



**SIDDHARTHA INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR  
(AUTONOMOUS)**

**DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING**

**INDUCTION PROGRAMME**

S.No.	Course Name	Category	L-T-P-C
1	Physical Activities -- Sports, Yoga And Meditation, Plantation	MC	0-0-6-0
2	Career Counselling	MC	2-0-2-0
3	Orientation To All Branches -- Career Options, Tools, Etc.	MC	3-0-0-0
4	Orientation On Admitted Branch -- Corresponding Labs, Tools And Platforms	EC	2-0-3-0
5	Proficiency Modules & Productivity Tools	ES	2-1-2-0
6	Assessment On Basic Aptitude And Mathematical Skills	MC	2-0-3-0
7	Remedial Training In Foundation Courses	MC	2-1-2-0
8	Human Values & Professional Ethics	MC	3-0-0-0
9	Communication Skills -- Focus On Listening, Speaking, Reading, Writing Skills	BS	2-1-2-0
10	Concepts of Programming	ES	2-0-2-0

**I B. Tech. – I Semester (CSE)**

S.No.	Course Code	Title	L	T	P	Credits
1	23HS0840	Engineering Physics	3	0	0	3
2	23HS0830	Linear Algebra & Calculus	3	0	0	3
3	23EE0201	Basic Electrical and Electronics Engineering	3	0	0	3
4	23ME0302	Engineering Graphics	1	0	4	3
5	23CS0501	Introduction to Programming	3	0	0	3
6	23CS0503	IT Workshop	0	0	2	1
7	23HS0841	Engineering Physics Lab	0	0	2	1
8	23EE0202	Electrical and Electronics Engineering Workshop	0	0	3	1.5
9	23CS0502	Computer Programming Lab	0	0	3	1.5
10	23HS0812	NSS/NCC/Scouts & Guides/Community Service	-	-	1	0.5
<b>Total</b>			<b>13</b>	<b>-</b>	<b>15</b>	<b>20.5</b>

**I B. Tech. – II Semester (CSE)**

S.No.	Course Code	Title	L	T	P	Credits
1	23HS0810	Communicative English	2	0	0	2
2	23HS0801	Chemistry	3	0	0	3
3	23HS0831	Differential Equations & Vector Calculus	3	0	0	3
4	23CE0101	Basic Civil & Mechanical Engineering	3	0	0	3
5	23CS0504	Data Structures	3	0	0	3
6	23HS0811	Communicative English Lab	0	0	2	1
7	23HS0802	Chemistry Lab	0	0	2	1
8	23ME0301	Engineering Workshop	0	0	3	1.5
9	23CS0505	Data Structures Lab	0	0	3	1.5
10	23HS0813	Health and wellness, Yoga and Sports	-	-	1	0.5
<b>Total</b>			<b>14</b>	<b>-</b>	<b>11</b>	<b>19.5</b>

## II B. Tech. – I Semester (CSE)

S.No.	Course Code	Title	L	T	P	Credits
1	23HS0836	Discrete Mathematics & Graph Theory	3	0	0	3
2	23HS0814	Universal Human Values - Understanding Harmony and Ethical human conduct	2	1	0	3
3	23CS0506	Digital Logic and Computer Organization	3	0	0	3
4	23CS0507	Advanced Data Structures & Algorithm Analysis	3	0	0	3
5	23CS0508	Object-Oriented Programming Through JAVA	3	0	0	3
6	23CS0509	Advanced Data Structures and Algorithm Analysis Lab	0	0	3	1.5
7	23CS0510	Object-Oriented Programming Through JAVA Lab	0	0	3	1.5
8	23CS0549	Python Programming	0	1	2	2
9	23HS0805	Environmental Science	2	0	0	0
<b>Total</b>			<b>16</b>	<b>2</b>	<b>8</b>	<b>20</b>

## II B. Tech. – II Semester (CSE)

S.No.	Course Code	Title	L	T	P	Credits
1	23HS0848	Managerial Economics and Financial Analysis	2	0	0	2
	23HS0851	Organizational Behavior				
	23HS0850	Business Environment				
2	23HS0838	Probability & Statistics	3	0	0	3
3	23CS0511	Operating Systems	3	0	0	3
4	23CS0512	Database Management Systems	3	0	0	3
5	23CS0513	Software Engineering	3	0	0	3
6	23CS0514	Operating Systems Lab	0	0	3	1.5
7	23CS0515	Database Management Systems Lab	0	0	3	1.5
8	23CS0550	Full Stack Development –I	0	1	2	2
9	23HS0815	Design Thinking & Innovation	1	0	2	2
<b>Total</b>			<b>15</b>	<b>1</b>	<b>10</b>	<b>21</b>
Mandatory Community Service Project/Internship of 08 weeks duration during summer vacation						

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**I B.Tech – I Sem.**

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**(23HS0840) ENGINEERING PHYSICS  
(Common to all branches of Engineering)**

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**COURSE OBJECTIVES**

*The objectives of this course*

*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.*

**COURSE OUTCOMES (COs)**

*After the completion of the course student should be able to*

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

**UNIT – I Wave Optics**

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

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

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

**UNIT II Crystallography and X-ray diffraction**

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

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

**UNIT III Dielectric and Magnetic Materials**

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

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

**UNIT IV Quantum Mechanics and Free electron Theory**

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

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

**UNIT V Semiconductors**

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors: Density of charge carriers – Electrical conductivity – Fermi level – Extrinsic semiconductors: density of charge carriers – dependence of Fermi energy on carrier concentration and temperature - Drift and diffusion currents – Einstein's equation – Hall effect and its applications

**TEXTBOOKS**

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

**REFERENCES**

1. B.K. Pandey and S. Chaturvedi, *Engineering Physics*, Cengage Learning 2021.
2. Shatendra Sharma, Jyotsna Sharma, *Engineering Physics*, Pearson Education, 2018.
3. M.R. Srinivasan, *Engineering Physics*, New Age international publishers (2009).

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

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**(23HS0830) LINEAR ALGEBRA & CALCULUS**  
**(Common to all branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course*

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

**COURSE OUTCOMES (COs)**

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

- 1. Develop and use of matrix algebra techniques that are needed by engineers for practical applications.*
- 2. Identify different matrix techniques to find the inverse and powers of the matrix.*
- 3. Understanding the concepts of continuity and differentiability of functions defined on intervals*
- 4. Estimate the series expansions of algebraic and transcendental functions.*
- 5. Analyze the functions of several variables which is useful in optimization.*
- 6. Familiarize with double and triple integrals of functions of several variables in two dimensions using Cartesian and polar coordinates and in three dimensions using cylindrical and spherical coordinates.*

**UNIT I**

**Matrices**

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

**UNIT II**

**Eigen values, Eigenvectors and Orthogonal Transformation**

Eigen values, Eigenvectors and their properties, Diagonalization of a matrix, Cayley-Hamilton Theorem (without proof), finding inverse and power of a matrix by Cayley-Hamilton Theorem, Quadratic forms and Nature of the Quadratic Forms, Reduction of Quadratic form to canonical forms by Orthogonal Transformation.

**UNIT III**

**Calculus**

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

**UNIT IV****Partial differentiation and Applications (Multi variable calculus)**

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

**UNIT V****Multiple Integrals (Multi variable Calculus)**

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

**TEXT BOOKS:**

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

**REFERENCES:**

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, Alpha Science 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)

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**I B.Tech – I Sem.**

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**(23EE0201) BASIC ELECTRICAL AND ELECTRONICS ENGINEERING  
(Common to all branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. 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.
2. 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.

**COURSE OUTCOMES (COs)**

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

1. Remember the fundamental laws, operating principles of motors, generators, MC and MI instruments.
2. Understand the problem-solving concepts associated to AC and DC circuits, construction and operation of AC and DC machines, measuring instruments; different power generation mechanisms, Electricity billing concept and important safety measures related to electrical operations
3. Apply mathematical tools and fundamental concepts to derive various equations related to machines, circuits and measuring instruments; electricity bill calculations and layout representation of electrical power systems.
4. Demonstrate the characteristics by analyzing the behaviour of electronic devices.
5. Develop applications using electronic devices.
6. Understand the number systems, codes, Boolean algebra, logic gates, and functioning of logic circuits.

**PART A: BASIC ELECTRICAL ENGINEERING**

**UNIT I DC & AC Circuits**

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

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

**UNIT II Machines and Measuring Instruments**

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

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

**UNIT III Energy Resources, Electricity Bill & Safety Measures**

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

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

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

**TEXTBOOKS:**

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

**REFERENCES:**

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****UNIT I SEMICONDUCTOR DEVICES**

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

**UNIT II BASIC ELECTRONIC CIRCUITS AND INSTRUMENTATION**

Rectifiers and power supplies: Block diagram description of a dc power supply, working of a full wave bridge rectifier, capacitor filter (no analysis), working of simple zener voltage regulator. Amplifiers: Block diagram of Public Address system, 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**

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)

**TEXTBOOKS:**

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

**REFERENCES:**

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.

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**(23ME0302) ENGINEERING GRAPHICS**  
**(Common to all branches of Engineering)**

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**COURSE OBJECTIVES**

*The objectives of this course is to*

- 1. Enable the students with various concepts like dimensioning, conventions and standards relate to Engineering Drawing*
- 2. Impart knowledge on the projection of points, lines and plane surfaces.*
- 3. Improve the visualization skills for better understanding of projection of solids.*
- 4. Develop the imaginative skills of the students required to understand Section of solids and Developments of surfaces.*
- 5. Make the students understand the viewing perception of a solid object in Isometric and Perspective projections.*

**COURSE OUTCOMES (COs)**

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

- 1. Understand the principles of engineering drawing, including engineering curves, scales, orthographic and isometric projections.*
- 2. Draw and interpret orthographic projections of points, lines, planes and solids in front, top and side views.*
- 3. Understand and draw projection of solids in various positions in first quadrant.*
- 4. Elucidate the basic principles of sections of solids and true shapes*
- 5. Explain principles behind development of surfaces.*
- 6. Prepare isometric and perspective sections of simple solids.*

**UNIT I**

**Introduction:** Lines, Lettering and Dimensioning, Geometrical Constructions and Constructing regular polygons by general methods. Curves: construction of ellipse, parabola and hyperbola by general, Cycloids, Involute, Normal and tangent to Curves. Scales: Plain scales, diagonal scales and vernier scales.

**UNIT II**

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

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

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

### UNIT III

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

### UNIT IV

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

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

### UNIT V

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

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

### TEXTBOOK:

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

### REFERENCES:

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

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**I B.Tech – I Sem.**

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3	-	-	3

**(23CS0501) INTRODUCTION TO PROGRAMMING  
(Common to all branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course*

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

**COURSE OUTCOMES (COs)**

*After the completion of the course student should be able to*

1. Understand basics of computers, the concept of algorithm and algorithmic thinking.
2. Analyse a problem and develop an algorithm using control structures & arrays
3. Analyse a problem and develop an algorithm to solve it using strings
4. Understand and implement the problems using pointers
5. Apply modular approach for solving the problem
6. Design and implement problem-solving using structures, unions and files.

