

Dept. of Electronics and Communication Engineering

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE**

**MADANAPALLE  
(UGC-AUTONOMOUS)**

**[www.mits.ac.in](http://www.mits.ac.in)**



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION  
ENGINEERING**

**Course Structure**

**&**

**Detailed Syllabi**

For the students admitted to

**B. Tech. Regular Four Year Degree Programme from the Academic Year 2023-24**

and

**B. Tech. Lateral Entry Scheme from the Academic Year 2024-25**



**DEPARTMENT OF ELECTRONICS AND COMMUNICATION  
ENGINEERING**

**MADANAPALLE INSTITUTE OF TECHNOLOGY & SCIENCE,  
MADANAPALLE**

**B. Tech Four Year Curriculum Structure**

**Branch: ELECTRONICS AND COMMUNICATION  
ENGINEERING**

<b>Total Credits</b>	160 Credits for 2023(Regular) & 120 Credits 2024(Lateral Entry) Admitted Batch onwards
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**I. Induction Program and Holistic Development Activities**

<b>Sl.No</b>	<b>Title</b>	<b>Duration</b>
1	Induction Program (Mandatory)	Three weeks' duration at the start of First Year

**R23 - Curriculum Structure  
I Year I Semester**

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	BS&H	23MAT101	Linear Algebra and Calculus	3	0	0	3	3
2	BS&H	23PHY101	Engineering Physics	3	0	0	3	3
3	ESC	23EEE101	Basic Electrical and Electronics Engineering	3	0	0	3	3
4	ESC	23CSE101	Introduction to Programming	3	0	0	3	3
5	ESC	23ME101	Engineering Graphics	1	0	4	5	3
6	BS&H	23PHY201	Engineering Physics Laboratory	0	0	2	2	1
7	ESC	23EEE201	Electrical and Electronics Engineering Workshop	0	0	3	3	1.5
8	ESC	23CSE201	Computer Programming Laboratory	0	0	3	3	1.5
9	ESC	23CSE202	IT Workshop	0	0	2	2	1
10	BS&H	23HUM202	NSS / NCC / Scouts and Guides / Community Service	-	-	1	1	0.5
<b>Total</b>				<b>13</b>	<b>0</b>	<b>15</b>	<b>28</b>	<b>20.5</b>

**I Year II Semester**

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	BS&H	23ENG101	Communicative English	2	0	0	2	2
2	BS&H	23MAT102	Differential Equations and Vector Calculus	3	0	0	3	3
3	BS&H	23CHE102	Chemistry	3	0	0	3	3
4	ESC	23CME101	Basic Civil and Mechanical Engineering	3	0	0	3	3
5	PCC	23ECE101	Network Analysis	3	0	0	3	3
6	HSC	23ENG201	Communicative English Laboratory	0	0	2	2	1
7	BS&H	23CHE202	Chemistry Laboratory	0	0	2	2	1
8	ESC	23ME201	Engineering Workshop	0	0	3	3	1.5
9	PCC	23ECE201	Network Analysis and Simulation Laboratory	0	0	3	3	1.5
10	BS&H	23HUM201	Health and Wellness, Yoga and Sports	-	-	1	1	0.5
<b>Total</b>				<b>14</b>	<b>0</b>	<b>11</b>	<b>25</b>	<b>19.5</b>

(L = Lecture, T = Tutorial, P = Practical, C = Credit)

**R23 - Curriculum Structure  
II Year I Semester**

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	HSMC	23HUM101	Universal Human Values	2	1	0	3	3
2	BSC	23MAT106	Complex Variables and Probability Theory	3	0	0	3	3
3	ESC	23ECE102	Signals and Systems	2	1	0	3	3
4	PCC	23ECE103	Electronic Devices and Circuits	3	0	0	3	3
5	PCC	23ECE104	Digital Circuits Design	2	1	0	3	3
6	PCC	23ECE202	Electronic Devices and Circuits Laboratory	0	0	3	3	1.5
7	PCC	23ECE203	Digital Circuits and Signal Simulation Laboratory	0	0	3	3	1.5
8	SEC	23CSE601	Python Programming	1	0	2	3	2
9	AUC	23CHE901	Environmental Science	2	0	0	2	-
<b>Total</b>				<b>15</b>	<b>3</b>	<b>8</b>	<b>26</b>	<b>20</b>

**II Year II Semester**

S. No.	Category	Course Code	Course Title	Hours Per Week				Credits
				L	T	P	Total	
1	HSMC	23HUM102	Economics and Financial Accounting For Engineers	2	0	0	2	2
2	ESC		Design Thinking and Innovation Related Courses (Refer ANNEXURE - II)	1	0	2	3	2
3	PCC	23ECE105	Linear Control Systems	2	1	0	3	3
4	PCC	23ECE106	EM Waves and Transmission Lines	3	0	0	3	3
5	PCC	23ECE107	Analog Circuits	3	0	0	3	3
6	PCC	23ECE108	Analog Communication	3	0	0	3	3
7	PCC	23ECE204	Analog Circuits Laboratory	0	0	3	3	1.5
8	PCC	23ECE205	Analog Communication Laboratory	0	0	3	3	1.5
9	SEC	23ENG601	Soft Skills	1	0	2	3	2
<b>Total</b>				<b>15</b>	<b>1</b>	<b>10</b>	<b>26</b>	<b>21</b>

(L = Lecture, T = Tutorial, P = Practical, C = Credit

### THREE WEEK MANDATORY INDUCTION PROGRAMME

- Yoga and Meditation
- Sports and Games
- NSS
- NCC
- MITS Social Responsibility Club
- Management module
- Design Thinking
- Spoken and Written Communication

➤ *Proficiency modules*

- Basic Computer Proficiency
- Interpersonal skills
- Computer Graphics
- Web programming
- Mobile Apps
- Vocabulary enhancement

### HOLISTIC DEVELOPMENT ACTIVITIES

#### Description of Activities

1. Physical and Health
2. Culture
3. Literature and Media
4. Social Service
5. Self-Development
6. Nature and Environment
7. Innovation

<b>DESIGN THINKING AND INNOVATION RELATED COURSES</b> (To be offered under MOOC's Category from SWAYAM – NPTEL)		
<b>Sl. No.</b>	<b>Course Code</b>	<b>Course Title</b>
1	23IIC5M01	Design, Technology and Innovation
2	23IIC5M02	Introduction on Intellectual Properties to Engineers and Technologists
3	23IIC5M03	Product Engineering and Design Thinking
4	23IIC5M04	Intellectual Property Rights and Competition Law
5	23IIC5M05	Innovation, Business Model and Entrepreneurship
6	23IIC5M06	Understanding Incubation and Entrepreneurship
Any new Innovation and Incubation Course offered by SWAYAM NPTEL can be appended in future.		

# **I Year I Semester**

**B. Tech I Year I Semester**

**23MAT101 LINEAR ALGEBRA AND CALCULUS**

**L T P C**  
**3 0 0 3**

**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 9 hours**

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 and Non-Homogeneous equations by Gauss elimination method, Jacobi and Gauss Seidel Iteration Methods.

**UNIT II EIGENVALUES, EIGENVECTORS AND ORTHOGONAL TRANSFORMATION 9 hours**

Eigenvalues, 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 9 hours**

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.

**UNIT IV PARTIAL DIFFERENTIATION AND APPLICATIONS (MULTI VARIABLE CALCULUS) 9 hours**

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) 9 hours**

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).

**Course Outcomes:**

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

CO1: Solve the system of linear equations and apply the matrix algebra techniques in practical applications.

CO2: Utilize the Eigenvalues, Eigenvectors and applications of diagonalization in the field of Science and Technology.

CO3: Relate the results of mean value theorems in real life problems.

CO4: Apply the functions of several variables to evaluate the rates of change with respect to time and space variables in engineering.

CO5: Compute the area and volume by interlinking them to appropriate double and triple integrals.



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### **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, 14<sup>th</sup> Edition.
2. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, AlphaScience International Ltd., 2021 5<sup>th</sup> Edition(9th reprint).
3. Advanced Modern Engineering Mathematics, Glyn James, Pearson publishers, 2018, 5<sup>th</sup> Edition.
4. Advanced Engineering Mathematics, Micheael Greenberg, Pearson publishers, 9<sup>th</sup> edition
5. Higher Engineering Mathematics, H. K Das, Er. Rajnish Verma, S. Chand Publications, 2014, Third Edition (Reprint 2021)

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

B. Tech I Year I Semester

23PHY101 ENGINEERING PHYSICS

L T P C  
3 0 0 3

**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**

**9 hours**

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**

**9 hours**

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 QUANTUM MECHANICS AND FREE ELECTRON THEORY**

**9 hours**

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 IV SEMICONDUCTORS**

**9 hours**

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.

**UNIT V DIELECTRIC AND MAGNETIC MATERIALS**

**9 hours**

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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### Course Outcomes:

- CO1:** Apply the knowledge of Interference, Diffraction and Polarization techniques for materials testing and explore their applications in both science and technology.
- CO2:** Explain the crystal structure in terms of atomic positions, unit cells, and crystal symmetry and also relate the crystal symmetry to the symmetry observed in a diffraction pattern.
- CO3:** Evaluate the Schrodinger wave equations for simple potentials and explain the concept of conductivity of different types of materials.
- CO4:** Distinguish the semiconductors using Fermi level and identify the type of semiconductors using Hall effect.
- CO5:** Explain the origin of fundamental magnetic phenomena and types of magnetic materials. Understand the induced fields in dielectrics, and electrical behaviour of dielectrics.

### Text Books:

1. A Text book of Engineering Physics, M. N. Avadhanulu, P.G.Kshirsagar & TVS ArunMurthy, 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>

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year I Semester**

**23EEE101 BASIC ELECTRICAL AND ELECTRONICS ENGINEERING**

L	T	P	C
3	0	0	3

**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 8 hours**

**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 8 hours**

**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 8 hours**

**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

**Course Outcomes:**

After the completion of the course students will be able to

CO1: Infer the basic AC and DC electrical circuits.

CO2: Analyze construction and operation of AC and DC machines, different electrical measuring instruments.

CO3: Illustrate operation of various power generating stations, energy consumption and electrical safety.

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### Text 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

### 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>

## PART B: BASIC ELECTRONICS ENGINEERING

### Course Objectives:

This course provides the student with the fundamental skills to understand the principles of digital electronics, basics of semiconductor devices like diodes & transistors, characteristics and its applications.

### UNIT I SEMICONDUCTOR DEVICES 8 hours

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 8 hours

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. Electronic Instrumentation: Block diagram of an electronic instrumentation system.

### UNIT III DIGITAL ELECTRONICS 8 hours

Overview of Number Systems, Logic gates including Universal Gates, BCD codes, Excess-3 code, Gray code, Hamming 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 Adder, Introduction to sequential circuits, Flip flops, Registers and counters (Elementary Treatment only).

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### **Course Outcomes:**

After the completion of the course students will be able to

CO1: Explain the theory, construction, and operation of electronic devices.

CO2: Apply the concept of science and mathematics to explain the working of diodes, transistors, and their applications.

CO3: Analyze logic gates and its applications in design of combinational circuits.

### **Text Books:**

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

### **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.

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year I Semester**

**23CSE101 INTRODUCTION TO PROGRAMMING**

**L T P C**  
**3 0 0 3**

**Course Objectives:**

- Comprehensive knowledge to computer systems, programming languages, and problem-solving techniques.
- Know the concept of control structures and their usage in programming.
- Introduce to the arrays, memory models, and basic string concepts
- Gain a knowledge from the concept of functions, including declaration, definition, and various aspects of function usage.
- Acquire the advanced programming concepts, including user-defined data types, pointers, and file handling.

**UNIT I INTRODUCTION TO PROGRAMMING AND PROBLEM SOLVING 9 hours**

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 9 hours**

Simple sequential programs Conditional Statements (if, if-else, switch), Loops (for, while, do- while) Break and Continue.

**UNIT III ARRAYS AND STRINGS 9 hours**

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

**UNIT IV POINTERS & USER DEFINED DATA TYPES 9 hours**

Pointers, dereferencing and address operators, pointer and address arithmetic, array manipulation using pointers, User-defined data types-Structures and Unions, Dynamic memory allocation.

**UNIT V FUNCTIONS & FILE HANDLING 9 hours**

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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### **Course Outcomes:**

A student after completion of the course will be able to

CO1: Illustrate the basic computer concepts and programming principles of C language.

