publishing Company, New Delhi, 2017
3. Fundamentals of Electric Circuits by Charles K. Alexander and Matthew N. O. Sadiku, McGraw-Hill Education.



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I Year - II Semester

L	T	P	C
0	0	2	1

COMMUNICATIVE ENGLISH LAB

Course Objectives:

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. The students will get trained in basic communication skills and also make them ready to face job interviews.

Course Outcomes:

1. Understand the different aspects of the English language proficiency with emphasis on LSRW skills.
2. Apply communication skills through various language learning activities.
3. Analyze the English speech sounds, stress, rhythm, intonation and syllable division for better listening and speaking comprehension.
4. Evaluate and exhibit professionalism in participating in debates and group discussions.
5. Create effective Course Objectives

List of Topics:

1. Vowels & Consonants
2. Neutralization/Accent Rules
3. Communication Skills & JAM
4. Role Play or Conversational Practice
5. E-mail Writing
6. Resume Writing, Cover letter, SOP
7. Group Discussions-methods & practice
8. Debates - Methods & Practice
9. PPT Presentations/ Poster Presentation
10. Interviews Skills

Suggested Software:

1. Walden Infotech
2. Young India Films

Reference Books:

1. Raman Meenakshi, Sangeeta-Sharma. Technical Communication. Oxford Press. 2018.
2. Taylor Grant: English Conversation Practice, Tata McGraw-Hill Education India, 2016.



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3. Hewing's, Martin. Cambridge Academic English (B2). CUP, 2012.
4. J. Sethi & P.V. Dhamija. A Course in Phonetics and Spoken English, (2nd Ed), Kindle, 2013

Web Resources:

Spoken English:

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

Voice & Accent:

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



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I Year - II Semester

L	T	P	C
0	0	2	1

CHEMISTRY LAB

Course Objectives:

Verify the fundamental concepts with experiments

List of Experiments: Any 8 experiments out of 12 and two experiments in virtual mode.

1. Determination of Strength of an acid in Pb-Acid battery
2. Estimation of Ferrous Iron by Dichrometry
3. Conductometric titration of strong acid vs. strong base
4. Conductometric titration of weak acid vs. strong base
5. Determination of cell constant and conductance of solutions
6. Potentiometry - determination of redox potentials and emfs
7. Preparation of a Bakelite
8. Preparation of nanomaterials by precipitation method
9. Verify Lambert-Beer's law
10. Measurement of 10Dq by spectrophotometric method
11. Wavelength measurement of sample through UV-Visible Spectroscopy
12. Identification of simple organic compounds by IR

References:

1. Vogel's Quantitative Chemical Analysis 6th Edition, Pearson Publications by J. Mendham, R.C.Denney, J.D.Barnes and B. Sivasankar.
2. Laboratory Manual of Engineering chemistry-II, VGS Techno Series, Dr. Jyotsna Cherukuri (2012). Chemistry Practical Manual, Lorven Publications.
3. Engineering Chemistry, B.S. Publication, K. Mukkamti (2009)

Course Outcomes:

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

CO1: Calculate the strength of acid in Pb-Acid battery.

CO2: Estimate Ferrous Iron by Dichrometry.

CO3: Prepare a polymer -Bakelite.

CO4: Synthesize the Nano-materials.

CO5: Determine the cell constant and conductance of solutions.



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I Year - II Semester

L	T	P	C
0	0	3	1.5

ENGINEERING WORKSHOP**Course Objectives:**

To familiarize students with wood working, sheet metal operations, fitting, electrical house wiring skills, and basic repairs of two-wheeler vehicle.

Course Outcomes:

1. Identify workshop tools and their operational capabilities.
2. Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.
3. Apply fitting operations in various applications.
4. Apply basic electrical engineering knowledge for House Wiring Practice

SYLLABUS

1. Demonstration: Safety practices and precautions to be observed in the workshop.
2. Wood Working: Familiarity with different types of woods and tools used in wood working and making 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 doing the following fitting exercises. a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler tyre
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 Molding 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.
9. Basic repairs of Two-wheeler vehicle – Demonstration of working of two-wheeler vehicle and its repairs.
10. Demonstration of working of 2-Wheeler and 4-Wheeler E-Vehicles.
11. Demonstration of working of 3D printing machine.



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Textbooks:

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



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I Year - II Semester

L	T	P	C
0	0	3	1.5

NETWORK ANALYSIS AND SIMULATION LAB**Course Objectives:**

- To gain hands on experience in verifying Kirchhoff's laws and network theorems
- To analyze transient behavior of circuits
- To study resonance characteristics
- To determine 2-port network parameters

Course Outcomes:

- CO1: Verify Kirchhoff's laws and network theorems.
- CO2: Measure time constants of RL & RC circuits.
- CO3: Analyze behavior of RLC circuit for different cases.
- CO4: Design resonant circuit for given specifications.
- CO5: Characterize and model the network in terms of all network parameters.

The following experiments need to be performed using both Hardware and simulation Software.

The experiments need to be simulated using software and the same need to be verified using the hardware.

1. Study of components of a circuit and Verification of KCL and KVL.
2. Verification of mesh and nodal analysis for DC circuits
3. Verification of Thevenin's & Norton theorems for DC circuits
4. Verification of maximum power transfer theorem for DC circuits
5. Verification of Tellegen's theorem for DC circuits.
6. Study of transient response of RL, RC series circuits with DC Excitation(1st order)
7. Study of transient response of RLC series circuits with DC Excitation(2nd order)
8. To study frequency response of various 1 st order RL & RC networks
9. To study the transient and steady state response of a 2 nd order circuit by varying its various parameters and studying their effects on responses
10. Find the Q Factor and Bandwidth of a Series and Parallel Resonance circuit.
11. Determination of open circuit (Z) and short circuit (Y) parameters



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12. Determination of hybrid (H) and transmission (ABCD) parameters 13. To measure two port parameters of a twin-T network and study its frequency response

Hardware Requirements:

Regulated Power supplies, Analog/Digital Function Generators, Digital Multimeters, Decade Resistance Boxes/Rheostats, Decade Capacitance Boxes, Ammeters (Analog or Digital), Voltmeters (Analog or Digital), Active & Passive Electronic Components

Software requirements:

Multisim/ Pspice/Equivalent simulation software tool, Computer Systems with required specifications

References:

1. Network Analysis – ME Van Valkenburg, Prentice Hall of India, revised 3rd Edition, 2019.
2. Engineering Circuit Analysis by William H. Hayt, Jack Kemmerly, Jamie Phillips, Steven M. Durbin, 9 th Edition 2020.



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I Year - II Semester

L	T	P	C
0	0	1	0.5

NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE

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:

After completion of the course the students will be able to

1. Understand the importance of discipline, character and service motto.
2. Solve some societal issues by applying acquired knowledge, facts, and techniques.
3. Explore human relationships by analyzing social problems.
4. Determine to extend their help for the fellow beings and downtrodden people.
5. Develop leadership skills and civic responsibilities.

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) Conducting talent show in singing patriotic songs – paintings - any other contribution.

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.

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- 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-area 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 Defence, New Delhi.
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:

1. Evaluated for a total of 100 marks.
2. 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.
3. A student shall be evaluated by the concerned teacher for 10 marks by conducting viva voce on the subject.



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