**UNIT - I**

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

**UNIT - II**

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

**UNIT - III**

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

**UNIT - IV**

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

**UNIT - V**

**Functions & File Handling:** Introduction to Functions, Function Declaration and Definition, Function call Return Types and Arguments, modifying parameters inside functions using pointers, arrays as parameters. Scope and Lifetime of Variables, Basics of File Handling.

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

**TEXTBOOKS**

1. Brian W. Kernighan and Dennis M. Ritchie, *The C Programming Language*, 2<sup>nd</sup> edition, 2015.
2. Pradip Dey Manas Ghosh|| Programming in C –First edition, Oxford University Press, 2018.

**REFERENCES**

1. Balagurusamy, E, *Computing fundamentals and C Programming*, McGraw-Hill Education, 2019.
2. Rema Theraja, *Programming in C*, Oxford, 2016, 2nd edition
3. Forouzan, Gilberg, Prasad, *C Programming, A Problem Solving Approach*, CENGAGE, 3<sup>rd</sup> edition

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**I B.Tech – I Sem.**

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**(23CS0503) IT WORKSHOP**  
**(Common to all branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course*

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

**COURSE OUTCOMES (COs)**

*After the completion of the course student should be able to*

1. Perform Hardware troubleshooting.
2. Understand Hardware components and inter dependencies.
3. Safeguard computer systems from viruses/worms.
4. Document/ Presentation preparation.
5. Perform calculations using spread sheets.
6. Understand and Analyse the concepts of Prompt Engineering, Language Translation and Creative Writing using AI Tools

**LIST OF EXPERIMENTS**

**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**

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

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

**Task 3:** Search Engines & Netiquette: Students should know what search engines are and how to use the search engines. A few topics would be given to the students for which they need to search on Google. This should be demonstrated to the instructors by the student.

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

### **LaTeX and WORD**

**Task 1:** Word Orientation: The mentor needs to give an overview of La TeX and Microsoft (MS) office or equivalent (FOSS) tool word: Importance of La TeX and MS office or equivalent (FOSS) tool Word as word Processors, Details of the four tasks and features that would be covered in each, Using La TeXand 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 Spread sheet 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?"

**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?'"

### REFERENCES

1. Vikas Gupta, *Comdex Information Technology course tool kit*, WILEY Dream tech, 2003.
2. Cheryl A Schmidt, *The Complete Computer upgrade and repair book*, WILEY Dream tech, 2013, 3rd edition

3. *Introduction to Information Technology*, ITL Education Solutions limited, Pearson Education, 2012, 2<sup>nd</sup> edition
4. Kate J. Chase, *PC Hardware - A Handbook*, PHI (Microsoft)
5. Leslie Lamport, *LaTeX Companion*, PHI/Pearson.
6. David Anfinson and Ken Quamme, *IT Essentials PC Hardware and Software Companion Guide*, – CISCO Press, Pearson Education, 3<sup>rd</sup> edition
7. Patrick Regan, *IT Essentials PC Hardware and Software Labs and Study Guide*, CISCO Press, Pearson Education, 3<sup>rd</sup> edition.

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**(23HS0841) ENGINEERING PHYSICS LAB  
(Common to all branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course*

*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.*

**COURSE OUTCOMES (COs)**

*After the completion of the course student should be able to*

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

**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.

### REFERENCES

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

### Web Resources

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

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**(23EE0202) ELECTRICAL AND ELECTRONICS ENGINEERING WORKSHOP  
(Common to all branches of Engineering)**

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**Course Objectives:**

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

**Course Outcomes:**

1. Understand the Electrical circuit design concept; measurement of resistance, power, power factor; concept of wiring and operation of Electrical Machines and Transformer. usage of electronic measuring instruments.
2. Apply the theoretical concepts and operating principles to derive mathematical models for circuits, Electrical machines and measuring instruments; calculations for the measurement of resistance, power and power factor.
3. Apply the theoretical concepts to obtain calculations for the measurement of resistance, power and power factor.
4. Demonstrate knowledge of different electronic devices and measuring instruments.
5. Plot and discuss the characteristics and applications of various electron devices.
6. Verify the functions of logic gates and flip-flops.

**Activities:**

1. Familiarization of commonly used Electrical & Electronic Workshop Tools: Bread board, Solder, cables, relays, switches, connectors, fuses, Cutter, plier, screwdriver set, wire stripper, flux, knife/blade, soldering iron, de-soldering pump etc.
  - Provide some exercises so that hardware tools and instruments are learned to be used by the students.
2. Familiarization of Measuring Instruments like Voltmeters, Ammeters, multimeter, LCR-Q meter, Power Supplies, CRO, DSO, Function Generator, Frequency counter.
  - Provide some exercises so that measuring instruments are learned to be used by the students.
3. Components:
  - Familiarization/Identification of components (Resistors, Capacitors, Inductors, Diodes, transistors, IC's etc.) – Functionality, type, size, colour coding package, symbol, cost etc.
  - Testing of components like Resistor, Capacitor, Diode, Transistor, ICs etc. - Compare values of components like resistors, inductors, capacitors etc with the measured values by using instruments

**PART A: ELECTRICAL ENGINEERING LAB****List of experiments:**

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

**Reference Books:**

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

**Note:** Minimum Six Experiments to be performed.

**PART B: ELECTRONICS ENGINEERING LAB****List of Experiments:**

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

**References:**

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.

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

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**(23CS0502) COMPUTER PROGRAMMING LAB**  
**(Common to all branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course*

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

**COURSE OUTCOMES (COs)**

1. Read, understand, and trace the execution of programs written in C language.
2. Select the right control structure for solving the problem.
3. Develop C programs which utilize memory efficiently using programming constructs like pointers.
4. Develop Debug and Execute programs to demonstrate the applications of arrays in C.
5. Develop Debug and Execute programs to demonstrate the applications of functions in C.
6. Implement the C programs using File handling Concepts.

**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
- iii) Simple interest calculation

**WEEK 3 - Objective:** Learn how to define variables with the desired data-type, initialize them with appropriate values and how arithmetic operators can be used with variables and constants.

**Suggested Experiments/Activities:****Tutorial 3:** Variable types and type conversions:**Lab 3:** Simple computational problems using arithmetic expressions.

- 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:** Simple computational problems using the operator' precedence and associativity

- 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:** Problems involving if-then-else structures.

- 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:** Iterative problems e.g., the sum of series

- i) Find the factorial of given number using any loop.
- ii) Find the given number is a prime or not.
- iii) 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:** 1D Array manipulation, linear search

- 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:** 2D arrays, sorting and Strings.

**Lab 8:** Matrix problems, String operations, Bubble sort

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

**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:** Pointers and structures, memory dereferences.

- 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 along with 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:** Bit fields, Self-Referential Structures, Linked lists

**Lab10:** Bit fields, linked lists Read and print a date using dd/mm/yyyy format using bit-fields and differentiate the same without using bit- fields

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

## 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:** Simple functions using call by value, solving differential equations using Eulers theorem.

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

**WEEK 12 - Objective:** Explore how recursive solutions can be programmed by writing recursive functions that can be invoked from the main by programming at-least five distinct problems that have naturally recursive solutions.

**Suggested Experiments/Activities:**

**Tutorial 12:** Recursion, the structure of recursive calls

**Lab 12:** Recursive functions

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

**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:** Simple functions using Call by reference, Dangling pointers.

- i) Write a C program to swap two numbers using call by reference.
- ii) Demonstrate Dangling pointer problem using a C program.
- iii) Write a C program to copy one string into another using pointer.
- iv) Write a C program to find no of 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:** File operations

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

**TEXTBOOKS**

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

**REFERENCES**

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

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**(23HS0812) NSS/NCC/SCOUTS & GUIDES/COMMUNITY SERVICE  
(Common to all branches of Engineering)**

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**COURSE OBJECTIVES**

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

**COURSE OUTCOMES (COs)**

*After the completion of the course student should be able to*

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

**UNIT I**

**Orientation**

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

**Activities:**

- Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
- Conducting orientations programs for the students –future plans-activities-releasing road map etc.
- Displaying success stories-motivational biopics- award winning movies on societal issues etc.
- Conducting talent show in singing patriotic songs-paintings- any other contribution.

**UNIT II**

**Nature & Care**

**Activities:**

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

**UNIT III****Community Service****Activities:**

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

**Reference Books:**

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

**General Guidelines:**

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

**Evaluation Guidelines:**

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

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**I B.Tech – II Sem.**

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**(23HS0810) COMMUNICATIVE ENGLISH**  
**(Common to all branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course*

*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.*

**COURSE OUTCOMES (COs)**

*After the completion of the course student should be able to*

- 1. Understand the context, topic, and pieces of specific information from social or Transactional dialogues.*
- 2. Apply grammatical structures to formulate sentences and correct word forms.*
- 3. Analyze discourse markers to speak clearly on a specific topic in informal discussions.*
- 4. Evaluate reading/listening texts and to write summaries based on global comprehension of these texts.*
- 5. Create a coherent paragraph, essay, and resume.*
- 6. Demonstrate the skills needed to participate in a conversation that builds knowledge collaboratively.*

**UNIT – I**

**Lesson: HUMAN VALUES: Gift of Magi (Short Story)**

**Listening:** Identifying the topic, the context and specific pieces of information by listening to short audio texts and answering a series of questions.

**Speaking:** Asking and answering general questions on familiar topics such as home, family, work, studies and interests; introducing oneself and others.

**Reading:** Skimming to get the main idea of a text; scanning to look for specific pieces of information.

**Writing:** Mechanics of Writing-Capitalization, Spellings, Punctuation-Parts of Sentences.

**Grammar:** Parts of Speech, Basic Sentence Structures-forming questions

**Vocabulary:** Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root words.

**UNIT – II**

**Lesson: NATURE: The Brook by Alfred Tennyson (Poem)**

**Listening:** Answering a series of questions about main ideas and supporting ideas after listening to audio texts.

**Speaking:** Discussion in pairs/small groups on specific topics followed by short structure talks.

**Reading:** Identifying sequence of ideas; recognizing verbal techniques that help to link the ideas in a paragraph together.  
**Writing:** Structure of a paragraph - Paragraph writing (specific topics)  
**Grammar:** Cohesive devices - linkers, use of articles and zero article; prepositions.  
**Vocabulary:** Homonyms, Homophones, Homographs.