CO2: Develop programs using various control structures in 'C'.

CO3: Design applications using arrays and basic string manipulation.

CO4: Demonstrate the applications of pointers, user-defined types and dynamic memory allocation.

CO5: Design various applications using functions and file concepts.

### **Text Books:**

1. C Programming, A Problem Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE, 3rd edition.

### **Reference Books:**

1. Computing fundamentals and C Programming, Balagurusamy, E., McGraw-Hill Education, 2008.
2. Programming in C, Rema Theraja, Oxford, 2016, 2<sup>nd</sup> edition
3. "The C Programming Language", Brian W. Kernighan and Dennis M. Ritchie, Prentice-Hall, 1988
4. Schaum's Outline of Programming with C, Byron S Gottfried, McGraw-Hill Education, 1996

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.



**B. Tech I Year I Semester**

**23ME101 ENGINEERING GRAPHICS**

**L T P C**  
**1 0 4 3**

**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**

**9 hours**

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**

**9 hours**

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**

**9 hours**

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 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**

**9 hours**

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**

**9 hours**

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).

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### **Course Outcomes:**

Students will use the Auto CAD software and will be able to

CO1: Construct the geometrical constructions, engineering curves and scales.

CO2: Draw the projections of points, straight lines and planes

CO3: Draw the projections of solids in various positions

CO4: Sketch the sections of solids and developments of surfaces

CO5: Draw the conversion of the isometric views to orthographic views and vice versa.

### **Text Books:**

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, TataMcGraw Hill, 2017.

**Mode of Evaluation:** Day-to-day Evaluation, Mid Term Tests and End Semester Examination.

**B. Tech I Year I Semester**

**23PHY201 ENGINEERING PHYSICS LABORATORY**

**L T P C**  
**0 0 2 1**

**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.

**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.

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

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### **Course Outcomes:**

- CO1:** Know the various phenomena of light practically and gain knowledge about various optical technique methods.
- CO2:** Verify the theoretical concepts of optics, magnetism and dielectrics by hands on experiment.
- CO3:** Apply the scientific process in the conduct of semiconductor experiments and report the experimental findings.
- CO4:** Understand mechanical phenomena by instruments and apply them in real time applications.
- CO5:** Acquire and interpret experimental data to examine the physical laws.

### **Web Resources:**

www.vlab.co.in

<https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype>

### **Reference Books:**

1. A Textbook of Practical Physics - S. Balasubramanian, M.N. Srinivasan, S. Chand Publishers, 2017.
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; AtulPrakashan, 2021-22.

**Mode of Evaluation:** Continuous Internal Evaluation, Model Test and End Semester Examination

**B. Tech I Year I Semester**

**23EEE201 ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP**

**L T P C**  
**0 0 3 1.5**

**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 LABORATORY**

**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

Note: Minimum Six Experiments to be performed.

**Course Outcomes:**

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

CO1: Analyze basic DC circuits.

CO2: Understand the usage of common electrical & electronic measuring instruments.

CO3: Understand the basic characteristics of electrical machines and perform energy calculations.

**PART B: ELECTRONICS ENGINEERING LABORATORY**

**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 rectifier.
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 S-R, J-K& D flip flops using respective ICs.

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

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

**Course Outcomes:**

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

CO1: Plot and discuss the characteristics of various electron devices.

CO2: Explain the operation of a digital circuit.

**Reference Books:**

1. R. L. Boylestad & Louis Nashlesky, Electronic Devices & Circuit Theory, Pearson Education, 2021.
2. R. P. Jain, Modern Digital Electronics, 4<sup>th</sup> Edition, Tata Mc Graw Hill, 2009
3. R. T. Paynter, Introductory Electronic Devices & Circuits – Conventional Flow Version, Pearson Education, 2009.

**Mode of Evaluation:** Continuous Internal Evaluation, Model Test and End Semester Examination

**B. Tech I Year I Semester**

**23CSE201 COMPUTER PROGRAMMING LABORATORY**

**L T P C**  
**0 0 3 1.5**

**Course Objectives:**

2. Provide hands-on experience in programming fundamentals, algorithm design, and basic problem-solving techniques.
3. Enable students to implement control structures for program flow control in practical scenarios.
4. Reinforce understanding of arrays, memory models, and string manipulation through practical exercises
5. Provide hands-on practice with functions, function calls, and parameter manipulation using pointers.
6. Offer practical exposure to advanced programming concepts, including user-defined data types, file handling, and pointer operations.

**UNIT I**

**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

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.

**Problems to Practice:**

- 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

**UNIT II**

**WEEK 4**

**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 associativity:

**Lab 4: Write C program to solve** Simple computational problems using the operator's precedence and associativity

**Problems to Practice:**

- i) Evaluate the following expressions.
  - a.  $A+B*C+(D*E) + F*G$
  - b.  $A/B*C-B+A*D/3$
  - c.  $A+++B---A$
  - d.  $J= (i++) + (++i)$
- ii) Find the maximum of three numbers using conditional operator
- iii) Take marks of 5 subjects in integers, and find the total, average in float

**WEEK 5**

**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:** Write C program for Problems involving if-then-else structures.

**Problems to Practice:**

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



**WEEK 6**

**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:** Write a C program for Iterative problems e.g., the sum of series

**Problems to Practice:**

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

**UNIT III**

**WEEK 7:**

**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:** 1 D Arrays: searching.

**Lab 7:** Write a C program to solve 1D Array manipulation, linear search

**Problems to Practice:**

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

**WEEK 8:**

**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:** Write a C program to solve Matrix problems, String operations, Bubble sort

**Problems to Practice:**

- 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

## **UNIT IV**

### **WEEK 9:**

**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: Write a C program for** Pointers and structures, memory dereference.

#### **Problems to Practice:**

- 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 n students data using calloc() and display failed students list
- iv) Read student name and marks from the command line and display the student details alongwith the total.
- v) Write a C program to implement realloc()

### **WEEK 10:**

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

#### **Suggested Experiments/Activities:**

**Tutorial 10:** Bitfields, Self-Referential Structures, Linked lists

**Lab10 :** Bitfields, 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 bitfields.
- iv) Write a C program to copy one structure variable to another structure of the same type.

## **UNIT V**

### **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:** Write a C program to solve Simple functions using call by value, solving differential equations using Eulers theorem.

#### **Problems to Practice:**

- 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.

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- 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

**Lab 12:** Write C program for Recursive functions.

#### Problems to Practice:

- 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.

### WEEK 13:

**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:** Write a C program to solve Simple functions using Call by reference, Dangling pointers.

#### Problems to Practice:

- 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 lowercase, uppercase, digits and other characters using pointers.

### WEEK 14:

**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:** Write a C program to handle File operations.

#### Problems to Practice:

- 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 fread() and fwrite()
- 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.

Write a C program to print last n characters of a given file.

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### **Course Outcomes:**

- CO1: Implement coding and debugging the simple programs, create algorithms, and practice problem solving strategies using programming languages.
- CO2: Demonstrate programs that incorporate conditional statements, loops, and break/continue statements to control program execution.
- CO3: Apply coding for real time examples with arrays, array indexing, and manipulate strings in programming tasks.
- CO4: Create, call, and debug functions, modify function parameters using pointers, and gain practical knowledge of variable scope within functions.
- CO5: Apply user-defined data types, manipulate files, pointer operations to solve real-world programming challenges.

### **Textbooks:**

1. Ajay Mittal, Programming in C: A practical approach, Pearson.
2. C Programming, A Problem-Solving Approach, Forouzan, Gilberg, Prasad, CENGAGE

### **Reference Books:**

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

**Mode of Evaluation:** Continuous Internal Evaluation, Model Test and End Semester Examination

**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.

**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.

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**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

### **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?"

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**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?'"

### Course Outcomes:

CO1: Gain expertise in computer hardware, assembly, and dual-boot OS configuration, enhancing their ability to manage and troubleshoot computer systems effectively.

CO2: Learn to connect to the LAN, configure browsers, use search engines effectively, and practice cyber hygiene for secure internet use.

CO3: Create well-formatted documents and presentations using Microsoft Office and Latex

CO4: Gain proficiency in using Excel or its FOSS equivalent for tasks like scheduling, GPA calculation, data manipulation, and formatting.

CO5: Craft effective and tailored inputs to obtain desired responses from AI tools like ChatGPT.

### 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, IITL 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 KenQuamme. – CISCO Press, Pearson Education, 3<sup>rd</sup> edition
7. IT Essentials PC Hardware and Software Labs and Study Guide, Patrick Regan– CISCO Press, Pearson Education, 3<sup>rd</sup> edition

**Mode of Evaluation:** Continuous Internal Evaluation, Model Test and End Semester Examination

**B. Tech I Year I Semester**

**23HUM202 NSS/NCC/SCOUTS AND GUIDES/COMMUNITY SERVICE**

**L T P C**  
**0 0 1 0.5**

**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.

**UNIT I ORIENTATION**

**5 hours**

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

**Activities:**

- i) Conducting –ice breaking sessions-expectations from the course-knowing personaltalents and skills
- ii) Conducting orientations programs for the students –future plans-activities-releasingroad map etc.
- iii) Displaying success stories-motivational biopics- award winning movies on societalissues etc.
- iv) Conducting talent show in singing patriotic songs-paintings- any other contribution.

**UNIT II NATURE & CARE**

**5 hours**

**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**

**5 hours**

**Activities:**

- i) Conducting One Day Special Camp in a village contacting village-area leaders-Surveyin 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 PopulationEducation.
- v) Any other programmes in collaboration with local charities, NGOs etc.



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### Course Outcomes:

After completion of the course the students 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.

### Reference Books:

1. Nirmalya Kumar Sinha & Surajit Majumder, *A Text Book of National Service Scheme*
2. Vol:I, Vidya Kutir Publication, 2021 ( ISBN 978-81-952368-8-6)
3. *Red Book - National Cadet Corps – Standing Instructions Vol I & II*, DirectorateGeneral of NCC, Ministry of Defence, New Delhi
4. Davis M. L. and Cornwell D. A., “Introduction to Environmental Engineering”, McGraw Hill, New York 4/e 2008
5. Masters G. M., Joseph K. and Nagendran R. “Introduction to Environmental Engineering and Science”, Pearson Education, New Delhi. 2/e 2007

### 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. 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 vivavoce on the subject.

# **I Year II Semester**

B. Tech I Year II Semester

23ENG101 COMMUNICATIVE ENGLISH

L T P C  
2 0 0 2

Pre-requisite: None

**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) 9 hours**

- 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) 9 hours**

- 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 9 hours**

- 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 9 hours**

**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) 9 hours**

**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

**Course Outcomes:**

**CO1:** Understand the topic, context, and pieces of specific information from personal, professional and social situations

**CO2:** Apply discourse markers to speak clearly in formal discussions

**CO3:** Analyze and apply grammatical structures to formulate contextualized phrases and sentences

**CO4:** Analyze texts and images to write summaries based on global comprehension

**CO5:** Draft coherent paragraphs and structured essays

**Text Books:**

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)

**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](http://www.bbc.co.uk/learningenglish)
- 2 <https://dictionary.cambridge.org/grammar/british-grammar/>
- 3 [www.eslpod.com/index.html](http://www.eslpod.com/index.html)
- 4 <https://www.learngrammar.net/>
- 5 <https://english4today.com/english-grammar-online-with-quizzes/>

**VOCABULARY**

- 1 <https://www.youtube.com/c/DailyVideoVocabulary/videos>
- 2 [https://www.youtube.com/channel/UC4cmBAit8i\\_NJZE8qK8sfpA](https://www.youtube.com/channel/UC4cmBAit8i_NJZE8qK8sfpA)

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year II Semester**

**23MAT102 DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS**

**L T P C**  
**3 0 0 3**

**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 9 hours**

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) 9 hours**

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 9 hours**

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 9 hours**

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 9 hours**

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.

**Course Outcomes:**

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

CO1: Find the solution of engineering problems formulated in the form of linear first order differential equations.

CO2: Solve the linear higher order differential equations related to various engineering fields.

CO3: Determine the solutions for linear partial differential equations that model the physical processes.

CO4: Interpret the physical meaning of different operators such as gradient, curl and divergence.

CO5: Estimate the work done against field, circulation and flux using vector calculus.