### UNIT – III

#### Lesson: BIOGRAPHY: Elon Musk

**Listening:** Listening for global comprehension and summarizing what is listened to.  
**Speaking:** Discussing specific topics in pairs or small groups and reporting what is discussed  
**Reading:** Reading a text in detail by making basic inferences -recognizing and interpreting specific context clues; strategies to use text clues for comprehension.  
**Writing:** Summarizing, Note-making, paraphrasing  
**Grammar:** Verbs - tenses; subject-verb agreement; Compound words,  
**Vocabulary:** Collocations

### UNIT – IV

#### Lesson: INSPIRATION: The Toys of Peace by Saki

**Listening:** Making predictions while listening to conversations/ transactional dialogues without video; listening with video.  
**Speaking:** Role plays for practice of conversational English in academic contexts (formal and informal) - asking for and giving information/directions.  
**Reading:** Studying the use of graphic elements in texts to convey information, reveal trends/patterns/relationships, communicate processes or display complicated data.  
**Writing:** Letter Writing: Official Letters, Resumes.  
**Grammar:** Reporting verbs, Direct & Indirect speech, Active & Passive Voice  
**Vocabulary:** Words often confused, Jargons

### UNIT – V

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

**Listening:** Identifying key terms, understanding concepts and answering a series of relevant questions that test comprehension.  
**Speaking:** Formal oral presentations on topics from academic contexts  
**Reading:** Reading comprehension.  
**Writing:** Writing structured essays on specific topics.  
**Grammar:** Editing short texts –identifying and correcting common errors in grammar and usage (articles, prepositions, tenses, subject verb agreement)  
**Vocabulary:** Technical Jargons

### TEXTBOOKS

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

**REFERENCES**

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/>
6. <https://www.talkenglish.com/grammar/grammar.aspx>

**VOCABULARY**

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

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**(23HS0801) CHEMISTRY**

**(Common to EEE, ECE, CSE, CSIT, CSM, CIC, CAD, CCC & CAI branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. To familiarize engineering chemistry and its applications
2. To train the students on the principles and applications of electrochemistry and polymers
3. To introduce instrumental methods, molecular machines and switches.

**COURSE OUTCOMES (COs)**

*After the completion of the course student should be able to*

1. Acquire the knowledge on the behaviour and interactions between matter and energy at both the atomic and molecular levels.
2. Analyze and demonstrate the applications of modern engineering materials in real world.
3. Impart the knowledge on the essential aspects of electrochemical cells, emf and applications of emf measurements
4. Gain the knowledge about construction and applications of batteries and sensors,
5. Impart knowledge on the essential aspects of Principles and comprehend idea about the synthesis and engineering applications of polymers.
6. Analyse the molecular transitions of Electromagnetic radiation (EMR) with matter in various spectroscopic techniques.

**UNIT – I Structure and Bonding Models:**

Fundamentals of Quantum mechanics, Schrodinger Wave equation, significance of  $\Psi^2$ , particle in one dimensional box, molecular orbital theory – bonding in homo- and heteronuclear diatomic molecules – energy level diagrams of O<sub>2</sub> and CO, etc.  $\pi$ -molecular orbitals of butadiene and benzene, calculation of bond order.

**UNIT- II Modern Engineering Materials**

**Semiconductors** – Introduction, basic concept, application.

**Super Conductors** - Introduction basic concept, applications.

**Super Capacitors** - Introduction, Basic Concept, Classification – Applications.

**Nano Materials** - Introduction, classification, properties and applications of Fullerenes, Carbon nano tubes and Graphines nano particles.

**UNIT- III Electrochemistry and Applications**

Electrochemical cell, Nernst equation, cell potential calculations and numerical problems, potentiometry- potentiometric titrations (redox titrations), concept of conductivity, conductivity cell, conductometric titrations (acid-base titrations).

Electrochemical sensors – potentiometric sensors with examples, amperometric sensors with examples. Primary cells – Zinc-air battery, Secondary cells – lithium-ion batteries- working of the batteries including cell reactions; Fuel cells, hydrogen-oxygen fuel cell– working of the cells. Polymer Electrolyte Membrane Fuel cells (PEMFC).

#### UNIT - IV Polymer Chemistry

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

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

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

**Conducting Polymers** – polyacetylene, polyaniline, – mechanism of conduction and applications. Bio-Degradable polymers - Poly Glycolic Acid (PGA), Polyl Lactic Acid (PLA).

#### UNIT - V Instrumental Methods and Applications

Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law. UV-Visible Spectroscopy, electronic transition, Instrumentation, IR spectroscopies, fundamental modes and selection rules, Instrumentation. High pressure Liquid Chromatography (HPLC) Classification, Principle, Instrumentation and Applications.

#### TEXTBOOKS

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

#### REFERENCES

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

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**(23HS0831) DIFFERENTIAL EQUATIONS & VECTOR CALCULUS**  
**(Common to all branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course*

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

**COURSE OUTCOMES (COs)**

*After the completion of the course student should be able to*

1. Solve the differential equations related to various engineering fields.
2. Create basic application problems described by second order linear differential equations with constant coefficients.
3. Understand basic properties of standard partial differential equations.
4. Identify solution methods for partial differential equations that model physical processes.
5. Interpret the physical meaning of different operators such as gradient, curl and divergence.
6. Estimate the work done against a field, circulation and flux using vector calculus.

**UNIT I**

**Differential equations of first order and first degree**

Linear differential equations – Bernoulli's equations- Exact equations and equations reducible to exact form. Applications: Newton's Law of cooling – Law of natural growth and decay- Electrical circuits.

**UNIT II**

**Linear differential equations of higher order (Constant Coefficients)**

Definitions, homogenous and non-homogenous, complimentary function, general solution, particular integral, Wronskian, Method of variation of parameters. Simultaneous linear equations, Applications to L-C-R Circuit problems and Simple Harmonic motion.

**UNIT III**

**Partial Differential Equations**

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

**UNIT IV****Vector differentiation**

Scalar and vector point functions, vector operator Del, Del applies to scalar point functions- Gradient, Directional derivative, del applied to vector point functions-Divergence and Curl, vector identities.

**UNIT V****Vector integration**

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

**TEXTBOOKS:**

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

**REFERENCES:**

1. Thomas Calculus, George B. Thomas, Maurice D. Weir and Joel Hass, Pearson Publishers, 2018, 14<sup>th</sup> 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, 5<sup>th</sup> Edition.
4. Advanced Engineering Mathematics, R. K. Jain and S. R. K. Iyengar, Alpha Science International Ltd., 2021 5<sup>th</sup> Edition (9<sup>th</sup> reprint).
5. Higher Engineering Mathematics, B. V. Ramana, , McGraw Hill Education, 2017.

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**(23CE0101) BASIC CIVIL & MECHANICAL ENGINEERING**  
**(Common to all branches of Engineering)**

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**PART A: BASIC CIVIL ENGINEERING**

**COURSE OBJECTIVES**

*The objectives of this course*

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

**COURSE OUTCOMES (COs)**

*After the completion of the course, student should be able to*

1. *Understand various sub-divisions of Civil Engineering and to appreciate their role in ensuring better society.*
2. *Know the concepts of surveying and to understand the measurement of distances, angles and levels through surveying.*
3. *Realize the importance of Transportation in nation's economy and the engineering measures related to Transportation and understand the process of water storage and its supply to the public.*

**UNIT I**

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

**UNIT II**

**Surveying:** 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:** Importance of Transportation in Nation's economic development - Types of Highway Pavements - Flexible Pavements and Rigid Pavements - Simple Differences. Basics of Harbour, Tunnel, Airport, and Railway Engineering

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

**TEXT BOOKS**

1. M.S.Palanisamy, *Basic Civil Engineering*, Tata McGraw Hill publications (India) Pvt. Ltd. Fourth Edition, 2011.
2. S.S. Bhavikatti, *Introduction to Civil Engineering*, New Age International Publishers, First Edition, 2022.
3. Satheesh Gopi, *Basic Civil Engineering*, Pearson Publications, First Edition, 2009

**REFERENCES**

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

**PART B: BASIC MECHANICAL ENGINEERING****COURSE OBJECTIVES**

*The objectives of this course*

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

**COURSE OUTCOMES**

*After the completion of the course, student should be able to*

1. *Understand the role of mechanical engineering and materials in the manufacturing and automotive industries*
2. *Explain the basics of manufacturing processes and thermal engineering and its applications.*
3. *Describe the working of different power plants. Mechanical power transmission systems and the applications of robotics in industrial sector.*

**UNIT I**

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

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

**UNIT II**

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

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

**UNIT III**

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

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

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

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

**TEXTBOOKS**

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

**REFERENCE BOOKS**

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

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**(23CS0504) DATA STRUCTURES**

**(Common to CSE, CSIT, CSM, CIC, CAD, CCC & CAI branches)**

**COURSE OBJECTIVES**

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

**COURSE OUTCOMES (COs)**

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

- Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.*
- Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.*
- Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.*
- Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between dequeues and priority queues, and apply them appropriately to solve data management challenges.*
- Devise novel solutions to small scale programming challenges involving data structures such as stacks, queues, Trees.*
- Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.*

**UNIT - I**

**Introduction to Linear Data Structures:** Definition and importance of linear data structures, Abstract data types (ADTs) and their implementation, Overview of time and space complexity analysis for linear data structures.

**Searching Techniques:** Linear & Binary Search.

**Sorting Techniques:** Bubble sort, Selection sort, Insertion Sort

**UNIT - II**

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

**UNIT III**

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

**UNIT IV**

**Queues:** Introduction to queues: properties and operations, implementing queues using arrays and linked lists, Applications of queues in breadth-first search, scheduling, etc.

**Deque:** Introduction to deque (double-ended queue), Operations on deque and their applications.

**UNIT V**

**Trees:** Introduction to Trees, Binary Search Tree – Insertion, Deletion & Traversal, AVL Trees

**Graphs:** Definition – Representation of Graph – Types of graph - Breadth-first traversal - Depth-first traversal – Applications of graphs.

**TEXTBOOKS**

1. Mark Allen Weiss, *Data Structures and algorithm analysis in C*, Pearson, 2<sup>nd</sup> Edition.
2. Reema Thareja –Data Structures using C++,Third Edition,Oxford University,2023

**REFERENCES**

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

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**(23HS0811) COMMUNICATIVE ENGLISH LAB**  
**( Common to all branches of Engineering )**

**COURSE OBJECTIVES**

*The objectives of this course*

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

**COURSE OUTCOMES (COs)**

*After the completion of the course student should be able to*

- 1. Understand the different aspects of the English language proficiency with emphasis on LSRW skills.*
- 2. Apply communication skills through various language learning activities.*
- 3. Analyze the English speech sounds, stress, rhythm, and syllable division for better listening and speaking comprehension.*
- 4. Evaluate and exhibit professionalism in participating in debates and group discussions.*
- 5. Become active participants in the learning process and acquire proficiency in spoken English.*
- 6. Speak with clarity and confidence thereby enhances employability skills.*

**List of Topics:**

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

**Suggested Software:**

1. Walden Infotech
2. Young India Films

**REFERENCES:**

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

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**(23HS0802) CHEMISTRY LAB**

**(Common to EEE, ECE, CSE, CSIT, CSM, CIC, CAD, CCC & CAI branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. *Verify the fundamental concepts with experiments.*

**COURSE OUTCOMES (COs)**

*After the completion of the course student should be able to*

1. *Determine the cell constant and conductance of solutions.*
2. *Prepare advanced polymer Bakelite materials.*
3. *Measure the strength of an acid present in secondary batteries.*
4. *Analyse the IR spectra of some organic compounds.*
5. *Able to understand about the fundamental concepts of analytical instruments*
6. *Calculate strength of acid in Pb-Acid battery.*

**LIST OF EXPERIMENTS**

1. Measurement of 10Dq by spectro photometric method
2. Conduct ometric titration of strong acid vs. strong base
3. Conduct ometric 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 simple organic compounds by IR
11. Preparation of nanomaterials by precipitation method
12. Estimation of Ferrous Iron by Dichrometry