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### **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, 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

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

B. Tech I Year II Semester

23CHE102 CHEMISTRY

L T P C  
3 0 0 3

**Course Objectives:**

7. To familiarize engineering chemistry and its applications
8. To train the students on the principles and applications of electrochemistry and polymers
9. To introduce instrumental methods, molecular machines and switches.

**UNIT I STRUCTURE AND BONDING MODELS**

**9 hours**

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of  $\Psi$  and  $\Psi^2$ , particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of  $N_2$ ,  $O_2$  and  $NO$ ,  $CO$   $\pi$ -molecular orbitals of butadiene and benzene, calculation of bond order.

**UNIT II MODERN ENGINEERING MATERIALS**

**9 hours**

Semiconductors – Introduction, basic concept, role of doping agents, applications  
Super conductors -Introduction, basic concept, applications.  
Supercapacitors: 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**

**9 hours**

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, Sodium-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**

**9 hours**

Introduction to polymers, functionality of monomers, chain growth and step growth polymerization, coordination polymerization, with specific examples and mechanisms of polymer formation, Poly Dispersity Index (PDI) & it's significance  
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 – polyacetylene, polyaniline, – mechanism of conduction and applications.  
Bio-Degradable polymers - Poly Glycolic Acid (PGA), Poly Lactic Acid (PLA).

**UNIT V INSTRUMENTAL METHODS AND APPLICATIONS**

**9 hours**

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



## Dept. of Electronics and Communication Engineering

### Course Outcomes:

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

- CO1: Explain the foundations of Quantum mechanics and concept of bonding in homo and hetero diatomic molecules like O<sub>2</sub>, CO etc.
- CO2: Apply the principle of Band diagrams in the application of conductors and semiconductors. Properties and applications of nanomaterials.
- CO3: Compare the materials of construction for battery, its working principles, fuel cells & electrochemical sensors.
- CO4: Explain the preparation, properties, and applications of thermoplastics & thermosetting & elastomers conducting polymers.
- CO5: Explain the principles of spectrometry, technique of HPLC in separation of solid and liquid mixtures. Summarize the concepts of Instrumental methods.

### Text Books:

1. Jain and Jain, Engineering Chemistry, 16/e, DhanpatRai, 2013.
2. Peter Atkins, Julio de Paula and James Keeler, Atkins' Physical Chemistry, 10/e, Oxford University Press, 2010.
3. G V Subba Reddy, K N Jayaveera, C Ramachandraiah, Engineering Chemistry, McGraw-Hill; First Edition, 2019.

### Reference Books:

1. Skoog and West, Principles of Instrumental Analysis, 6/e, Thomson, 2007.
2. J.D. Lee, Concise Inorganic Chemistry, 5<sup>th</sup> Edition, Wiley Publications, Feb.2008
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year II Semester**

**23CME101 BASIC CIVIL AND MECHANICAL ENGINEERING**

**L T P C**  
**3 0 0 3**

**Course Objectives:**

10. Get familiarized with the scope and importance of Civil Engineering sub-divisions.
11. Introduce the preliminary concepts of surveying.
12. Acquire preliminary knowledge on Transportation and its importance in nation's economy.
13. Get familiarized with the importance of quality, conveyance and storage of water.
14. Introduction to basic civil engineering materials and construction techniques.

**PART A: BASIC CIVIL ENGINEERING**

**UNIT I BASICS OF CIVIL ENGINEERING**

**8 hours**

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- Cement concrete- Steel. Introduction to Prefabricated construction Techniques.

**UNIT II SURVEYING**

**8 hours**

Objectives of Surveying- Horizontal Measurements- Angular Measurements- Introduction to Bearings Levelling instruments used for levelling -Simple problems on levelling and bearings-Contour mapping.

**UNIT III TRANSPORTATION ENGINEERING**

**8 hours**

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).

**Course Outcomes:**

- CO1: Identify various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.
- CO2: Measure of distances, angles and levels through surveying.
- CO3: Identify various transportation infrastructures, sources of water and various water conveyance, storage structures like 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, 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. 38<sup>th</sup> Edition.
4. Highway Engineering, S.K. Khanna, C.E.G. Justo and Veeraraghavan, Nemchand and Brothers Publications 2019. 10<sup>th</sup> Edition.
5. Indian Standard DRINKING WATER — SPECIFICATION IS 10500-2012.

**PART B: BASIC MECHANICAL ENGINEERING**

**Course Objectives:**

The students after completing the course are expected to

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

**UNIT I**

**8 hours**

**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**

**8 hours**

**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**

**8 hours**

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)

**Course Outcomes:**

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

CO1: Understand the role and importance of mechanical engineering and engineering materials

CO2: Identify the different manufacturing processes for engineering applications and explain the basics of thermal engineering and its applications.

CO3: Explain the working of different mechanical power transmission systems, power plants and robotics.

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### **Text Books:**

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

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year II Semester**

**23ECE101 NETWORK ANALYSIS**

**L T P C**  
**3 0 0 3**

**Course Objectives:**

15. Understand the formulation of network equations, Network theorems and Graph theory.
16. Expose the students to the concepts of resonance in electrical circuit
17. Expose the students to the concepts of various types of Transient analysis of different electrical circuits with and without initial conditions using Laplace Transform.
18. Demonstrate relationship of two port network variables and connections.
19. Analyse and design passive network filter circuits, attenuators and equalizers

**UNIT I**

**9 hours**

Types of circuit components, Types of Sources and Source Transformations, Mesh analysis and Nodal analysis, problem solving with resistances only including dependent sources also. Principle of Duality with examples.

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

**UNIT II**

**9 hours**

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, problem-solving using R-L-C elements with DC excitation and AC excitation, Response as related to s-plane rotation of roots.

Laplace transform: introduction, Laplace transformation, basic theorems, problem solving using Laplace transform, partial fraction expansion, Heaviside's expansions, problem solving using Laplace transform.

**UNIT III**

**9 hours**

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, Star-Delta conversion, problem solving using Laplace transforms also.

**UNIT IV**

**9 hours**

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, Natural current, Dot rule of coupled circuits, conductively coupled equivalent circuits- problem solving.

**UNIT V**

**9 hours**

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 dependent sources also.

Image and iterative impedances. Image and iterative transfer constants. Insertion loss. Attenuators and pads. Lattice network and its parameters. Impedance matching networks.

## **Dept. of Electronics and Communication Engineering**

### **Course Outcomes:**

At the end of this course students will demonstrate the ability to

CO1: Understand basic electrical circuits with nodal and mesh analysis Analyse the circuit using network theorems.

CO2: Find Transient response and Steady state response of a network.

CO3: Analyze the response of RL, RC and RLC circuits with different inputs.

CO4: Analyse the series and parallel resonance circuits.

CO5: Compute the parameters of a two-port network.

### **Text Books:**

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<sup>th</sup> Edition 2020.
3. Network lines and Fields by John. D. Ryder 2<sup>nd</sup> 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,7<sup>th</sup> 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.

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech I Year II Semester**

**23ENG201 COMMUNICATIVE ENGLISH LABORATORY**

**L T P C**  
**0 0 2 1**

**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.

**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

**Course Outcomes:**

- CO1: Understand the English speech sounds, stress, rhythm, intonation and syllabic division for better listening and speaking
- CO2: Apply communication strategies and implement them in language learning activities.
- CO3: Analyze and enhance job-relevant writing skills
- CO4: Evaluate and exhibit professionalism in debates and group discussions.
- CO5: Make effective presentations by developing public speaking abilities

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

**Web Resources:**

Spoken English:

1. [www.esl-lab.com](http://www.esl-lab.com)
2. [www.englishmedialab.com](http://www.englishmedialab.com)
3. [www.englishinteractive.net](http://www.englishinteractive.net)

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4. <https://www.britishcouncil.in/english/online>
5. <http://www.letstalkpodcast.com/>
6. [https://www.youtube.com/c/mmmEnglish\\_Emma/featured](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](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](https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc)
4. [https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp\\_IA](https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IA)

**Mode of Evaluation:** Continuous Internal Evaluation, Model Test and End Semester Examination



**B. Tech I Year II Semester**

**23CHE202 CHEMISTRY LABORATORY**

**L T P C**  
**0 0 2 1**

**Course Objectives:**

20. Verify the fundamental concepts with experiments.

**List of Experiments:**

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

**Course Outcomes:**

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

CO1: Determine the cell constant and conductance of solutions.

CO2: Prepare advanced polymer Bakelite materials.

CO3: Measure the strength of an acid present in secondary batteries.

CO4: Measure the wavelength of absorption of some organic compounds using UV-Vis spectroscopy.

CO5: Determine the EMF & redox potentials using potentiometric titrations.

**Reference Books:**

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

**Mode of Evaluation:** Continuous Internal Evaluation, Model Test and End Semester Examination

**B. Tech I Year II Semester**

**23ME201 ENGINEERING WORKSHOP**

**L T P C**  
**0 0 3 1.5**

**Course Objectives:**

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

**List of Experiments**

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 Bridlejoint
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 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 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.

**Course Outcomes:**

CO1: Identify workshop tools and their operational capabilities.

CO2: Practice on manufacturing of components using workshop trades including fitting, carpentry, foundry and welding.

CO3: Apply fitting operations in various applications.

CO4: Apply basic electrical engineering knowledge for House Wiring Practice

## **Dept. of Electronics and Communication Engineering**

### **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, MediaPromoters and Publishers, Mumbai. 2007, 14th edition
2. Workshop Practice by H. S. Bawa, Tata-McGraw Hill, 2004.
3. Wiring Estimating, Costing and Contracting; Soni P.M. & Upadhyay P.A.; AtulPrakashan, 2021-22.

**Mode of Evaluation:** Continuous Internal Evaluation, Model Test and End Semester Examination

**B. Tech I Year II Semester**

**23ECE201 NETWORK ANALYSIS AND SIMULATION LABORATORY**

**L T P C**  
**0 0 3 1.5**

**Course Objectives:**

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

**List of Experiments:**

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 AC circuits
3. Verification of Superposition, Thevenin's & Norton theorems for AC circuits
4. Verification of maximum power transfer theorem for AC circuits
5. Verification of Tellegen's theorem for two networks of the same topology.
6. Study of DC transients in RL, RC and RLC circuits
7. To study frequency response of various 1st order RL & RC networks
8. To study the transient and steady state response of a 2nd order circuit by varying its various parameters and studying their effects on responses
9. Find the Q Factor and Bandwidth of a Series and Parallel Resonance circuit.
10. Determination of open circuit (Z) and short circuit (Y) parameters
11. Determination of hybrid (H) and transmission (ABCD) parameters
12. 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

## **Dept. of Electronics and Communication Engineering**

### **Course Outcomes:**

CO1: Verify Kirchoff'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.

### **Reference Books:**

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<sup>th</sup> Edition 2020.

**Mode of Evaluation:** Continuous Internal Evaluation, Model Test and End Semester Examination

**B. Tech I Year II Semester**

**23HUM201 HEALTH AND WELLNESS, YOGA AND SPORTS**

**L T P C**  
**0 0 1 0.5**

**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**

**5 hours**

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**

**5 hours**

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**

**5 hours**

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.

**Course Outcomes:**

After 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

**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,
5. The Sports Rules Book/ Human Kinetics with Thomas Hanlon. -- 3rd ed. HumanKinetics, 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 manyas 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 vivavoce on the subject.

# II Year I Semester



**B. Tech II Year I Semester**

**23HUM101 UNIVERSAL HUMAN VALUES**

L	T	P	C
2	1	0	3

**Course Prerequisite:** None or Universal Human Values I (desirable)

**Course Description :**

The course has 28 lectures and 14 tutorials in 5 Units. The lectures and tutorials are of 1-hour duration. Tutorial sessions are to be used to explore and practice what has been proposed during the lecture sessions. The Teacher's Manual provides the outline for lectures as well as practice sessions. The teacher is expected to present the issues to be discussed as propositions and encourage the students to have a dialogue.

**Course Objectives:** None. Universal Human Values-I (desirable)

The main objectives of the course is to

1. help the students appreciate the essential complementary between 'VALUES' and 'SKILLS' to ensure happiness and prosperity in continuity, which are the core aspirations of all human beings.
2. facilitate the development of a Holistic perspective among students towards life and profession based on right understanding of the Human reality, family, society and the rest of nature. Such holistic perspective forms the basis of Universal Human Values (UHV) and movement towards value-based living in a natural way.
3. highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.
4. aid the students to realize their full human potential and act accordingly.
5. assist the students to live with feeling of relationship, harmony and co-existence.