***Note: Any Ten experiments may be conducted***

**REFERENCES**

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

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**(23ME0301) ENGINEERING WORKSHOP**  
**(Common to all branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course is to*

1. *Familiarize with the different types of wood and carpentry joints.*
2. *Develop Tapered Tray and Conical funnel using sheet metal.*
3. *Acquire practical knowledge on different types of fittings.*
4. *Provides hands-on training in the trades of House-Wiring .*
5. *Overview of metal cutting processes, foundry, Welding and plumbing, is provided through live demonstrations.*
6. *Acquire practical skills by performing the experiments in different shops of workshop.*

**COURSE OUTCOMES**

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

1. *Describe the different types of wood and carpentry joints.*
2. *Produce Tapered Tray and Conical funnel using sheet metal.*
3. *Understands about Fitting and their types.*
4. *Explain the method of preparation of various House-Wiring .*
5. *Apply basic techniques in foundry, Welding and plumbing.*
6. *Estimate the amount of material required for various models.*

**SYLLABUS**

1. **Demonstration:** Safety practices and precautions to be observed in workshop.
2. **Wood Working:** Familiarity with different types of woods and tools used in wood working and make following joints.
  - a) Half – Lap joint b) Mortise and Tenon joint c) Corner Dovetail joint or Bridle joint
3. **Sheet Metal Working:** Familiarity with different types of tools used in sheet metal working, Developments of following sheet metal job from GI sheets.
  - a) Tapered tray b) Conical funnel c) Elbow pipe d) Brazing
4. **Fitting:** Familiarity with different types of tools used in fitting and do the following fitting exercises.
  - a) V-fit b) Dovetail fit c) Semi-circular fit d) Bicycle tire puncture and change of two-wheeler 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.

**TEXTBOOKS:**

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

**REFERENCES:**

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

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**(23CS0505) DATA STRUCTURES LAB**

**(Common to CSE, CSIT, CSM, CIC, CAD, CCC & CAI branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

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

**COURSE OUTCOMES (COs)**

*After the completion of the course student should be able to*

1. Explain the role of linear data structures in organizing and accessing data efficiently in algorithms.
2. Design, implement, and apply linked lists for dynamic data storage, demonstrating understanding of memory allocation.
3. Develop programs using stacks to handle recursive algorithms, manage program states, and solve related problems.
4. Apply queue-based algorithms for efficient task scheduling and breadth-first traversal in graphs and distinguish between dequeues and priority queues and apply them appropriately to solve data management challenges.
5. Implement the concepts of Binary Search Trees in Linked List
6. Recognize scenarios where hashing is advantageous, and design hash-based solutions for specific problems.

**LIST OF EXPERIMENTS:**

**Exercise 1: Array Manipulation**

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

**Exercise 2: Linked List Implementation**

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

**Exercise 3: Linked List Applications**

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

**Exercise 4: Double Linked List Implementation**

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

**Exercise 5: Stack Operations**

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

**Exercise 6: Queue Operations**

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

**Exercise 7: Stack and Queue Applications**

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

**Exercise 8: Binary Search Tree**

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

**Exercise 9: Graph**

- i) Write a program for finding the Depth First Search of a graph.
- ii) Write a program for finding the Breadth First Search of a graph.

**TEXTBOOKS**

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

**REFERENCES**

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

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**(23HS0813) HEALTH AND WELLNESS, YOGA AND SPORTS  
(Common to all branches of Engineering)**

**COURSE OBJECTIVES**

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

**COURSE OUTCOMES (COs)**

*After the completion of the course student should be able to*

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

**UNIT I**

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

**Activities:**

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

**UNIT II**

Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.

**Activities:**

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

**UNIT III**

Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.

**Activities:**

- i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.

- Practicing general and specific warm up, aerobics
- ii) Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping and running.

**Reference Books:**

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

**General Guidelines:**

1. Institutes must assign slots in the Timetable for the activities of Health/Sports/Yoga.
2. Institutes must provide field/facility and offer the minimum of five choices of as 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 viva voce on the subject.

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**II B.Tech – I Sem.**

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3	0	0	3

**(23HS0836) DISCRETE MATHEMATICS & GRAPH THEORY**  
**(Common to All Branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. To enable students to understand the fundamentals of set, relation and recurrence relation.
2. To enable students to understand the fundamental concepts of graph theory and its applications in computer science.

**COURSE OUTCOMES (COs)**

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

1. Apply mathematical logic to solve problems.
2. Understand the concepts and perform the operations related to sets, relations and functions. Gain the conceptual background needed and identify structures of algebraic nature.
3. Apply basic counting techniques to solve combinatorial problems.
4. Formulate problems and solve Binomial, Multinomial problems
5. Formulate problems and solve recurrence relations.
6. Apply Graph Theory in solving computer science problems

**UNIT - I**

**Mathematical Logic:**

Introduction, Statements and Notation, Connectives, Well-formed formulas, Tautology, Duality law, Equivalence, Implication, Normal Forms, Functionally complete set of connectives, Inference Theory of Statement Calculus, Predicate Calculus, Inference theory of Predicate Calculus.

**UNIT - II**

**Set theory:**

The Principle of Inclusion- Exclusion, Pigeon hole principle and its application, Functions composition of functions, Inverse Functions, Recursive Functions, Lattices and its properties. Algebraic structures: Algebraic systems-Examples and General Properties, Semi groups and Monoids, groups, sub groups, homomorphism, Isomorphism.

**UNIT III**

**Elementary Combinatorics:**

Combinations and Permutations, Enumeration of Combinations and Permutations, Enumerating Combinations and Permutations with Repetitions, Enumerating Permutations with Constrained Repetitions, Binomial Coefficients, The Binomial and Multinomial Theorems.

**UNIT IV****Recurrence Relations**

Generating Functions of Sequences, Calculating Coefficients of Generating Functions, Recurrence relations, Solving Recurrence Relations by Substitution and Generating functions, The Method of Characteristic roots, Solutions of Inhomogeneous, Recurrence Relations.

**UNIT V****Graphs**

Basic Concepts, Isomorphism and Subgraphs, Trees and their Properties, Spanning Trees, Directed Trees, Binary Trees, Planar Graphs, Euler's Formula, Multigraphs and Euler Circuits, Hamiltonian Graphs.

**TEXTBOOKS**

1. J.P. Tremblay and R. Manohar, Discrete Mathematical Structures with Applications to Computer Science, Tata McGrawHill, 2002.
2. Kenneth H. Rosen, Discrete Mathematics and its Applications with Combinatorics and Graph Theory, 7th Edition, McGraw Hill Education (India) Private Limited.

**REFERENCES**

1. Joe L. Mott, Abraham Kandel and Theodore P. Baker, Discrete Mathematics for Computer Scientists & Mathematicians, 2nd Edition, Pearson Education.
2. Narsingh Deo, Graph Theory with Applications to Engineering and Computer Science.

**ONLINE LEARNING RESOURCES:**

1. <http://www.cs.yale.edu/homes/aspnes/classes/202/notes.pdf>

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**II B.Tech – I Sem.**

L	T	P	C
2	1	0	3

**(23HS0814) UNIVERSAL HUMAN VALUES  
UNDERSTANDING HARMONY & ETHICAL HUMAN CONDUCT  
(Common to All Branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course*

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

**COURSE OUTCOMES (COs)**

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

1. Define the terms like Natural Acceptance, Happiness and Prosperity
2. Identify oneself, and one's surroundings (family, society nature)
3. Apply what they have learnt to their own self in different day-to-day settings in real life
4. Relate human values with human relationship and human society.
5. Justify the need for universal human values and harmonious existence
6. Develop as socially and ecologically responsible engineers

**Course Topics**

The course has 28 lectures and 14 tutorials in 5 modules. 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.

**UNIT - I**

**Introduction to Value Education** (6 lectures and 3 tutorials for practice session)

Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education)

Lecture 2: Understanding Value Education

Tutorial 1: Practice Session PS1 Sharing about Oneself

Lecture 3: self-exploration as the Process for Value Education  
Lecture4: 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** (6 lectures and 3 tutorials for practice session)

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** (6 lectures and 3 tutorials for practice session)

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** (4 lectures and 2 tutorials for practice session)

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 (6 lectures and 3 tutorials for practice session)

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

**Practice Sessions for UNIT I – Introduction to Value Education**

PS1 Sharing about Oneself

PS2 Exploring Human Consciousness

PS3 Exploring Natural Acceptance

Practice Sessions for UNIT II – Harmony in the Human Being

PS4 Exploring the difference of Needs of self and body

PS5 Exploring Sources of Imagination in the self

PS6 Exploring Harmony of self with the body

Practice Sessions for UNIT III – Harmony in the Family and Society

PS7 Exploring the Feeling of Trust

PS8 Exploring the Feeling of Respect

PS9 Exploring Systems to fulfil Human Goal

Practice Sessions for UNIT IV – Harmony in the Nature (Existence)

PS10 Exploring the Four Orders of Nature

PS11 Exploring Co-existence in Existence

Practice Sessions for UNIT V – Implications of the Holistic Understanding – a Look at Professional Ethics

PS12 Exploring Ethical Human Conduct

PS13 Exploring Humanistic Models in Education

PS14 Exploring Steps of Transition towards Universal Human Order

**TEXTBOOKS**

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

## REFERENCES

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)

## Mode of Conduct:

Lecture hours are to be used for interactive discussion, placing the proposals about the topics at hand and motivating students to reflect, explore and verify them. Tutorial hours are to be used for practice sessions. While analyzing and discussing the topic, the faculty mentor's role is in pointing to essential elements to help in sorting them out from the surface elements. In other words, help the students explore the important or critical elements. In the discussions, particularly during practice sessions (tutorials), the mentor encourages the student to connect with one's own self and do self-observation, self-reflection and self-exploration.

Scenarios may be used to initiate discussion. The student is encouraged to take up "ordinary" situations rather than "extra-ordinary" situations. Such observations and their analyses are shared and discussed with other students and faculty mentor, in a group sitting. Tutorials (experiments or practical) are important for the course. The difference is that the laboratory is everyday life, and practical are how you behave and work in real life. Depending on the nature of topics, worksheets, home assignment and/or activity are included. The practice sessions (tutorials) would also provide support to a student in performing actions commensurate to his/her beliefs. It is intended that this would lead to development of commitment, namely behaving and working based on basic human values.

It is recommended that this content be placed before the student as it is, in the form of a basic foundation course, without including anything else or excluding any part of this content. Additional content may be offered in separate, higher courses. This course is to be taught by faculty from every teaching department, not exclusively by any one department. Teacher

preparation with a minimum exposure to at least one 8-day Faculty Development Program on Universal Human Values is deemed essential.