**UNIT I INTRODUCTION TO VALUE EDUCATION**

**8 hours**

Lecture 1: Understanding Value Education

Lecture 2: self-exploration as the Process for Value Education

Tutorial 1: Practice Session PS1 - Sharing about Oneself

Lecture 3: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 4: Continuous Happiness and Prosperity – the Basic Human Aspirations

Tutorial 2: Practice Session PS2 - Exploring Human Consciousness

Lecture 5: Happiness and Prosperity – Current Scenario

Lecture 6: Method to Fulfill the Basic Human Aspirations

Tutorial 3: Practice Session PS3 - Exploring Natural Acceptance

**UNIT II HARMONY IN THE HUMAN BEING**

**8 hours**

Lecture 7: Understanding Human being as the Co-existence of the self and the body.

Lecture 8: Distinguishing between the Needs of the self and the body

Tutorial 4: Practice Session PS4 - Exploring the difference of Needs of self and body.

Lecture 9: The body as an Instrument of the self

Lecture 10: Understanding Harmony in the self

Tutorial 5: Practice Session PS5 - Exploring Sources of Imagination in the self

Lecture 11: Harmony of the self with the body

Lecture 12: Programme to ensure self-regulation and Health

Tutorial 6: Practice Session PS6 - Exploring Harmony of self with the body

**UNIT III HARMONY IN THE FAMILY AND SOCIETY**

**10 hours**

Lecture 13: Harmony in the Family – the Basic Unit of Human Interaction

Lecture 14: 'Trust' – the Foundational Value in Relationship

Tutorial 7: Practice Session PS7 - Exploring the Feeling of Trust

Lecture 15: 'Respect' – as the Right Evaluation

Tutorial 8: Practice Session PS8 - Exploring the Feeling of Respect

Lecture 16: Other Feelings, Justice in Human-to-Human Relationship

Lecture 17: Understanding Harmony in the Society

Lecture 18: Vision for the Universal Human Order

Tutorial 9: Practice Session PS9 - Exploring Systems to fulfil Human Goal

**UNIT IV HARMONY IN THE NATURE/EXISTENCE**

**8 hours**

Lecture 19: Understanding Harmony in the Nature

Lecture 20: Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature

Tutorial 10: Practice Session PS10 - Exploring the Four Orders of Nature

Lecture 21: Realizing Existence as Co-existence at All Levels

Lecture 22: The Holistic Perception of Harmony in Existence

Tutorial 11: Practice Session PS11 - Exploring Co-existence in Existence.

**UNIT V IMPLICATIONS OF THE HOLISTIC UNDERSTANDING –  
A LOOK AT PROFESSIONAL ETHICS**

**8 hours**

Lecture 23: Natural Acceptance of Human Values

Lecture 24: Definitiveness of (Ethical) Human Conduct

Tutorial 12: Practice Session PS12 - Exploring Ethical Human Conduct

Lecture 25: A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order

Lecture 26: Competence in Professional Ethics

Tutorial 13: Practice Session PS13 - Exploring Humanistic Models in Education

Lecture 27: Holistic Technologies, Production Systems and Management Models-Typical Case Studies

Lecture 28: Strategies for Transition towards Value-based Life and Profession

Tutorial 14: Practice Session PS14 - Exploring Steps of Transition towards Universal Human Order

**Course Outcomes:**

At the end of this course students will demonstrate the ability to

CO1: Understand the Natural Acceptance and basic human aspiration.

CO2: Aware of themselves and self-regulation.

CO3: Recognize human-human relationship (Justice) and identify human goals in the society.

CO4: Appreciate the harmony in the nature and existence.

CO5: Develop as socially and ecologically responsible engineers in handling problems with sustainable solutions (user-friendly and eco-friendly).

**Text Books:**

1. R R Gaur, R Asthana, G P Bagaria, A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1
2. R R Gaur, R Asthana, G P Bagaria, Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53-2

**Reference Books:**

1. Jeevan Vidya: Ek Parichaya, A Nagaraj, Jeevan Vidya Prakashan, 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 – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English)

**Online Learning Resources**

1. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%201-Introduction%20to%20Value%20Education.pdf>
2. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%202-Harmony%20in%20the%20Human%20Being.pdf>
3. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%203-Harmony%20in%20the%20Family.pdf>
4. <https://fdp-si.aicte-india.org/UHV%201%20Teaching%20Material/D3-S2%20Respect%20July%202023.pdf>
5. <https://fdp-si.aicte-india.org/UHV-II%20Class%20Notes%20&%20Handouts/UHV%20Handout%205-Harmony%20in%20the%20Nature%20and%20Existence.pdf>
6. <https://fdp-si.aicte-india.org/download/FDPTeachingMaterial/3-days%20FDP-SI%20UHV%20Teaching%20Material/Day%203%20Handouts/UHV%203D%20D3-S2A%20Und%20Nature-Existence.pdf>
7. <https://fdp-si.aicte-india.org/UHV%20II%20Teaching%20Material/UHV%20II%20Lecture%2023-25%20Ethics%20v1.pdf>
8. <https://www.studocu.com/in/document/kiet-group-of-institutions/universal-human-values/chapter-5-holistic-understanding-of-harmony-on-professional-ethics/62490385>
9. [https://onlinecourses.swayam2.ac.in/aic22\\_ge23/preview](https://onlinecourses.swayam2.ac.in/aic22_ge23/preview)
10. <https://uhv.org.in/>

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11. <https://www.youtube.com/@UniversalHumanValues/playlists>
12. <https://fdp-si.aicte-india.org/index.php>

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech II Year I Semester**

**23MAT106 COMPLEX VARIABLES AND PROBABILITY THEORY**

L	T	P	C
3	0	0	3

**Course Prerequisite:** 23MAT101 & 23MAT102

**Course Description:**

This course covers the Complex functions and their analyticity, complex integration, Taylor and Laurent series expansions and Calculus of Residues. The course also deals Probability, Bayes theorem, Univariate random variables and its probability distributions, Chebyshev's inequality, Multivariate Random variables and Joint distributions.

**Course Objectives:**

This course enables students to

1. Analyze the functions of Complex variables and their analyticity.
2. Get Acquainted with complex integration, Laurent series and Calculus of residues.
3. Understand the concepts of Probability, Random Variables and probability distributions.
4. Study operations on the univariate random variable and the transformation of the random variable.
5. Learn multiple random variables, conditional probability, joint distribution, and statistical independence.

**UNIT I COMPLEX VARIABLE – DIFFERENTIATION**

**9 hours**

Introduction to functions of complex variable-concept of Limit & continuity- Differentiation, Cauchy-Riemann equations, analytic functions harmonic functions, finding harmonic conjugate-construction of analytic function by Milne Thomson method

**UNIT II COMPLEX VARIABLE – INTEGRATION**

**9 hours**

Cauchy's theorem, Cauchy Integral formula, Taylor's series, Laurent series, singularities, Cauchy Residue theorem

**UNIT III PROBABILITY AND RANDOM VARIABLES**

**9 hours**

Probability through Sets and Probability Definitions and Axioms, Joint Probability, Conditional Probability, Total Probability, Bayes' Theorem, Independent Events.

The Random variable concept, Distribution and Density functions, Properties, Probability distributions: Binomial, Poisson, Uniform, Gaussian, Exponential, Rayleigh

**UNIT IV OPERATIONS ON UNIVARIATE RANDOM VARIABLE**

**9 hours**

Expectation, Moments-moments about the origin, Central moments, Variance and Skewness, Chebyshev's inequality, moment generating function, characteristic function. Transformations of one dimensional random variable

**UNIT V MULTIPLE RANDOM VARIABLES**

**9 hours**

Vector random variables, joint distribution function, joint density function and its properties, conditional distribution and conditional density functions; Statistical independence, Central Limit Theorem, Expected value of a function of random variables, Joint moments, joint characteristic function, Jointly Gaussian random variables, Transformation of multiple random variables

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### Course Outcomes:

At the end of this course students will demonstrate the ability to

CO1: Examine the concepts of complex functions using CR-equations.

CO2: Evaluate complex contour integrals and Taylor and Laurent series expansions.

CO3: Understand the importance of probability, discrete and continuous probability distributions in engineering

CO4: Apply the operations on one dimensional random variable.

CO5: Get an idea about joint density functions, distribution functions to the random variables and analyze the multivariate problems in engineering

### Text Books:

1. B.S. Grewal, "Higher Engineering Mathematics", Khanna Publishers, 42nd Edition, 2012.
2. Peyton Z. Peebles, Probability, Random Variables & Random Signal Principles, TMH, 4<sup>th</sup> edition, 2001.

### Reference Books:

1. H. Stark and J. Woods, "Probability and Random Processes with Applications to Signal Processing," 3<sup>rd</sup> edition, Pearson Education.
2. A. Papoulis and S. Unnikrishnan Pillai, "Probability, Random Variables and Stochastic Processes," 4<sup>th</sup> edition, McGraw-Hill.
3. K. L. Chung, Introduction to Probability Theory with Stochastic Processes, Springer International
4. R. V Churchill and J. W. Brown, Complex variables and applications by, 8th edition, 2008, McGraw Hill.
5. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2011.

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year I Semester

23ECE102 SIGNALS AND SYSTEMS

L	T	P	C
2	1	0	3

**Course Objectives:**

1. Understanding the basics of signals and systems required for ECE courses
2. To teach concepts of signals and systems and its analysis using different transform techniques.
3. To provide basic understanding of random processes which is essential for the random signals and systems encountered in communications and signal Processing areas.

**UNIT I**

**9 hours**

**Signals & Systems:** Basic definitions and classification of Signals and Systems (Continuous time and discrete time), operations on signals, Concepts of Convolution and Correlation of signals, Analogy between vectors and signals-Orthogonality, mean square error,

**Fourier series:** Trigonometric & Exponential forms of Fourier series, Properties, Concept of discrete spectrum, Illustrative Problems.

**UNIT II**

**9 hours**

**Fourier Transform:** Definition, Computation and properties of Fourier transform for different types of signals and systems, Inverse Fourier transform. Sampling: Sampling theorem – Graphical and analytical proof for Band Limited Signals, Reconstruction of signal from its samples, Effect of under sampling – Aliasing. Illustrative Problems.

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

**UNIT III**

**9 hours**

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

**9 hours**

**UNIT IV**

**Random Processes – Temporal Characteristics:** The Random Process Concept, Classification of Processes, Deterministic and Nondeterministic Processes, Distribution and Density Functions, concept of Stationarity and Statistical Independence. First-Order Stationary Processes, Second- Order and Wide-Sense Stationarity, (N-Order) and Strict Sense Stationarity, Time Averages and Ergodicity, Autocorrelation Function and Its Properties, Cross-Correlation Function and Its Properties, Covariance Functions, Gaussian Random Processes, Poisson Random Process. Random Signal, Mean and Mean-squared Value of System Response, autocorrelation Function of Response, Cross-Correlation Functions of Input and Output.

**UNIT V**

**9 hours**

**Random Processes – Spectral Characteristics:** The Power Spectrum: Properties, Relationship between Power Spectrum and Autocorrelation Function, The Cross-Power Density Spectrum, Properties, Relationship between Cross-Power Spectrum and Cross Correlation Function. Spectral Characteristics of System Response: Power Density Spectrum of Response, Cross-Power Density Spectrums of Input and Output.

**Course Outcomes:**

At the end of this course students will demonstrate the ability to

CO1: Understand the mathematical description and representation of continuous-time and discrete-time signals and systems, Also, understand the concepts of various transform techniques and Random Processes (L2)

CO2: Apply sampling theorem to convert continuous-time signals to discrete-time signals and reconstruct back, different transform techniques to solve signals and system related problems. (L3)

CO3: Formulate and solve engineering problems involving random processes. (L3)

CO4: Analyze the frequency spectra of various continuous-time signals using different transform methods. (L4)

CO5: Classify the systems based on their properties and determine the response of them. (L4)

**Text Books:**

1. Peyton Z. Peebles, “Probability, Random Variables & Random Signal Principles”, 4th Edition, TMH, 2002.
2. A.V. Oppenheim, A.S. Willsky and S.H. Nawab, “Signals and Systems”, 2nd Edition, PHI, 2009.

**Reference Books:**

1. B.P. Lathi, “Signals, Systems & Communications”, 2013, BSP.
2. Athanasios Papoulis and S. Unnikrishna Pillai, “Probability, Random Variables and Stochastic Processes”, 4<sup>th</sup> Edition, PHI, 2002
3. Simon Haykin and Van Veen, “Signals & Systems”, 2<sup>nd</sup> Edition, Wiley, 2005.
4. Matthew Sadiku and Warsame H. Ali, “Signals and Systems A primer with MATLAB”, CRC Press, 2016.
5. Hwei Hsu, “Schaum's Outline of Signals and Systems”, 4<sup>th</sup> Edition, TMH, 2019.

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.



**B. Tech II Year I Semester**

**23ECE103 ELECTRONIC DEVICES AND CIRCUITS**

L	T	P	C
3	0	0	3

**Course Objectives:**

1. Students will be able understand the basic principles of all semiconductor devices.
2. Able to analyze diode circuits, various biasing and small signal equivalent circuits of amplifiers, compare the performance of BJTs and MOSFETs
3. Able to design rectifier circuits and various amplifier circuits using BJTs and MOSFETs.

**UNIT I**

**9 hours**

PN junction diode: Band structure of PN Junction, Quantitative Theory of PN Diode, types of PN junction diode, VI Characteristics, PN diode current equation, Diode resistance, Transition and Diffusion Capacitance, effect of temperature on PN junction diode, Half-wave, Full-wave and Bridge Rectifiers with and without Filters, Ripple Factor and Regulation Characteristics, Clipping and Clamping circuits, Voltage doubler, Illustrative problems.

Special Diodes: Zener and Avalanche Breakdowns, VI Characteristics of Zener diode, Zener diode as voltage regulator, Construction, operation and VI characteristics of Tunnel Diode, Varactor Diode, LED, LCD, Photo Diode, SCR and UJT.

**UNIT II**

**9 hours**

Bipolar Junction Transistors: Transistor construction, BJT Operation, Transistor as an Amplifier and as a Switch, Common Emitter, Common Base and Common Collector Configurations, Limits of Operation, BJT Specifications.

Biasing and Stabilization: Operating Point, DC and AC Load Lines, Importance of Biasing, Fixed Bias, Collector to Base Bias, Self-Bias, Bias Stability, Thermal Runaway, Thermal Stability, Illustrative problems.

**UNIT III**

**9 hours**

MOS Field Effect Transistors: Introduction, Device Structure and Physical Operation, CMOS, V - I Characteristics, MOSFET Circuits at DC, MOSFET as an Amplifier and as a Switch. Biasing in MOS Amplifier circuits - biasing by fixing VGS with and without source resistance, biasing using drain to gate feedback resistor, biasing using constant current source, body effect, Problem solving.

**UNIT IV**

**9 hours**

BJT Small Signal Operation and Models- the transconductance, input resistance at the base, input resistance at the emitter, Voltage gain, separating the Signal and the DC Quantities, The Hybrid  $\pi$  Model, the T Model. Single Stage BJT Amplifiers - Common-Emitter (CE) amplifier without and with emitter resistance, Common-Base (CB) amplifier, Common-Collector (CC) amplifier or Emitter Follower, Problem solving.

**UNIT V**

**9 hours**

MOSFET Small Signal Operation Models– the dc bias, separating the DC analysis and the signal analysis, Small signal equivalent circuit models, the transconductance, the T equivalent circuit model, Single stage MOS Amplifiers – common source (CS) amplifier without and with source resistance, common gate (CG) amplifier, source follower, Problem Solving.

**Course Outcomes:**

At the end of this course students will demonstrate the ability to

- CO1: Understand principle of operation, characteristics and applications of Semiconductor diodes, Bipolar Junction Transistor and MOSFETs. (L2)
- CO2: Applying the basic principles solving the problems related to Semiconductor diodes, BJTs, and MOSFETs. (L3)
- CO3: Analyze diode circuits for different applications such as rectifiers, clippers and clampers also analyze biasing circuits of BJTs, and MOSFETs. (L4)
- CO4: Design of diode circuits and amplifiers using BJTs, and MOSFETs. (L4)
- CO5: Compare the performance of various semiconductor devices. (L4)

**Text Books:**

1. Adel S. Sedra and Kenneth C. Smith, “Microelectronic Circuits – Theory and Applications”, 6<sup>th</sup> Edition, Oxford Press, 2013.
2. J. Milliman and C Halkias, “Integrated electronics”, 2<sup>nd</sup> Edition, Tata McGraw Hill, 1991.

**Reference Books:**

1. Donald A Neamen, “Electronic Circuits – analysis and design”, 3<sup>rd</sup> Edition, McGraw Hill (India), 2019.
2. Behzad Razavi, “Microelectronics”, Second edition, Wiley, 2013.
3. R.L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuits,” 9<sup>th</sup> Edition, Pearson, 2006.
4. Jimmie J Cathey, “Electronic Devices and Circuits,” Schaum’s outlines series, 3<sup>rd</sup> Edition, McGraw-Hill (India), 2010.

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.



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### **Text Books:**

1. M. Morris Mano, “Digital Design”, 3<sup>rd</sup> Edition, PHI. (Unit I to IV)
2. Stephen Brown and Zvonko Vranesic, “Fundamentals of Digital Logic with Verilog Design”, 3<sup>rd</sup> Edition, McGraw-Hill (Unit V)

### **Reference Books:**

1. Charles H. Roth, Jr, “Fundamentals of Logic Design”, 4<sup>th</sup> Edition, Jaico Publishers.
2. Zvi Kohavi and Niraj K. Jha, “Switching and Finite Automata Theory, 3<sup>rd</sup> Edition, Cambridge University Press, 2010.
3. Samir Palnitkar, “Verilog HDL: A Guide to Digital Design and Synthesis”, 2<sup>nd</sup> Edition, Prentice Hall PTR.
4. D.P. Leach, A.P. Malvino, “Digital Principles and Applications”, TMH, 7<sup>th</sup> Edition.

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year I Semester

23ECE202 ELECTRONIC DEVICES AND CIRCUITS LABORATORY

L	T	P	C
0	0	3	1.5

**Course Objectives:**

1. Verify the theoretical concepts practically from all the experiments.
2. Analyse the characteristics of Diodes, BJT, MOSFET, UJT.
3. Design the amplifier circuits from the given specifications.
4. Model the electronic circuits using tools such as PSPICE/Multisim.

**List of Experiments:**

**Note: Any 12 experiments Shall be implemented using Hardware / Software.**

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

**Hardware Requirements:**

DC Power supplies, Multi meters, DC Ammeters, DC Voltmeters, AC Voltmeters, CROs, all the required active devices.

**Software requirements:**

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

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### **Course Outcomes:**

Upon successful completion of the course, students will be able to

- CO1: Understand the characteristics and applications of basic electronic devices. (L2)
- CO2: Plot the characteristics of electronic devices. (L3)
- CO3: Analyze various biasing circuits and electronic circuits as amplifiers (L4).
- CO4: Design MOSFET / BJT based amplifiers for the given specifications. (L5)
- CO5: Simulate all circuits in PSPICE /Multisim. (L5).

### **Reference Books:**

1. Robert L. Boylestad, Louis Nashelsky, “Electronic Devices and Circuit Theory”, 13<sup>th</sup> edition, Pearson, 2014.
2. Behzad Razavi, “Fundamentals of Microelectronics”, 2<sup>nd</sup> edition, Wiley, 2013.

**Mode of Evaluation:** Continuous Internal Evaluation, Model Test and End Semester Examination

**B. Tech II Year I Semester**

**23ECE203 DIGITAL CIRCUITS AND SIGNAL SIMULATION LABORATORY**

L	T	P	C
0	0	3	1.5

**Course Objectives:**

1. Verify the truth tables of various logic circuits.
2. Design sequential/combinational circuit using Hardware Description Language and verify their functionality.
3. Simulate various Signals and Systems through MATLAB
4. Analyze the output of a system when it is excited by different types of deterministic and random signals.

**List of Experiments:**

**PART A**

1. Design a simple combinational circuit with four variables and obtain minimal SOP expression and verify the truth table using Digital Trainer Kit.
2. Verification of functional table of 3 to 8-line Decoder /De-multiplexer
3. 4 variable logic function verification using 8 to1 multiplexer.
4. Design full adder circuit and verify its functional table.
5. Design a four-bit ring counter using D Flip-Flops/JK Flip Flop and verify output.
6. Design a four-bit Johnson's counter using D Flip-Flops/JK Flip Flops and verify output
7. Verify the operation of 4-bit Universal Shift Register for different Modes of operation.
8. Draw the circuit diagram of MOD-8 ripple counter and construct a circuit using T-Flip-Flops and Test It with a low frequency clock and sketch the output waveforms.
9. Design MOD-8 synchronous counter using T Flip-Flop and verify the result and sketch the output waveforms.
10. (a) Draw the circuit diagram of a single bit comparator and test the output  
(b) Construct 7 Segment Display Circuit Using Decoder and 7 Segment LED and test it.

**Note:** Any 8 experiments. Design and verify combinational and sequential circuits using Hardware Description Language

**PART B**

1. Write a program to generate various Signals and Sequences: Periodic and Aperiodic, Unit Impulse, Unit Step, Square, Saw tooth, Triangular, Sinusoidal, Ramp, Sinc function.
2. Perform operations on Signals and Sequences: Addition, Multiplication, Scaling, Shifting, Folding, Computation of Energy and Average Power.
3. Write a program to find the trigonometric & exponential Fourier series coefficients of a rectangular periodic signal. Reconstruct the signal by combining the Fourier series coefficients with appropriate weightings- Plot the discrete spectrum of the signal.
4. Write a program to find Fourier transform of a given signal. Plot its amplitude and phase spectrum.
5. Write a program to convolve two discrete time sequences. Plot all the sequences.
6. Write a program to find autocorrelation and cross correlation of given sequences.
7. Write a program to verify Linearity and Time Invariance properties of a given Continuous System.

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8. Write a program to generate discrete time sequence by sampling a continuous time signal. Show that with sampling rates less than Nyquist rate, aliasing occurs while reconstructing the signal.
9. Write a program to find magnitude and phase response of first order low pass and high pass filter. Plot the responses in logarithmic scale.
10. Write a program to generate Complex Gaussian noise and find its mean, variance, Probability Density Function (PDF) and Power Spectral Density (PSD).
11. Generate a Random data (with bipolar) for a given data rate (say 10kbps). Plot the same for a time period of 0.2 sec.
12. To plot pole-zero diagram in S-plane of given signal/sequence and verify its stability.

**Note:** Any 10 experiments. All the experiments are to be simulated using MATLAB or equivalent software.

### Hardware Requirements:

Logic gates, Digital ICs, DC power supplies,

### Software requirements:

MATLAB, Computer Systems with required specifications

### Course Outcomes:

Upon successful completion of the course, students will be able to

CO1: Verify the truth tables of various logic circuits. (L2)

CO2: Understand how to simulate different types of signals and system response. (L2)

CO3: Design sequential and combinational logic circuits and verify their functionality. (L3, L4)

CO4: Analyze the response of different systems when they are excited by different signals and plot power spectral density of signals. (L4)

CO5: Generate different random signals for the given specifications. (L5)

### Reference Books:

1. M. Morris Mano, "Digital Design", 3<sup>rd</sup> Edition, PHI
2. Stephen J. Chapman, "MATLAB Programming for Engineers", Cengage, November 2012

**Mode of Evaluation:** Continuous Internal Evaluation, Model Test and End Semester Examination



**B. Tech II Year I Semester**

**Skill Enhancement Course - I**

**23CSE601 PYTHON PROGRAMMING**

**L T P C**  
**1 0 2 3**

**Course Objectives:**

The main objectives of the course are to

1. Introduce core programming concepts of Python programming language.
2. Learn to solve problems using Python conditional and loops.
3. Demonstrate about Python data structures like Lists, Tuples, Sets and dictionaries
4. Implement Functions, Modules and Regular Expressions in Python Programming and to create practical and contemporary applications.
5. Demonstrate to do input/output with files in Python.