**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://onlinecourses.swayam2.ac.in/aic22\\_ge23/preview](https://onlinecourses.swayam2.ac.in/aic22_ge23/preview)

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**II B.Tech – I Sem.**

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**(23CS0506) DIGITAL LOGIC AND COMPUTER ORGANIZATION  
(Common to All CSE & CSE Allied branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. Provide students with a comprehensive understanding of digital logic design principles and computer organization fundamentals
2. Describe memory hierarchy concepts
3. Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices

**COURSE OUTCOMES (COs)**

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

1. Differentiate between combinational and sequential circuits based on their characteristics and functionalities.
2. Demonstrate an understanding of computer functional units.
3. Analyze the design and operation of processors, including instruction execution, pipelining, and control unit mechanisms, to comprehend their role in computer systems.
4. Demonstrate Hardwired Control and Multi programmed Control Units
5. Describe memory hierarchy concepts, including cache memory, virtual memory, and secondary storage, and evaluate their impact on system performance and scalability.
6. Explain input/output (I/O) systems and their interaction with the CPU, memory, and peripheral devices, including interrupts, DMA, and I/O mapping techniques.

**UNIT - I**

**Data Representation:** Binary Numbers, Fixed Point Representation. Floating Point Representation. Number base conversions, Octal and Hexadecimal Numbers, components, Signed binary numbers, Binary codes

**Digital Logic Circuits-I:** Basic Logic Functions, Logic gates, universal logic gates, Minimization of Logic expressions. K-Map Simplification, Combinational Circuits, Decoders, Multiplexers

**UNIT - II**

**Digital Logic Circuits-II:** Sequential Circuits, Flip-Flops, Binary counters, Registers, Shift Registers, Ripple counters

**Basic Structure of Computers:** Computer Types, Functional units, Basic operational concepts, Bus structures, Software, Performance, multiprocessors and multi computers, Computer Generations, Von- Neumann Architecture

**UNIT III**

**Computer Arithmetic:** Addition and Subtraction of Signed Numbers, Design of Fast Adders, Multiplication of Positive Numbers, Signed-operand Multiplication, Fast Multiplication, Integer Division, Floating-Point Numbers and Operations

**Processor Organization:** Fundamental Concepts, Execution of a Complete Instruction, Multiple-Bus Organization, Hardwired Control and Multi programmed Control

**UNIT IV**

**The Memory Organization:** Basic Concepts, Semiconductor RAM Memories, Read-Only Memories, Speed, Size and Cost, Cache Memories, Performance Considerations, Virtual Memories, Memory Management Requirements, Secondary Storage

**UNIT V**

**Input/ Output Organization:** Accessing I/O Devices, Interrupts, Processor Examples, Direct Memory Access, Buses, Interface Circuits, Standard I/O Interfaces

**TEXTBOOKS**

1. Computer Organization, Carl Hamacher, Zvonko Vranesic, Safwat Zaky, 6th edition, McGraw Hill
2. Digital Design, 6th Edition, M. Morris Mano, Pearson Education.

**REFERENCES**

1. *Computer Organization and Architecture*, William Stallings, 11th Edition, Pearson.
2. *Computer Systems Architecture*, M. Moris Mano, 3rd Edition, Pearson
3. *Computer Organization and Design*, David A. Paterson, John L. Hennessy, Elsevier
4. *Fundamentals of Logic Design*, Roth, 5th Edition, Thomson

**ONLINE LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/106/103/106103068/>

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**II B.Tech – I Sem.**

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**(23CS0507) ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS**  
**(Common to All CSE & CSE Allied branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. *provide knowledge on advance data structures frequently used in Computer Science domain*
2. *Develop skills in algorithm design techniques popularly used*
3. *Understand the use of various data structures in the algorithm design*

**COURSE OUTCOMES (COs)**

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

1. *Illustrate the working of the advanced tree data structures and their applications.*
2. *Understand the Graph data structure, traversals and apply them in various contexts.*
3. *Use various data structures in the design of algorithms.*
4. *Analyze the efficiency of Greedy and Dynamic Programming design techniques to solve the optimization problems.*
5. *Recommend appropriate data structures based on the problem being solved.*
6. *Analyze algorithms with respect to space and time complexities.*

**UNIT - I**

**Introduction:** Introduction to Algorithm Analysis, Space and Time Complexity analysis, Asymptotic Notations.

**AVL Trees:** Creation, Insertion, Deletion operations and Applications

**B-Trees:** Creation, Insertion, Deletion operations and Applications

**UNIT - II**

**Heap Trees (Priority Queues):** Min and Max Heaps, Operations and Applications

**Graphs:** Terminology, Representations, Basic Search and Traversals, Connected Components and Biconnected Components, applications

**Divide and Conquer:** The General Method, Quick Sort, Merge Sort, Strassen's matrix multiplication, Convex Hull

**UNIT III**

**Greedy Method:** General Method, Job Sequencing with deadlines, Knapsack Problem, Minimum cost spanning trees, Single Source Shortest Paths

**Dynamic Programming:** General Method, All pairs shortest paths, Single Source Shortest Paths– General Weights (Bellman Ford Algorithm), Optimal Binary Search Trees, 0/1 Knapsack, String Editing, Travelling Salesperson problem

**UNIT IV**

**Backtracking:** General Method, 8-Queens Problem, Sum of Subsets problem, Graph Coloring, 0/1 Knapsack Problem

**Branch and Bound:** The General Method, 0/1 Knapsack Problem, Travelling Salesperson problem

**UNIT V**

**NP Hard and NP Complete Problems:** Basic Concepts, Cook's theorem

**NP Hard Graph Problems:** Clique Decision Problem (CDP), Chromatic Number Decision Problem (CNDP), Traveling Salesperson Decision Problem (TSP)

**NP Hard Scheduling Problems:** Scheduling Identical Processors, Job Shop Scheduling

**TEXTBOOKS**

1. Fundamentals of Data Structures in C++, Horowitz, Ellis; Sahni, Sartaj; Mehta, Dinesh, 2nd Edition Universities Press
2. Computer Algorithms in C++, Ellis Horowitz, Sartaj Sahni, Sanguthevar Rajasekaran, 2nd Edition University Press

**REFERENCES**

1. *Data Structures and program design in C*, Robert Kruse, Pearson Education Asia
2. *An introduction to Data Structures with applications*, Trembley & Sorenson, McGraw Hill
3. *The Art of Computer Programming, Vol.1: Fundamental Algorithms*, Donald E Knuth, Addison-Wesley, 1997.
4. *Data Structures using C & C++*: Langsam, Augenstein & Tanenbaum, Pearson, 1995
5. *Algorithms + Data Structures & Programs*., N. Wirth, PHI
6. *Fundamentals of Data Structures in C++*: Horowitz Sahni & Mehta, Galgotia Pub.
7. *Data structures in Java*., Thomas Standish, Pearson Education Asia

**ONLINE LEARNING RESOURCES:**

1. [https://www.tutorialspoint.com/advanced\\_data\\_structures/index.asp](https://www.tutorialspoint.com/advanced_data_structures/index.asp)
2. <http://peterindia.net/Algorithms.html>
3. [https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs\\_O](https://www.youtube.com/playlist?list=PLDN4rrl48XKpZkf03iYFl-O29szjTrs_O)

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**II B.Tech – I Sem.**

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**(23CS0508) OBJECT ORIENTED PROGRAMMING THROUGH JAVA  
(Common to All CSE & CSE Allied branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

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

**COURSE OUTCOMES (COs)**

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

1. Understand the Java language components for implementing control statements.
2. Apply the concepts of OOP's fundamentals like classes, Methods and class libraries to develop applications
3. Apply the concepts of arrays, inheritance develop efficient java applications.
4. Analyze the interfaces for implementing multiple inheritance.
5. Evaluate the concepts of packages, file I/O, by using access control, and exception handling mechanisms to solve real world scenarios
6. Create the GUI applications by using concepts like multi-threading, Java FX, JDBC

**UNIT - I**

**Object Oriented Programming:** Basic concepts, Principles,

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

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

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

## UNIT - II

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

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

## UNIT III

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

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

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

## UNIT IV

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

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

**Java I/O and File:** Java I/O API, standard I/O streams, types, Byte streams, Character streams, Scanner class, Files in Java.

**UNIT V**

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

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

**Java Database Connectivity:** Introduction, JDBC Architecture, Installing MySQL and MySQL Connector/J, JDBC Environment Setup, Establishing JDBC Database Connections, ResultSet Interface

**Java FX GUI:** Java FX Scene Builder, Java FX App Window Structure, displaying text and image, event handling, laying out nodes in scene graph, mouse events

**TEXTBOOKS**

1. JAVA one step ahead, Anitha Seth, B.L.Juneja, Oxford.
2. Joy with JAVA, Fundamentals of Object Oriented Programming, Debasis Samanta, Monalisa Sarma, Cambridge, 2023.
3. JAVA for Programmers, Paul Deitel, Harvey Deitel, 4th Edition, Pearson.

**REFERENCES**

1. *The complete Reference Java, 11th edition, Herbert Schildt, TMH*
2. *Introduction to Java programming, 7th Edition, Y Daniel Liang, Pearson*

**ONLINE LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/106/105/106105191/>
2. [https://infyspringboard.onwingspan.com/web/en/app/toc/lex\\_auth\\_012880464547618816347\\_shared/overview](https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_012880464547618816347_shared/overview)

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**II B.Tech – I Sem.**

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**(23CS0509) ADVANCED DATA STRUCTURES & ALGORITHM ANALYSIS LAB  
(Common to All CSE & CSE Allied branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. *acquire practical skills in constructing and managing Data structures*
2. *apply the popular algorithm design methods in problem-solving scenarios*

**COURSE OUTCOMES (COs)**

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

1. *Design and develop programs to solve real world problems with the popular algorithm design methods.*
2. *Demonstrate an understanding of Non-Linear data structures by developing implementing the operations on AVL Trees, B-Trees, Heaps and Graphs.*
3. *Relate the mathematical criterion for deciding whether an algorithm is efficient, and know many practically important problems that do not admit any efficient algorithms.*
4. *Critically assess the design choices and implementation strategies of algorithms and data structures in complex applications.*
5. *Utilize appropriate data structures and algorithms to optimize solutions for specific computational problems.*
6. *Compare the performance of different of algorithm design strategies*

**Experiments covering the Topics:**

- Operations on AVL trees, B-Trees, Heap Trees
- Graph Traversals
- Sorting techniques
- Finding Biconnected components in a graph
- Shortest path algorithms using greedy Method
- 0/1 Knapsack Problem using Dynamic Programming and Backtracking
- Travelling Salesperson problem using Branch and Bound
- N-Queens Problem using Backtracking
- Job Sequencing using Branch and Bound

**Sample Programs:**

1. Construct an AVL tree for a given set of elements which are stored in a file. And implement insert and delete operation on the constructed tree. Write contents of tree into a new file using in-order.
2. Construct B-Tree an order of 5 with a set of 100 random elements stored in array. Implement searching, insertion and deletion operations.

3. Construct Min and Max Heap using arrays, delete any element and display the content of the Heap.
4. Implement BFT and DFT for given graph, when graph is represented by
  - a) Adjacency Matrix
  - b) Adjacency Lists
5. Write a program for finding the biconnected components in a given graph.
6. Implement Quick sort and Merge sort and observe the execution time for various input sizes (Average, Worst and Best cases).
7. Compare the performance of Single Source Shortest Paths using Greedy method when the graph is represented by adjacency matrix and adjacency lists.
8. Implement Job Sequencing with deadlines using Greedy strategy.
9. Write a program to solve 0/1 Knapsack problem Using Dynamic Programming.
10. Implement N-Queens Problem Using Backtracking.
11. Use Backtracking strategy to solve 0/1 Knapsack problem.
12. Implement Travelling Sales Person problem using Branch and Bound approach.

## REFERENCES

1. *Fundamentals of Data Structures in C++*, Horowitz Ellis, SahniSartaj, Mehta, Dinesh, 2ndEdition, Universities Press
2. *Computer Algorithms/C++* Ellis Horowitz, SartajSahni, SanguthevarRajasekaran, 2ndEdition, University Press
3. *Data Structures and program design in C*, Robert Kruse, Pearson Education Asia
4. *An introduction to Data Structures with applications*, Trembley& Sorenson, McGraw Hill

## ONLINE LEARNING RESOURCES:

1. <http://cse01-iiith.vlabs.ac.in/>
2. <http://peterindia.net/Algorithms.html>

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II B.Tech – I Sem.

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**(23CS0510) OBJECT ORIENTED PROGRAMMING THROUGH JAVA LAB**  
(Common to All CSE & CSE Allied branches)

**COURSE OBJECTIVES**

*The objectives of this course*

1. Practice object-oriented programming in the Java programming language
2. Implement Classes, Objects, Methods, Inheritance, Exception, Runtime Polymorphism, User defined Exception handling mechanism
3. Illustrate inheritance, Exception handling mechanism, JDBC connectivity
4. Construct Threads, Event Handling, implement packages, Java FX GUI

**COURSE OUTCOMES (COs)**

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

1. Demonstrate a solid understanding of Java syntax, including data types, control structures, methods, classes, objects, inheritance, polymorphism, and exception handling.
2. Apply fundamental OOP principles such as encapsulation, inheritance, polymorphism, and abstraction to solve programming problems effectively.
3. Familiar with commonly used Java libraries and APIs, including the Collections Framework, Java I/O, JDBC, and other utility classes.
4. Identify and fix defects and common security issues in code.
5. Develop problem-solving skills and algorithmic thinking, applying OOP concepts to design efficient solutions to various programming challenges.
6. Proficiently construct graphical user interface (GUI) applications using JavaFX

**Experiments covering the Topics:**

- Object Oriented Programming fundamentals- data types, control structures
- Classes, methods, objects, Inheritance, polymorphism,
- Exception handling, Threads, Packages, Interfaces
- Files, I/O streams, JavaFX GUI

**Sample Programs:**

**Exercise – 1:**

- a) Write a JAVA program to display default value of all primitive data type of JAVA
- b) Write a java program that display the roots of a quadratic equation  $ax^2+bx=0$ . Calculate the discriminate D and basing on value of D, describe the nature of root.

**Exercise - 2**

- a) Write a JAVA program to search for an element in a given list of elements using binary

search mechanism.

- b) Write a JAVA program to sort for an element in a given list of elements using bubble sort
- c) Write a JAVA program using String Buffer to delete, remove character.

### Exercise - 3

- a) Write a JAVA program to implement class mechanism. Create a class, methods and invoke them inside main method.
- b) Write a JAVA program implement method overloading.
- c) Write a JAVA program to implement constructor.
- d) Write a JAVA program to implement constructor overloading.

### Exercise - 4

- a) Write a JAVA program to implement Single Inheritance
- b) Write a JAVA program to implement multi level Inheritance
- c) Write a JAVA program for abstract class to find areas of different shapes

### Exercise - 5

- a) Write a JAVA program give example for “super” keyword.
- b) Write a JAVA program to implement Interface. What kind of Inheritance can be achieved?
- c) Write a JAVA program that implements Runtime polymorphism

### Exercise - 6

- a) Write a JAVA program that describes exception handling mechanism
- b) Write a JAVA program Illustrating Multiple catch clauses
- c) Write a JAVA program for creation of Java Built-in Exceptions
- d) Write a JAVA program for creation of User Defined Exception

### Exercise - 7

- a) Write a JAVA program that creates threads by extending Thread class. First thread display “Good Morning “every 1 sec, the second thread displays “Hello “every 2 seconds and the third display “Welcome” every 3 seconds,(Repeat the same by implementing Runnable)
- b) Write a program illustrating is Alive and join ()
- c) Write a Program illustrating Daemon Threads.
- d) Write a JAVA program Producer Consumer Problem

### Exercise – 8

- a) Write a JAVA program that import and use the user defined packages
- b) Without writing any code, build a GUI that display text in label and image in an ImageView (use JavaFX)
- c) Build a Tip Calculator app using several JavaFX components and learn how to respond to user interactions with the GUI

**REFERENCES**

1. *P. J. Deitel, H. M. Deitel, "Java for Programmers", Pearson Education, PHI, 4th Edition, 2007.*
2. *P. Radha Krishna, "Object Oriented Programming through Java", Universities Press, 2nd Edition, 2007*
3. *Bruce Eckel, "Thinking in Java", Pearson Education, 4th Edition, 2006.*
4. *Sachin Malhotra, Saurabh Chaudhary, "Programming in Java", Oxford University Press, 5th Edition, 2010.*

**ONLINE LEARNING RESOURCES:**

1. <https://java-iitd.vlabs.ac.in/>
2. <http://peterindia.net/JavaFiles.html>

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II B.Tech – I Sem.

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**(23CS0549) PYTHON PROGRAMMING**  
(Common to All Branches of Engineering)

**COURSE OBJECTIVES**

*The objectives of this course*

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

**COURSE OUTCOMES (COs)**

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

1. Showcase adept command of Python syntax, deftly utilizing variables, data types, control structures, functions, modules, and exception handling to engineer robust and efficient code solutions.
2. Apply Python programming concepts to solve a variety of computational problems
3. Understand the principles of object-oriented programming (OOP) in Python, including classes, objects, inheritance, polymorphism, and encapsulation, and apply them to design and implement Python programs
4. Acquire the skills in different operators and statements in python
5. Become proficient in using commonly used Python libraries and frameworks such as JSON, XML, NumPy, pandas
6. Exhibit competence in implementing and manipulating fundamental data structures such as lists, tuples, sets, dictionaries

**UNIT - I**

History of Python Programming Language, Thrust Areas of Python, Installing Anaconda Python Distribution, Installing and Using Jupyter Notebook.

**Parts of Python Programming Language:** Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator, Dynamic and Strongly Typed Language.

**Control Flow Statements:** if statement, if-else statement, if...elif...else, Nested if statement, while Loop, for Loop, continue and break Statements, Catching Exceptions Using try and except Statement.

**Sample Experiments:**

1. Write a program to find the largest element among three Numbers.
2. Write a Program to display all prime numbers within an interval
3. Write a program to swap two numbers without using a temporary variable.

4. 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
5. Write a program to add and multiply complex numbers
6. Write a program to print multiplication table of a given number.

## UNIT - II

**Functions:** Built-In Functions, Commonly Used Modules, Function Definition and Calling the function, return Statement and void Function, Scope and Lifetime of Variables, Default Parameters, Keyword Arguments, \*args and \*\*kwargs, Command Line Arguments.

**Strings:** Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods, Formatting Strings.

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

### Sample Experiments:

7. Write a program to define a function with multiple return values.
8. Write a program to define a function using default arguments.
9. Write a program to find the length of the string without using any library functions.
10. Write a program to check if the substring is present in a given string or not.
11. Write a program to perform the given operations on a list:
  - i. addition
  - ii. Insertion
  - iii. slicing
12. Write a program to perform any 5 built-in functions by taking any list.

## UNIT III

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

**Tuples and Sets:** Creating Tuples, Basic Tuple Operations, tuple() Function, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Relation between Tuples and Lists, Relation between Tuples and Dictionaries, Using zip() Function, Sets, Set Methods, Frozenset.

### Sample Experiments:

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

**UNIT IV**

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

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

**Sample Experiments:**

18. 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.
19. Python program to print each line of a file in reverse order.
20. Python program to compute the number of characters, words and lines in a file.
21. Write a program to create, display, append, insert and reverse the order of the items in the array.
22. Write a program to add, transpose and multiply two matrices.
23. Write a Python program to create a class that represents a shape. Include methods to calculate its area and perimeter. Implement subclasses for different shapes like circle, triangle, and square.

**UNIT V**

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

**Sample Experiments:**

24. Python program to check whether a JSON string contains complex object or not.
25. Python Program to demonstrate NumPy arrays creation using array () function.
26. Python program to demonstrate use of ndim, shape, size, dtype.
27. Python program to demonstrate basic slicing, integer and Boolean indexing.
28. Python program to find min, max, sum, cumulative sum of array
29. Create a dictionary with at least five keys and each key represent value as a list where this list contains at least ten values and convert this dictionary as a pandas data frame and explore the data through the data frame as follows:
  - a) Apply head () function to the pandas data frame
  - b) Perform various data selection operations on Data Frame
30. Select any two columns from the above data frame, and observe the change in one attribute with respect to other attribute with scatter and plot operations in matplotlib

**REFERENCES**

1. Gowrishankar S, Veena A., Introduction to Python Programming, CRC Press.
2. Python Programming, S Sridhar, J Indumathi, V M Hariharan, 2ndEdition, Pearson, 2024
3. Introduction to Programming Using Python, Y. Daniel Liang, Pearson.

**ONLINE LEARNING RESOURCES:**

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

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**II B.Tech – I Sem.**

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**(23HS0805) ENVIRONMENTAL SCIENCE**  
**(Common to All Branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. To make the students to get awareness on 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 earth from the inventions by the engineers.

**COURSE OUTCOMES (COs)**

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

1. To make the students to get awareness about the environment.
2. To understand the importance of protecting natural ecosystems for future.
3. To understand the various types of pollutions and its causes.
4. To understand the various engineering techniques to protect the environment.
5. To make awareness about social issues and laws of environmental protection.
6. To understand the concept of sustainable development and role of engineering Technology in environment and human health.

**UNIT - I**

**Multidisciplinary Nature of Environmental Studies:** Definition, Scope and Importance – Need for Public Awareness.

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

**UNIT - II**

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

- a. Forest ecosystem.
- b. Grassland ecosystem
- c. Desert ecosystem.

d. Aquatic ecosystems (ponds, streams, lakes, rivers, 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.

### UNIT III

**Environmental Pollution:** Definition, Cause, effects and control measures of :

- a. Air Pollution.
- b. Water pollution
- c. Soil pollution
- d. Marine pollution
- e. Noise pollution
- f. Thermal pollution
- g. Nuclear hazards

**Solid Waste Management:** Causes, effects and control measures of urban and industrial wastes – Role of an individual in prevention of pollution – Pollution case studies – Disaster management: floods, earthquake, cyclone and landslides.

### UNIT IV

**Social Issues and the Environment:** From Unsustainable to Sustainable development – Urban problems related to energy – Water conservation, rain water harvesting, watershed management – Resettlement and rehabilitation of people; its problems and concerns. Case studies.

**Environmental ethics:** Issues and possible solutions – Climate change, global warming, acid rain, ozone layer depletion, nuclear accidents and holocaust. Case Studies – Wasteland reclamation. – Consumerism and waste products. – Environment Protection Act. – Air (Prevention and Control of Pollution) Act. – Water (Prevention and control of Pollution) Act – Wildlife Protection Act – Forest Conservation Act – Issues involved in enforcement of environmental legislation – Public awareness.