**UNIT I DATA TYPES, EXPRESSIONS AND CONTROL FLOW STATEMENTS**

**6 hours**

**Introduction:** 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 swap two numbers without using a temporary variable.
3. Demonstrate the following Operators in Python with suitable examples.

i) Arithmetic Operators ii) Relational Operators iii) Assignment Operators iv) Logical Operators v) Bit wise Operators vi) Ternary Operator vii) Membership Operators viii) Identity Operators

**UNIT II LISTS & DICTIONARIES**

**6 hours**

**Lists:** Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, del Statement.

**Dictionaries:** Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, del Statement.

**Sample Experiments:**

1. Write a program to perform the given operations on a list:
  - i. Addition ii. Insertion iii. slicing
2. Write a program to perform any 5 built-in functions by taking any list.
3. Write a program to sum all the items in a given dictionary.

**UNIT III TUPLES AND SETS**

**6 hours**

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.

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### 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.

## UNIT IV FUNCTIONS & STRINGS

6 hours

**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.

### 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.

## UNIT V FILES HANDLING IN PYTHON

6 hours

**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.

### 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. Implement a Python program to print each line of a file in reverse order.
3. Write a Python program to compute the number of characters, words and lines in a file

### Course Outcomes:

After completion of the course, students will be able to

CO1: Understand to adept command of Python syntax, deftly utilizing variables, data types, and control structures.

CO2: Interpret Strings, functions, modules, exception handling to engineer robust and efficient code solutions.

CO3: Apply Python programming concepts like Lists and Dictionary to solve a variety of computational problems.

CO4: Build and manipulate fundamental data structures such as tuples and sets.

CO5: Demonstrate file handling concepts in python.

### Text Books:

1. Gowri shankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2nd Edition, Pearson, 2024.

**Reference Books:**

1. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.
2. Paul Deitel and Harvey Deitel, “Python for Programmers”, Pearson Education, 1st Edition, 2021.

**Online Resources:**

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

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech II Year I Semester**

**Audit Course**

**23CHE901 ENVIRONMENTAL SCIENCE**

L	T	P	C
2	0	0	0

**Course Objectives:**

This course enables students to

1. To make the students to get awareness of the environment.
2. To understand the importance of protecting natural resources, ecosystems for future generations and pollution causes due to the day-to-day activities of human life
3. To save the earth from the inventions by the engineers.

**UNIT I MULTIDISCIPLINARY NATURE OF ENVIRONMENTAL STUDIES 6 hours**

Definition, Scope, and Importance – Need for Public Awareness.

**Natural Resources:** Energy resources- Renewable and non-renewable resources – Natural resources and associated problems – Forest resources – Use and over – exploitation, deforestation, case studies – Timber extraction – Mining, dams and other effects on forest and tribal people – Water resources – Use and over utilization of surface and ground water – Floods, drought, conflicts over water, dams – benefits and problems – Mineral resources: Use and exploitation, environmental effects of extracting and using mineral resources, case studies – Food resources: World food problems, changes caused by agriculture and overgrazing, effects of modern agriculture, fertilizer-pesticide problems, water logging, salinity, case studies.

**UNIT II ECOSYSTEMS 7 hours**

Concept of an ecosystem. – Structure and function of an ecosystem – Producers, consumers and decomposers – Energy flow in the ecosystem – Ecological succession – Food chains, food webs and ecological pyramids – Introduction, types, characteristic features, structure and function of the following ecosystem:

- a) Forest ecosystem.
- b) Grassland ecosystem
- c) Desert ecosystem.
- d) Aquatic ecosystems (freshwater - ponds, streams, lakes, rivers, marine ecosystem- oceans, estuaries)

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

**UNIT III ORDERED STRUCTURES 6 hours**

Definition, Cause, effects, and control measures of:

Air Pollution, Water pollution, Soil pollution, Marine pollution, Noise pollution, Thermal pollution, nuclear hazards

Pollution case studies - Role of an individual in the prevention of pollution

**Solid Waste Management:** Causes, effects and control measures of urban and industrial wastes

**Disaster management:** floods, earthquakes, cyclones and landslides.

**UNIT IV SOCIAL ISSUES AND THE ENVIRONMENT**

**5 hours**

Sustainable Development Goals, From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rainwater harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies – Environmental ethics: Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents, and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and Control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

**UNIT V HUMAN POPULATION AND THE ENVIRONMENT**

**6 hours**

Population growth, variation among nations. Population explosion – Family Welfare Programmes. – Environment and human health – Human Rights – Value Education – HIV/AIDS – Women and Child Welfare – Role of Information Technology in Environment and human health – Case studies.

**Field Work:** Visit a local area to document environmental assets River/forest grassland/hill/mountain – Polluted site - Urban/Rural/Industrial/Agricultural Study of common plants, insects, and birds – river, hill slopes.

**Course Outcomes:**

At the end of this course students will demonstrate the ability to

CO1: Exploring different types of renewable and non-renewable energy sources.

CO2: Students will learn about the structure and function of different ecosystems.

CO3: Students will learn about different types of pollution (air, water, soil) and their sources, effects, and control measures.

CO4: Exploring the science behind climate change, its evidence, and its impacts on ecosystems and human societies.

CO5: Understanding demographic factors and their environmental implications.

**Text Books:**

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press, Third Edition, 2021.
2. Palaniswamy, “Environmental Studies”, Pearson Education, Second Edition, 2014.
3. S. Azeem Unnisa, “Environmental Studies” Academic Publishing Company
4. K. Raghavan Nambiar, “Textbook of Environmental Studies for Undergraduate Courses as per UGC model syllabus”, Scitech Publications (India), Pvt. Ltd. Second Edition, 2008.
5. A. Koushik & C. P. Koushik, Perspectives in Environmental Studies, New Age International, Fourth Edition, 2006.

**Reference Books:**

1. Deeksha Dave and E. Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications, Second Edition, 2012.
2. M. Anji Reddy, "Textbook of Environmental Sciences and Technology", BS Publication, Second Edition, 2023.
3. J.P. Sharma, Comprehensive Environmental studies, Laxmi publications, Third Edition, 2009.
4. J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice Hall of India Private Limited, Second Edition, 2004.
5. G.R. Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House, Fourth Edition, 2014.
6. Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice Hall of India Private Limited, Third Edition, 2007.

**Online Resources:**

1. Atika Qazi; Fayaz Hussain; Nasrudin ABD. Rahim; Glenn Hardaker; Daniyal Alghazzaw, "Towards sustainable energy: a systematic review of renewable energy sources, technologies, and public opinions," 10.1109/ACCESS.2019.2906402, IEEE Access, vol. 7, pp. 63837-63851, 2019.
2. Gina Garland, Samiran Banerjee, Anna Edlinger, Emily Miranda Oliveira, Chantal Herzog, Raphaël Wittwer, Laurent Philippot, Fernando T. Maestre, Marcel G. A. van der Heijden, "A closer look at the functions behind ecosystem multifunctionality: A review," <https://doi.org/10.1111/1365-2745.13511>, Journal of Ecology, vol. 109, no. 2, pp. 600-613, 2021.
3. Siddiqua, A, Hahladakis, J.N. and Al-Attiya, "An overview of the environmental pollution and health effects associated with waste landfilling and open dumping," <https://doi.org/10.1007/s11356-022-21578-z>, Environmental Science and Pollution Research, 29(39), pp.58514-58536, 2022.
4. Seddon N, Chausson A, Berry P, Girardin C.A, Smith A. and Turner B, "Understanding the value and limits of nature-based solutions to climate change and other global challenges," <https://doi.org/10.1098/rstb.2019.0120>, Philosophical Transactions of the Royal Society B, 375(1794), p.20190120, 2020.
5. Hannes Weber and Jennifer Dabbs Sciubba, "The effect of population growth on the environment: evidence from European regions," <https://doi.org/10.1007/s10680-018-9486-0>, European Journal of Population, vol. 35, pp. 379-402, 2019.

**Mode of Evaluation:** Assignments and Mid Term Tests

# **II Year II Semester**

**B. Tech II Year II Semester**

**23HUM102 ECONOMICS AND FINANCIAL ACCOUNTING FOR ENGINEERS**

L	T	P	C
2	0	0	2

**Course Prerequisite:** NIL

**Course Description:**

The Engineering Economics and Financial Accounting aims to provide an insight into production, cost analysis, market structure, Accounting Basic concepts and financial Statement Analysis. The course is designed to give emphasis on the application of real life examples on various fundamental issues of economics and accounts. This course introduces the accounting system, principles, types of accounts, and financial statements etc. The ratio analysis and financial analysis are useful to know the positions of financial statements are explained to know the analysis of financial matters.

**Course Objectives:**

This course enables students to

1. Describe the nature of engineering economics in dealing with the issues of scarcity;
2. Know the supply, demand, production and cost analysis to analyze the impact of economic events on markets;
3. Explain the different market structures and price determination in various market conditions.
4. Explain the accounting principles, types of accounting and preparation of final accounts; and
5. Describe the financial statement analysis and investment evaluation through ratios and capital budgeting techniques.

**UNIT I DEMAND ANALYSIS**

**7 hours**

Scope and Significance of Economics- Elements of market Economy: Demand, Supply and Market Equilibrium- Theory of Demand, Elasticity of Demand, Supply and Law of Supply.

**UNIT II PRODUCTION AND COST ANALYSIS**

**7 hours**

Production Function – Short-run and long-run production – Cost Analysis: Cost concepts - Cost Structure of Firms and Output Decision- Break-Even Analysis (BEA) – significance and Limitations of BEA - Determination of Break Even Point (Simple Problems).

**UNIT III MARKET STRUCTURE AND PRICING**

**6 hours**

Classification of Markets - General Equilibrium and efficiency of Perfect competition, Monopoly, Monopolistic – Price determination under Perfect, Monopoly, and Monopolistic Competition, Pricing objectives- Pricing Strategies.

**UNIT IV BASICS OF ACCOUNTING**

**7 hours**

Accounting - Double Entry System - Accounting Principles - Classification of Accounts - Rules of Debit & Credit- Accounting Cycle: Journal, Ledger, Trial Balance. Final Accounts: Trading Account - Profit & Loss Account - Balance Sheet with Adjustments, (Simple Problems).

**UNIT V FINANCIAL RATIO ANALYSIS AND CAPITAL BUDGETING**

**7 hours**

Ratio Analysis - Liquidity, Solvency, Activity and Profitability Ratios - Capital Budgeting. (Simple Problems).



## **Dept. of Electronics and Communication Engineering**

### **Course Outcomes:**

At the end of this course students will demonstrate the ability to

CO1: Understand Engineering economics basic concepts,

CO2: Analyze the concepts of demand, elasticity, supply, Production, Cost Analysis and its essence in floating of an organization,

CO3: Compare various different market structures and identify suitable market,

CO4: Demonstrate an understanding and analyzing the accounting statements, and

CO5: Exhibit the ability to apply knowledge of ratio analysis and capital budgeting techniques in financial statement analysis and investment evaluation respectively.

### **Text Books:**

1. Case E. Karl & Ray C. Fair, "Principles of Economics", Pearson Education, 8th Edition, 2007
2. Aryasri: Business Economics and Financial Analysis, 4/e. MGH.
3. Financial Accounting, S. N. Maheshwari, Sultan Chand, 2009
4. Varshney & Maheswari: Management Economics, Sultan Chand
5. Financial Statement Analysis, Khan and Jain, PHI, 2009
6. Financial Management, Prasanna Chandra, T.M.H, 2009

### **Reference Books:**

1. Lipsey, R. G. & K. A. Chrystal, "Economics", Oxford University Press, 11th Edition, 2007
2. Samuelson P. A. & Nordhaus W. D. "Economics", Tata McGraw-Hill 18th Edition, 2007
3. Financial Management and Policy, Van Horne, James, C., Pearson, 2009.
4. Financial Management, I. M. Pandey, Vikas Publications

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year II Semester

23ECE105 LINEAR CONTROL SYSTEMS

L	T	P	C
2	1	0	3

**Course Objectives:**

1. Introduce the basic principles and applications of control systems.
2. Learn the time response and steady state response of the systems.
3. Know the time domain analysis and solutions to time invariant systems.
4. Understand different aspects of stability analysis of systems in frequency domain.
5. Understand the concept of state space, controllability and observability.

**UNIT I**

**9 hours**

**Control Systems Concepts:** Open loop and closed loop control systems and their differences- Examples of control systems- Classification of control systems, Feedback characteristics, Effects of positive and negative feedback, Mathematical models – Differential equations of translational and rotational mechanical systems and electrical systems, Analogous Systems, Block diagram reduction methods – Signal flow graphs - Reduction using Mason's gain formula. Controller components, DC Servomotor and AC Servomotor- their transfer functions, Synchros.