### UNIT V

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

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

**TEXTBOOKS**

1. Textbook of Environmental Studies for Undergraduate Courses Erach Bharucha for University Grants Commission, Universities Press.
2. Palaniswamy, "Environmental Studies", Pearson education
3. S. Azeem Unnisa, "Environmental Studies" Academic Publishing Company
4. K. Raghavan Nambiar, "Text book of Environmental Studies for Undergraduate Courses as per UGC model syllabus", Scitech Publications (India), Pvt. Ltd.

**REFERENCES**

1. *Deeksha Dave and E.Sai Baba Reddy, "Textbook of Environmental Science", Cengage Publications.*
2. *M.Anji Reddy, "Text book of Environmental Sciences and Technology", BS Publication.*
3. *J.P.Sharma, Comprehensive Environmental studies, Laxmi publications.*
4. *J. Glynn Henry and Gary W. Heinke, "Environmental Sciences and Engineering", Prentice hall of India Private limited*
5. *G.R.Chatwal, "A Text Book of Environmental Studies" Himalaya Publishing House*
6. *Gilbert M. Masters and Wendell P. Ela, "Introduction to Environmental Engineering and Science, Prentice hall of India Private limited*

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II B.Tech – II Sem.

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**(23HS0848) MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS**  
(Common to All Branches of Engineering)

**COURSE OBJECTIVES**

*The objectives of this course*

1. To familiarize the students with the concepts of micro economics and make them understand the concept to demand and supply analysis in business applications
2. To understand the pricing and output decisions under different market structures
3. To understand the basic financial statements and techniques off in financial statement analysis

**COURSE OUTCOMES (COs)**

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

1. Understand the nature of managerial economics and the role of it in business firms
2. Identify the determinants of demand and apply cost analysis under different market conditions
3. Integrate the concepts of price and output decisions of business firms
4. Appreciate the importance of market structures and implement appropriate price and output decisions
5. Assess the financial statements of a firm and the financial performance of the firm through the financial statements
6. Measure operating, investing and financial performance of a firm

**UNIT - I**

Introduction To Managerial Economics - Managerial Economics - Definition, nature and scope – contemporary importance of Managerial Economics - Demand Analysis: Determinants- Law of Demand - Elasticity of Demand. Significance –Types – measurement of elasticity of demand - Demand forecasting- factors governing demand Forecasting-methods of demand forecasting –Relationship of Managerial Economics with Financial Accounting and Management.

**UNIT - II**

Theory Of Production and Cost Analysis -Production Function – Short-run and long- run production -Isoquants and Iso-costs, MRTS, least cost Combination of inputs -Cobb-Douglas production function –laws of returns-Internal and External Economies of scale.

Cost Analysis: Cost concepts - Break-Even Analysis (BEA) – Managerial Significance and limitations of BEA-Determination of Break Even Point(Simple Problems).

**UNIT III**

Introduction to Markets and New Economic Environment - Market structures: Types of Markets –PerfectandImperfectCompetition-Features,Oligopoly-Monopolisticcompetition. Price-Output determination – Pricing Methods and Strategies- New Economic Environment-

Economic systems –Economic Liberalization–Privatization and Globalization

#### UNIT IV

Capital and Capital Budgeting-Concept of Capital-Over and under capitalization– Remedial measures- Sources of Short term and Long term capital-Estimating Working Capital requirement – Capital budgeting– Features of Capital Budgeting proposals– Methods and Evaluation of Capital budgeting – Pay Back Method – Accounting Rate of Return (ARR) – Net Present Value (NPV) – Internal Rate Return (IRR) Method (simple problems)

#### UNIT V

Introduction to Financial Accounting and Analysis - Financial Accounting – Concept - emerging need and importance - Double-Entry Book Keeping-Journal - Ledger – Trial Balance - Financial Statements - - Trading Account – Profit & Loss Account –Balance Sheet (with simple adjustments). Financial Analysis – Ratios – Techniques – Liquidity, Leverage, Profitability, and Activity Ratios (simple problems).

#### TEXT BOOKS

1. Aryasri, Managerial Economics and Financial Analysis, 4/e, TMH, 2009.
2. Varshney & Maheswari, Managerial Economics, Sultan Chand, 2009.

#### REFERENCES

1. Premchand Babu, Madan Mohan, *Financial Accounting and Analysis*, Himalaya 2009.
2. S.A. Siddiqui and A.S. Siddiqui, *Managerial Economics and Financial Analysis*, New Age International, 2009.
3. Pearson Joseph G. Nellis and David Parke, *Principles of Business Economics*, 2/e New Delhi.
4. Domnick Salvatore, *Managerial Economics in a Global Economy*, Cengage 2009.
5. H.L. Ahuja, *Managerial Economics*, S.Chand, 3/e 2009.

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**(23HS0851) ORGANIZATIONAL BEHAVIOR**  
**(Common to All Branches of Engineering)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. To enable student's comprehension of organizational behavior
2. To offer knowledge to students on self-motivation, leadership and management
3. To facilitate them to become powerful leaders
4. To Impart knowledge about group dynamics
5. To make them understand the importance of change and development

**COURSE OUTCOMES (COs)**

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

1. To make the students to get awareness about the environment.
2. To understand the importance of protecting natural ecosystems for future.
3. To understand the various types of pollutions and its causes.
4. To understand the various engineering techniques to protect the environment.
5. To make awareness about social issues and laws of environmental protection.
6. To understand the concept of sustainable development and role of engineering Technology in environment and human health.

**UNIT - I**

**Introduction to Organizational Behavior**

Meaning, definition, nature, scope and functions - Organizing Process – Making organizing effective -Understanding Individual Behaviour –Attitude -Perception - Learning – Personality.

**UNIT - II**

**Motivation and Leading**

Theories of Motivation- Maslow's Hierarchy of Needs - Herzberg's Two Factor Theory - Vroom's theory of expectancy – Mc Clelland's theory of needs–Mc Gregor's theory X and theory Y– Adam's equity theory.

**UNIT III**

**Organizational Culture**

Introduction – Meaning, scope, definition, Nature - Organizational Climate - Leadership - Traits Theory–Managerial Grid - Transactional Vs Transformational Leadership - Qualities of good Leader - Conflict Management -Evaluating Leader.

**UNIT IV****Group Dynamics**

Introduction – Meaning, scope, definition, Nature- Types of groups - Determinants of group behaviour - Group process – Group Development - Group norms - Group cohesiveness - Small Groups - Group decision making - Team building - Conflict in the organization– Conflict resolution

**UNIT V****Organizational Change and Development**

Introduction –Nature, Meaning, scope, definition and functions- Organizational Culture - Changing the Culture – Change Management – Work Stress Management - Organizational management – Managerial implications of organization's change and development

**TEXT BOOKS**

1. Luthans, Fred, Organisational Behaviour, McGraw-Hill, 12 Th edition.
2. P Subba Ran, Organisational Behaviour, Himalya Publishing House.

**REFERENCES**

3. McShane, Organizational Behaviour, TMH
4. Nelson, Organisational Behaviour, Thomson.
5. Robbins, P. Stephen, Timothy A. Judge, Organisational Behaviour, Pearson.
6. Aswathappa, Organisational Behaviour, Himalaya.

**ONLINE LEARNING RESOURCES**

1. <https://www.slideshare.net/Knight1040/organizational-culture-9608857s://www.slideshare.net/AbhayRajpoot3/motivation-165556714>  
<https://www.slideshare.net/harshrastogi1/group-dynamics-159412405>
2. <https://www.slideshare.net/vanyasingla1/organizational-change-development-26565951>

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**(23HS0850) BUSINESS ENVIRONMENT**  
(Common to All Branches of Engineering)

**COURSE OBJECTIVES**

*The objectives of this course*

1. To make the student to understand about the business environment
2. To enable them in knowing the importance of fiscal and monetary policy
3. To facilitate them in understanding the export policy of the country
4. To Impart knowledge about the functioning and role of WTO
5. To Encourage the student in knowing the structure of stock markets

**COURSE OUTCOMES (COs)**

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

1. Define Business Environment and its Importance.
2. Understand various types of business environment.
3. Apply the knowledge of Money markets in future investment
4. Analyse India's Trade Policy
5. Evaluate fiscal and monetary policy
6. Develop a personal synthesis and approach for identifying business opportunities

**UNIT - I**

**Overview of Business Environment**

Introduction – meaning Nature, Scope, significance, functions and advantages. Types- Internal & External, Micro and Macro. Competitive structure of industries -Environmental analysis- advantages & limitations of environmental analysis.

**UNIT - II**

**Fiscal & Monetary Policy**

Introduction – Nature, meaning, significance, functions and advantages. Public Revenues - Public Expenditure - Evaluation of recent fiscal policy of GOI. Highlights of Budget- Monetary Policy - Demand and Supply of Money –RBI -Objectives of monetary and credit policy - Recent trends- Role of Finance Commission.

**UNIT III**

**India's Trade Policy**

Introduction – Nature, meaning, significance, functions and advantages. Magnitude and direction of Indian International Trade - Bilateral and Multilateral Trade Agreements - EXIM policy and role of EXIM bank -Balance of Payments– Structure & Major components - Causes for Disequilibrium in Balance of Payments - Correction measures.

**UNIT IV****World Trade Organization**

Introduction – Nature, significance, functions and advantages. Organization and Structure - Role and functions of WTO in promoting world trade - GATT -Agreements in the Uruguay Round –TRIPS, TRIMS - Disputes Settlement Mechanism - Dumping and Anti-dumping Measures.

**UNIT V****Money Markets and Capital Markets**

Introduction – Nature, meaning, significance, functions and advantages. Features and components of Indian financial systems - Objectives, features and structure of money markets and capital markets - Reforms and recent development – SEBI – Stock Exchanges - Investor protection and role of SEBI, Introduction to international finance.

**TEXT BOOKS**

1. Francis Cherunilam, International Business: Text and Cases, Prentice Hall of India.
2. K. Aswathappa, Essentials of Business Environment: Texts and Cases & Exercises 13th Revised Edition.HPH

**REFERENCES**

1. K. V. Sivayya, V. B. M Das, Indian Industrial Economy, Sultan Chand Publishers, New Delhi, India.
2. Sundaram, Black, International Business Environment Text and Cases, Prentice Hall of India, New Delhi, India.
3. Chari. S. N, International Business, Wiley India.
4. E. Bhattacharya, International Business, Excel Publications, New Delhi.

**ONLINE LEARNING RESOURCES**

1. <https://www.slideshare.net/ShompaDhali/business-environment-53111245>
2. <https://www.slideshare.net/rbalsells/fiscal-policy-ppt>
3. <https://www.slideshare.net/aguness/monetary-policy-presentationppt>
4. <https://www.slideshare.net/DaudRizwan/monetary-policy-of-india-69561982>
5. <https://www.slideshare.net/ShikhaGupta31/indias-trade-policyppt>
6. <https://www.slideshare.net/viking2690/wto-ppt-60260883>
7. <https://www.slideshare.net/prateeknepal3/ppt-mo>

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II B.Tech – II Sem.