**UNIT II**

**9 hours**

**Time Response Analysis:** Step Response - Impulse Response - Time response of first order systems – Characteristic Equation of Feedback control systems, Transient response of second order systems - Time domain specifications – Steady state response - Steady state errors and error constants, Study of effects and Design of P, PI, PD and PID Controllers on second order system.

**UNIT III**

**9 hours**

**Stability Analysis in Time Domain:** The concept of stability – Routh's stability criterion – Stability and conditional stability - limitations of Routh's stability. The Root locus concept - construction of root loci-effects of adding poles and zeros to  $G(s)$   $H(s)$  on the root loci.

**UNIT IV**

**9 hours**

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

Compensation techniques – Study of Effects and Design of Lag, Lead, Lag-Lead Compensator design in frequency Domain on a second order system.

**UNIT V**

**9 hours**

**State Space Analysis of Continuous Systems:** Concepts of state, state variables and state model - differential equations & Transfer function models - Block diagrams. Diagonalization, Transfer function from state model, solving the Time invariant state Equations- State Transition Matrix and its Properties. System response through State Space models. The concepts of controllability and observability, Duality between controllability and observability.

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### Course Outcomes:

Upon successful completion of the course, students will be able to

- CO1: Summarize the basic principles and applications of control systems. (L2)
- CO2: Understand the time response and steady state response of the systems. (L2)
- CO3: Understand the concept of state space, controllability and observability. (L2)
- CO4: Apply time domain analysis to find solutions to time invariant systems. (L3)
- CO5: Analyze different aspects of stability analysis of systems in frequency domain. (L4)

### Text Books:

1. Katsuhiko Ogata, “Modern Control Engineering”, Prentice Hall of India Pvt. Ltd., 5<sup>th</sup> Edition, 2010.
2. I. J. Nagrath and M. Gopal, “Control Systems Engineering”, New Age International (P) Limited Publishers, 5<sup>th</sup> Edition, 2007.

### Reference Books:

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

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year II Semester

23ECE106 EM WAVES AND TRANSMISSION LINES

L	T	P	C
3	0	0	3

**Course Objectives:**

1. To understand and analyze different laws and theorems of electrostatic fields.
2. To study and analyze different laws and theorems of magnetostatic fields.
3. Analyzing Maxwell's equations in different forms.
4. To learn the concepts of wave theory and its propagation through various mediums.
5. To get exposure to the properties of transmission lines.

**UNIT I**

**9 hours**

Review of Co-ordinate Systems, **Electrostatics:** Coulomb's Law, Electric Field Intensity, Electric Flux Density, Gauss Law and Applications, Electric Potential, Maxwell's Two Equations for Electrostatic Fields, Energy Density, Illustrative Problems. Convection and Conduction Currents, Dielectric Constant, Poisson's and Laplace's Equations; Capacitance – Parallel Plate, Coaxial Capacitors, Illustrative Problems.

**UNIT II**

**9 hours**

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

**Maxwell's Equations (Time Varying Fields):** Faraday's Law and Transformer EMF, Inconsistency of Ampere's Law and Displacement Current Density, Maxwell's Equations in Different Final Forms and Word Statements, Conditions at a Boundary Surface, Illustrative Problems.

**UNIT III**

**9 hours**

**EM Wave Characteristics:** Wave Equations for Conducting and Perfect Dielectric Media, Uniform Plane Waves – Definition, All Relations Between E & H, Sinusoidal Variations, Wave Propagation in Lossy dielectrics, lossless dielectrics, free space, wave propagation in good conductors, skin depth, Polarization & Types, Illustrative Problems.

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

**UNIT IV**

**9 hours**

**Transmission Lines - I:** Types, Parameters, T &  $\pi$  Equivalent Circuits, Transmission Line Equations, Primary & Secondary Constants, Expressions for Characteristic Impedance, Propagation Constant, Phase and Group Velocities, Infinite Line, Lossless lines, distortion less lines, Illustrative Problems.

**UNIT V**

**9 hours**

**Transmission Lines – II:** Input Impedance Relations, Reflection Coefficient, VSWR, Average Power, Shorted Lines, Open Circuited Lines, and Matched Lines, Low loss radio frequency and UHF Transmission lines, UHF Lines as Circuit Elements, Smith Chart – Construction and Applications, Quarter wave transformer, Single Stub Matching, Illustrative Problems.

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### **Course Outcomes:**

Upon successful completion of the course, students will be able to

CO1: Learn the concepts of wave theory and its propagation through various mediums. (L2)

CO2: Understand the properties of transmission lines and their applications. (L2)

CO3: Apply the laws & theorems of electrostatic fields to solve the related problems (L3)

CO4: Gain proficiency in the analysis and application of magnetostatic laws and theorems (L4).

CO5: Analyze Maxwell's equations in different forms. (L4)

### **Text Books:**

1. Matthew N.O. Sadiku, "Elements of Electromagnetics", 4<sup>th</sup> Edition, Oxford University Press, 2008.
2. E.C. Jordan and K.G. Balmain, "Electromagnetic Waves and Radiating Systems", 2<sup>nd</sup> Edition, PHI, 2000.

### **Reference Books:**

1. G. S. N. Raju, "Electromagnetic Field Theory and Transmission Lines", 2<sup>nd</sup> Edition, Pearson Education, 2013.
2. William H. Hayt Jr. and John A. Buck, "Engineering Electromagnetics", 7<sup>th</sup> Edition, Tata McGraw Hill, 2006.
3. John D. Krauss, "Electromagnetics", 3<sup>rd</sup> Edition, McGraw Hill, 1988.
4. John D. Ryder, "Networks, Lines, and Fields", 2<sup>nd</sup> Edition, PHI publications, 2012.

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

B. Tech II Year II Semester

23ECE107 ANALOG CIRCUITS

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

1. Understand the characteristics of Differential amplifiers, feedback and power amplifiers.
2. Analyze the response of tuned amplifiers
3. Categorize different oscillator circuits based on the application
4. Design the electronic circuits for the given specifications and for a given application.

**UNIT I Multistage and Differential Amplifiers 9 hours**

Introduction –Classification of Amplifiers- Distortion in amplifiers, Coupling Schemes, RC Coupled Amplifier using BJT, Cascaded RC Coupled BJT Amplifiers, Cascode amplifier, Darlington pair, the MOS Differential Pair, Small-Signal Operation of the MOS Differential Pair, The BJT Differential Pair, and other Nonideal Characteristics of the Differential Amplifier.

**UNIT II Frequency Response 9 hours**

Low-Frequency Response of the CS and CE Amplifiers, Internal Capacitive Effects and the High-Frequency Model of the MOSFET and the BJT, High-Frequency Response of the CS, follower, CE, CG and Cascode Amplifiers,

**UNIT III Feedback Amplifiers 9 hours**

Feedback Amplifiers: Introduction, The General Feedback Structure, Some Properties of Negative Feedback, The Four Basic Feedback Topologies, The Feedback Voltage Amplifier (Series-Shunt), The Feedback Transconductance Amplifier (Series-Series), The Feedback Trans-Resistance Amplifier (Shunt-Shunt), The Feedback Current Amplifier (Shunt-Series).

**UNIT IV Oscillators and Tuned Amplifiers 9 hours**

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

Tuned Amplifiers: Basic Principle, Use of Transformers, Single Tuned Amplifiers, Amplifiers with multiple Tuned Circuits, Stagger Tuned Amplifiers.

**UNIT V Power Amplifiers 9 hours**

Introduction, Classification of Output Stages, Class A Output Stage, Class B Output Stage, Class AB Output Stage, Biasing the Class AB Circuit, CMOS Class AB Output Stages, Power BJTs, Variations on the Class AB Configuration, MOS Power Transistors.

**Course Outcomes:**

Upon successful completion of the course, students will be able to

- CO1: Understand the characteristics of differential amplifiers, feedback and power amplifiers. (L2)
- CO2: Examine the frequency response of multistage and differential amplifier circuits using BJT & MOSFETs at low and high frequencies. (L3)
- CO3: Investigate different feedback and power amplifier circuits based on the application. (L4)
- CO4: Derive the expressions for frequency of oscillation and condition for oscillation of RC and LC oscillator circuits (L4). Evaluate the performance of different tuned amplifiers (L5)
- CO5: Design analog circuits for the given specifications and application. (L6)

## **Dept. of Electronics and Communication Engineering**

### **Text Books:**

1. Millman and Halkias, “Integrated Electronics”, 4<sup>th</sup> Edition, McGraw Hill Education (India) Private Ltd., 2015.
2. Adel. S. Sedra and Kenneth C. Smith, “Micro Electronic Circuits,” 6<sup>th</sup> Edition, Oxford University Press, 2011.

### **Reference Books:**

1. Behzad Razavi, “Fundamentals of Micro Electronics”, Wiley, 2010.
2. Donald A Neamen, “Electronic Circuits – Analysis and Design,” 3<sup>rd</sup> Edition, McGraw Hill (India), 2019.
3. Robert L. Boylestad and Louis Nashelsky, “Electronic Devices and Circuits Theory”, 9<sup>th</sup> Edition, Pearson/Prentice Hall, 2006.

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech II Year II Semester**

**23ECE108 ANALOG COMMUNICATION**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>3</b>	<b>0</b>	<b>0</b>	<b>3</b>

**Course Objectives:**

1. Understand the transmission of random signal both in time and frequency domain.
2. Analyse various amplitude modulation and demodulation techniques.
3. Evaluate the performance of angle modulation and demodulation in the presence of noise.
4. Understand sampling theorem and various analog pulse modulation techniques.
5. Understand the concepts of information theory, source coding and channel coding techniques.

**UNIT I      RANDOM PROCESS FOR COMMUNICATION      9 hours**

Elements of an electrical communication system, Characteristics of communication channel and their mathematical modeling, Signal models: deterministic and random, Random variable, Random Process, Mean and Variance of random process, Stationary Processes, Ergodic Processes, Transmission through LTI, Principles and properties of Autocorrelation and cross correlation, Power spectral density. Gaussian process, White process, Central Limit Theorem.

**UNIT II      AMPLITUDE MODULATION SYSTEMS      9 hours**

Amplitude modulation: Concepts of Modulation, Continuous wave (CW) modulation: amplitude modulation (AM) - double sideband (DSB); double sideband suppressed carrier (DSBSC); single sideband suppressed carrier (SSBSC) and vestigial sideband (VSB) modulation and demodulation. Noise: External and internal sources of noise, Thermal noise, Representation of narrowband noise; receiver model- Tuned radio frequency receiver, Superheterodyne receiver, signal to noise ratio (SNR), noise figure, Noise temperature, Equivalent noise bandwidth, Noise in Amplitude Modulation: DSB-SC, SSB-SC and AM system,

**UNIT III      ANGLE MODULATION SYSTEMS      9 hours**

Angle modulation: Concepts of Instantaneous frequency and phase, phase modulation (PM) & frequency modulation (FM) and demodulation; Bandwidth of FM, Wideband and Narrowband FM, Concept of Frequency division multiplexing. Noise in angle modulation systems: Noise in FM and PM, Pre-emphasis and De-emphasis in FM, Threshold effect in angle modulation.

**UNIT IV      ANALOG PULSE MODULATION SCHEMES      9 hours**

Sampling process, sampling theorem, signal reconstruction, flat-top sampling of band pass signals, Analog Pulse Modulation, Types of analog pulse modulation, Method of generation and detection of PAM, PWM, PPM, Spectra of pulse modulation, concepts of pulse code modulation.

**UNIT V      INFORMATION THEORY & CHANNEL CAPACITY      9 hours**

Measure of information, Entropy, Source Coding Theorem, Hamming weight and distance, Syndrome Coding, Shannon Fano and Huffman Coding, Discrete memory less channels, Channel Coding, Error Control Codes, Linear block code and convolutional codes, Nyquist bandwidth, Shannon-Hartley capacity theorem.



## **Dept. of Electronics and Communication Engineering**

### **Course Outcomes:**

After completing the course, the student will be able to:

- CO1: Analyze the transmission of random signal both in time and frequency domain.
- CO2: Analyze the amplitude modulation and demodulation techniques in communication systems
- CO3: Analyze the angle modulation and demodulation techniques in communication systems
- CO4: Understand the concepts of analog pulse modulation.
- CO5: Use source and channel coding technique to improve system performance.

### **Text Books:**

1. Simon Haykin & Michael Moher, "Communication Systems", John Wiley & Sons, 5<sup>th</sup> Edition, 2010.
2. B. P. Lathi and Z. Ding, "Modern Digital and Analog Communication Systems", 4<sup>th</sup> Edition, Oxford, 2011.

### **Reference Books:**

1. H Taub & D. Schilling, Gautam Sahe, "Principles of Communication Systems", 3<sup>rd</sup> Edition, Tata McGraw Hill, 2007.
2. H.P. Hsu, "Analog and Digital Communication", 3<sup>rd</sup> Edition, McGraw Hill Education, 2017.

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.

**B. Tech II Year II Semester**

**23ECE204 ANALOG CIRCUITS LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Course Objectives:**

1. Plot the characteristics of Differential amplifiers, feedback and power amplifiers.
2. Analyze the response of tuned amplifiers and multivibrators.
3. Categorize different oscillator circuits based on the application.
4. Design the electronic circuits for the given specifications and for a given application.

**List of Experiments:**

1. Design and Analysis of Darlington pair.
2. Frequency response of CE – CC multistage Amplifier
3. Design and Analysis of Cascode Amplifier.
4. Frequency Response of Differential Amplifier
5. Design and Analysis of any two topologies of feedback amplifies and find the frequency response of it
6. Design and Analysis of Class A power amplifier
7. Design and Analysis of Class AB amplifier
8. Design and Analysis of RC phase shift oscillator
9. Design and Analysis of LC Oscillator
10. Frequency Response of Single Tuned amplifier
11. Design a Bistable Multivibrator and analyze the effect of commutating capacitors and draw the wave forms at base and collector of transistors.
12. Design an Astable Multivibrator and draw the wave forms at base and collector of transistors.
13. Design a Monostable Multivibrator and draw the input and output waveforms.
14. Draw the response of Schmitt trigger for gain of greater than and less than one.

**Note:** At least 12 experiments shall be performed.

Faculty members who are handling the laboratory shall see that students are given design specifications for a given circuit appropriately and monitor the design and analysis aspects of the circuit.

**Hardware Requirements:**

Power supplies, Signal generators, Oscilloscopes, Multimeters, Component kits.

**Software requirements:**

SPICE like LTSpice, PSpice, or Multisim, MATLAB

**Course Outcomes:**

Upon successful completion of the course, students will be able to

CO1: Know about the usage of equipment/components/software tools used to conduct experiments in analog circuits. (L2)

CO2: Conduct the experiment based on the knowledge acquired in the theory about various analog circuits using BJT/MOSFETs to find the important parameters of the circuit experimentally. (L3)

CO3: Analyze the given analog circuit to find required important metrics of it theoretically. (L4)

## **Dept. of Electronics and Communication Engineering**

CO4: Compare the experimental results with that of theoretical ones and infer the conclusions. (L4)

CO5: Design the circuit for the given specifications. (L6)

### **Reference Books:**

1. Paul Horowitz and Winfield Hill, "The Art of Electronics", 3<sup>rd</sup> Edition, Cambridge university press, 2015.
2. Bob Dobkin and Jim Williams, "Analog Circuit Design: A Tutorial Guide to Applications and Solutions", 1<sup>st</sup> Edition, Newnes, 1991.

**Mode of Evaluation:** Continuous Internal Evaluation, Model Test and End Semester Examination

**B. Tech II Year II Semester**

**23ECE205 ANALOG COMMUNICATION LABORATORY**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>0</b>	<b>0</b>	<b>3</b>	<b>1.5</b>

**Course Objectives:**

1. Understand how signals are amplitude modulated and demodulated in the transmitter and receiver, respectively, in analog communication.
2. Understand how signals are frequency modulated and demodulated in the transmitter and receiver, respectively, in analog communication
3. Understand how more than one signals are Frequency-Division multiplexed in the transmitter and how it is demultiplexed in the receiver so that the signal reaches to the intended user at the destination.
4. Understand how analog signals are converted into pulses of varying characteristics in communication
5. Understand the effect of noise communication in analog communication.

**List of Experiments:**

1. Amplitude Modulation and Demodulation
2. DSB-SC Modulation and Demodulation
3. SSB-SC Modulation and Demodulation
4. Frequency Modulation and Demodulation
5. Study of spectrum analyzer and analysis of AM and FM Signals
6. Pre-emphasis and De-emphasis Filter
7. Frequency Division Multiplexing & De multiplexing
8. Sampling and Reconstruction
9. Pulse Amplitude Modulation & Demodulation
10. Pulse Width Modulation & Demodulation
11. Pulse Position Modulation & Demodulation
12. Design and analysis of analog RC filter using MATLAB
13. Study and simulation of signals in the presence of noise using MATLAB
14. Analysis of Linear Block Codes using MATLAB

**Hardware Requirements:**

Signal Generators, Modulation and Demodulation kits, Oscilloscopes, Communication trainer kits.

**Software requirements:**

MATLAB, Computer Systems with required specifications

**Course Outcomes:**

Upon successful completion of the course, students will be able to

- CO1: Analyse various amplitude modulation and demodulation techniques
- CO2: Analyse frequency modulation and demodulation
- CO3: Apply Frequency Division Multiplexing and Demultiplexing for communication
- CO4: Analyse pulse modulation techniques, such as PAM, PWM, PPM
- CO5: Analyse analog communication system in the presence of noise.

## **Dept. of Electronics and Communication Engineering**

### **Reference Books:**

1. Simon Haykin and Michael Moher, “Analog Communication Systems”, 5<sup>th</sup> Edition, Wiley, 2010.
2. Michael P. Fitz, “Fundamentals of Communication Systems”, 1<sup>st</sup> Edition, McGraw-Hill Education, 2012.

**Mode of Evaluation:** Continuous Internal Evaluation, Model Test and End Semester Examination

**B. Tech II Year II Semester  
Skill Enhanced Course – II**

**23ENG601 SOFT SKILLS**

<b>L</b>	<b>T</b>	<b>P</b>	<b>C</b>
<b>1</b>	<b>0</b>	<b>2</b>	<b>2</b>

**Course Objectives:**

1. To encourage all round development of the students by focusing on soft skills
2. To make the students aware of critical thinking and problem-solving skills
3. To enhance healthy relationship and understanding within and outside an organization
4. To function effectively with heterogeneous teams

**UNIT I SOFT SKILLS & COMMUNICATION SKILLS**

**6 hours**

Soft Skills - Introduction, Need - Mastering Techniques of Soft Skills – Communication Skills - Significance, process, types - Barriers of communication - Improving techniques.

**Activities:**

Intrapersonal Skills- Narration about self- strengths and weaknesses- clarity of thought – self- expression – articulating with felicity.

(The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes and literary sources)

Interpersonal Skills- Group Discussion – Debate – Team Tasks - Book and film Reviews by groups - Group leader presenting views (non- controversial and secular) on contemporary issues or on a given topic.

Verbal Communication- Oral Presentations- Extempore- brief addresses and speeches- convincing- negotiating- agreeing and disagreeing with professional grace.

Non-verbal communication – Public speaking – Mock interviews – presentations with an objective to identify non- verbal clues and remedy the lapses on observation

**UNIT II CRITICAL THINKING**

**6 hours**

Active Listening – Observation – Curiosity – Introspection – Analytical Thinking – Open-mindedness – Creative Thinking - Positive thinking - Reflection

**Activities:**

Gathering information and statistics on a topic - sequencing – assorting – reasoning – critiquing issues – placing the problem – finding the root cause - seeking viable solution – judging with rationale – evaluating the views of others - Case Study, Story Analysis

**UNIT III PROBLEM SOLVING & DECISION MAKING**

**6 hours**

Meaning & features of Problem Solving – Managing Conflict – Conflict resolution – Team building - Effective decision making in teams – Methods & Styles

**Activities:**

Placing a problem which involves conflict of interests, choice and views – formulating the problem – exploring solutions by proper reasoning – Discussion on important professional, career and organizational decisions and initiate debate on the appropriateness of the decision.

Case Study & Group Discussion

**UNIT IV EMOTIONAL INTELLIGENCE & STRESS MANAGEMENT**

**6 hours**

Managing Emotions – Thinking before Reacting – Empathy for Others – Self-awareness – Self-Regulation – Stress factors – Controlling Stress – Tips

**Activities:**

Providing situations for the participants to express emotions such as happiness, enthusiasm, gratitude, sympathy, and confidence, compassion in the form of written or oral presentations.

Providing opportunities for the participants to narrate certain crisis and stress –ridden situations caused by failure, anger, jealousy, resentment and frustration in the form of written and oral presentation,

Organizing Debates

**UNIT V CORPORATE ETIQUETTE**

**6 hours**

Etiquette- Introduction, concept, significance - Corporate etiquette - meaning, modern etiquette, benefits - Global and local culture sensitivity - Gender Sensitivity - Etiquette in interaction- Cell phone etiquette - Dining etiquette - Netiquette - Job interview etiquette -Corporate grooming tips -Overcoming challenges

**Activities**

Providing situations to take part in the Role Plays where the students will learn about bad and good manners and etiquette - Group Activities to showcase gender sensitivity, dining etiquette etc. -

Conducting mock job interviews - Case Study - Business Etiquette Games

**Note:**

1. The facilitator can guide the participants before the activity citing examples from the lives of the great, anecdotes, epics, scriptures, autobiographies and literary sources which bear true relevance to the prescribed skill.
2. Case studies may be given wherever feasible for example for Decision Making- The decision of King Lear.

**Course Outcomes:**

At the end of this course students will demonstrate the ability to

CO1: List out various elements of soft skills (L1, L2)

CO2: Describe methods for building professional image (L1, L2)

CO3: Apply critical thinking skills in problem solving (L3)

CO4: Analyse the needs of an individual and team for well-being (L4)

CO5: Assess the situation and take necessary decisions (L5).

CO6: Create a productive workplace

atmosphere using social and work-life skills ensuring personal and emotional well-being (L6)

**Text Books:**

1. Mitra Barun K, Personality Development and Soft Skills, Oxford University Press, Pap/Cdr edition 2012.
2. Dr Shikha Kapoor, Personality Development and Soft Skills: Preparing for Tomorrow, I K International Publishing House, 2018.

**Reference Books:**

1. Sharma, Prashant, Soft Skills: Personality Development for Life Success, BPB Publications 2018
2. Alex K, Soft Skills S.Chand & Co, 2012 (Revised edition)

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3. Gajendra Singh Chauhan & Sangeetha Sharma, Soft Skills: An Integrated Approach to Maximise Personality Published by Wiley, 2013
4. Pillai, Sabina & Fernandez Agna, Soft Skills and Employability Skills, Cambridge University Press, 2018.
5. Soft Skills for a Big Impact (English, Paperback, Renu Shorey) Publisher: Notion Press
6. Dr. Rajiv Kumar Jain, Dr. Usha Jain, Life Skills (Paperback English) Publisher : Vayu Education of India, 2014

### E Books:

1. [https://youtu.be/DUIsNJtg2L8?list=PLLy\\_2iUCG87CQhELCYtvXh0E\\_y-bOO1\\_q](https://youtu.be/DUIsNJtg2L8?list=PLLy_2iUCG87CQhELCYtvXh0E_y-bOO1_q)
2. [https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHIsQFwJZel\\_j2PUy0pwjVUgj7KIJ](https://youtu.be/xBaLgJZ0t6A?list=PLzf4HHIsQFwJZel_j2PUy0pwjVUgj7KIJ)
3. <https://youtu.be/-Y-R9hD17IU>
4. <https://youtu.be/gkLsn4ddmTs>
5. <https://youtu.be/2bf9K2rRWwo>
6. <https://youtu.be/FchfE3c2jzc>
7. <https://www.businesstrainingworks.com/training-resource/five-free-business-etiquette-training-games/>
8. [https://onlinecourses.nptel.ac.in/noc24\\_hs15/preview](https://onlinecourses.nptel.ac.in/noc24_hs15/preview)
9. [https://onlinecourses.nptel.ac.in/noc21\\_hs76/preview](https://onlinecourses.nptel.ac.in/noc21_hs76/preview)

**Mode of Evaluation:** Assignments, Mid Term Tests and End Semester Examination.