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**(23HS0838) PROBABILITY & STATISTICS**  
(Common to All Branches of Engineering)

**COURSE OBJECTIVES**

*The objectives of this course*

1. To familiarize the students with the foundations of probability and statistical methods.
2. To help the students in getting a thorough understanding of fundamentals of probability and usage of statistical techniques like testing of hypothesis.

**COURSE OUTCOMES (COs)**

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

1. Acquire knowledge in finding the analysis of categorically and various statistical elementary tools
2. Develop skills in designing mathematical models involving probability, random variables and the critical thinking in the theory of probability and its applications in real life problems.
3. Apply binomial and Poisson distributions for real data to compute probabilities, theoretical frequencies
4. Interpret the properties of normal distributions and its applications.
5. Analyze to test various hypotheses included in theory and types of errors for large samples.
6. Apply the different testing tools like t-test, F-test, chi-square test to analyze the relevant real life problems

**UNIT - I**

**Descriptive statistics**

Statistics Introduction, Population vs Sample, Collection of data, primary and secondary data, Measures of Central tendency, Measures of Variability (spread or variance) Skewness, Kurtosis, correlation, correlation coefficient, rank correlation, regression coefficients, method of least squares, regression lines.

**UNIT - II**

**Probability**

Probability, probability axioms, addition law and multiplicative law of probability, conditional probability, Baye's theorem, random variables (discrete and continuous), probability density functions, properties, mathematical expectation.

**UNIT III**

**Probability distributions**

Probability distributions: Binomial, Poisson and Normal-their properties (Chebyshevs inequality). Approximation of the binomial distribution to normal distribution.

**UNIT IV****Estimation and Testing of hypothesis, large sample tests**

Estimation-parameters, statistics, sampling distribution, point estimation, Formulation of null hypothesis, alternative hypothesis, the critical and acceptance regions, level of significance, two types of errors and power of the test. Large Sample Tests: Test for single proportion, difference of proportions, test for single mean and difference of means. Confidence interval for parameters in one sample and two sample problems

**UNIT V****Small sample tests**

Student t-distribution (test for single mean, two means and paired t-test), testing of equality of variances (F-test),  $\chi^2$  - test for goodness of fit,  $\chi^2$  - test for independence of attributes.

**TEXTBOOKS**

1. Miller and Freunds, Probability and Statistics for Engineers, 7/e, Pearson, 2008.
2. S.C. Gupta and V.K. Kapoor, Fundamentals of Mathematical Statistics, 11/e, Sultan Chand & Sons Publications, 2012.

**REFERENCES**

1. *S. Ross, a First Course in Probability, Pearson Education India, 2002.*
2. *W. Feller, an Introduction to Probability Theory and its Applications, 1/e, Wiley, 1968.*
3. *B. V. Ramana, Higher Engineering Mathematics, Mc Graw Hill Education.*

**ONLINE LEARNING RESOURCES:**

1. [https://onlinecourses.nptel.ac.in/noc21\\_ma74/preview](https://onlinecourses.nptel.ac.in/noc21_ma74/preview)
2. [https://onlinecourses.nptel.ac.in/noc22\\_mg31/preview](https://onlinecourses.nptel.ac.in/noc22_mg31/preview)

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**(23CS0511) OPERATING SYSTEMS**  
**(Common to All CSE & CSE Allied branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection
2. Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
3. Illustrate different conditions for deadlock and their possible solutions.

**COURSE OUTCOMES (COs)**

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

1. Describe the basics of the operating systems, mechanisms of OS to handle processes, threads, and their communication.
2. Understand the basic concepts and principles of operating systems, including process management, memory management, file systems, and Protection.
3. Analyze the requirement for process synchronization and deadlocks handled by operating system.
4. Make use of process scheduling algorithms and synchronization techniques to achieve better performance of a computer system.
5. Illustrate different conditions for deadlock and their possible solutions.
6. Analyze the memory management and its allocation policies.

**UNIT - I**

**Operating Systems Overview:** Introduction, Operating system functions, Operating systems operations, Computing environments, Free and Open-Source Operating Systems

**System Structures:** Operating System Services, User and Operating-System Interface, system calls, Types of System Calls, system programs, Operating system Design and Implementation, Operating system structure, Building and Booting an Operating System, Operating system debugging

**UNIT - II**

**Processes:** Process Concept, Process scheduling, Operations on processes, Inter-process communication.

**Threads and Concurrency:** Multithreading models, Thread libraries, Threading issues.

**CPU Scheduling:** Basic concepts, Scheduling criteria, Scheduling algorithms, Multiple processor scheduling.

**UNIT III**

**Synchronization Tools:** The Critical Section Problem, Peterson's Solution, Mutex Locks, Semaphores, Monitors, Classic problems of Synchronization.

**Deadlocks:** system Model, Deadlock characterization, Methods for handling Deadlocks, Deadlock prevention, Deadlock avoidance, Deadlock detection, Recovery from Deadlock.

**UNIT IV**

**Memory-Management Strategies:** Introduction, Contiguous memory allocation, Paging, Structure of the Page Table, Swapping.

**Virtual Memory Management:** Introduction, Demand paging, Copy-on-write, Page replacement, Allocation of frames, Thrashing

**Storage Management:** Overview of Mass Storage Structure, HDD Scheduling.

**UNIT V**

**File System:** File System Interface: File concept, Access methods, Directory Structure; **File system Implementation:** File-system structure, File-system Operations, Directory implementation, Allocation method, Free space management; File-System Internals: File-System Mounting, Partitions and Mounting, File Sharing.

**Protection:** Goals of protection, Principles of protection, Protection Rings, Domain of protection, Access matrix.

**TEXTBOOKS**

1. Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.
2. Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson , 2016

**REFERENCES**

1. *Operating Systems -Internals and Design Principles*, Stallings W, 9th edition, Pearson, 2018
2. *Operating Systems: A Concept Based Approach*, D.M Dhamdhare, 3rd Edition, McGraw- Hill, 2013

**ONLINE LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/106/106/106106144/>
2. <http://peterindia.net/OperatingSystems.html>

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**(23CS0512) DATABASE MANAGEMENT SYSTEMS  
(Common to All CSE & CSE Allied branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. Introduce database management systems and to give a good formal foundation on the relational model of data and usage of Relational Algebra
2. Introduce the concepts of basic SQL as a universal Database language
3. Demonstrate the principles behind systematic database design approaches by covering conceptual design, logical design through normalization
4. Provide an overview of physical design of a database system, by discussing Database indexing techniques and storage techniques

**COURSE OUTCOMES (COs)**

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

1. Understand the basic concepts of database management systems
2. Analyze a given database application scenario to use ER model for conceptual design of the database
3. Develop relational algebra expressions to query and optimize the database using SQL
4. Utilize SQL proficiently to address diverse query challenges
5. Employ normalization methods to enhance database structure
6. Assess and implement transaction processing, concurrency control and database recovery protocols in databases.

**UNIT - I**

**Introduction:** Database system, Characteristics (Database Vs File System), Database Users, Advantages of Database systems, Database applications. Brief introduction of different Data Models; Concepts of Schema, Instance and data independence; Three tier schema architecture for data independence; Database system structure, environment, Centralized and Client Server architecture for the database.

**Entity Relationship Model:** Introduction, Representation of entities, attributes, entity set, relationship, relationship set, constraints, sub classes, super class, inheritance, specialization, generalization using ER Diagrams.

**UNIT - II**

**Relational Model:** Introduction to relational model, concepts of domain, attribute, tuple, relation, importance of null values, constraints (Domain, Key constraints, integrity constraints) and their importance, Relational Algebra, Relational Calculus. BASIC SQL: Simple Database schema, data types, table definitions (create, alter), different DML operations (insert, delete, update).

**UNIT III**

**SQL:** Basic SQL querying (select and project) using where clause, arithmetic & logical operations, SQL functions(Date and Time, Numeric, String conversion).Creating tables with relationship, implementation of key and integrity constraints, nested queries, sub queries, grouping, aggregation, ordering, implementation of different types of joins, view(updatable and non-updatable), relational set operations.

**UNIT IV**

**Schema Refinement (Normalization):** Purpose of Normalization or schema refinement, concept of functional dependency, normal forms based on functional dependency Lossless join and dependency preserving decomposition, (1NF, 2NF and 3 NF), concept of surrogate key, Boyce-Codd normal form(BCNF), MVD, Fourth normal form(4NF), Fifth Normal Form (5NF).

**UNIT V**

**Transaction Concept:** Transaction State, ACID properties, Concurrent Executions, Serializability, Recoverability, Implementation of Isolation, Testing for Serializability, lock based, time stamp based, optimistic, concurrency protocols, Deadlocks, Failure Classification, Storage, Recovery and Atomicity, Recovery algorithm.

**Introduction to Indexing Techniques:** B+ Trees, operations on B+Trees, Hash Based Indexing.

**TEXTBOOKS**

1. Database Management Systems, 3rd edition, Raghurama Krishnan, Johannes Gehrke, TMH (For Chapters 2, 3, 4)
2. Database System Concepts, 5th edition, Silberschatz, Korth, Sudarsan, TMH (For Chapter 1 and Chapter 5)

**REFERENCES**

3. *Data Structures and program design in C*, Robert Kruse, Pearson Education Asia
4. *An introduction to Data Structures with applications*, Trembley & Sorenson, McGraw Hill
5. *The Art of Computer Programming, Vol.1: Fundamental Algorithms*, Donald E Knuth, Addison-Wesley, 1997.
6. *Data Structures using C & C++: Langsam, Augenstein & Tanenbaum*, Pearson, 1995
7. *Algorithms + Data Structures & Programs*, N. Wirth, PHI
8. *Fundamentals of Data Structures in C++: Horowitz Sahni & Mehta*, Galgottia Pub.
9. *Data structures in Java*, Thomas Standish, Pearson Education Asia
10. *Introduction to Database Systems, 8th edition*, C J Date, Pearson.
11. *Database Management System, 6th edition*, Ramez Elmasri, Shamkant B. Navathe, Pearson

12. *Database Principles Fundamentals of Design Implementation and Management, 10th edition, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 2022*

**ONLINE LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/106/105/106105175/>
2. [https://infyspringboard.onwingspan.com/web/en/app/toc/lex\\_auth\\_01275806667282022456\\_shared/overview](https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01275806667282022456_shared/overview)

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**(23CS0513) SOFTWARE ENGINEERING  
(Common to All CSE & CSE Allied branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. *Software life cycle models, Software requirements and SRS document.*
2. *Project Planning, quality control and ensuring good quality software.*
3. *Software Testing strategies, use of CASE tools, Implementation issues, validation & verification procedures.*

**COURSE OUTCOMES (COs)**

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

1. *Perform various life cycle activities like Analysis, Design, Implementation, Testing and Maintenance*
2. *Analyze various software engineering models and apply methods for design and development of software projects.*
3. *Illustrate the design process and architectural design*
4. *Develop system designs using appropriate techniques.*
5. *Understand various testing techniques for a software project.*
6. *Apply standards, CASE tools and techniques for engineering software projects.*

**UNIT - I**

**Introduction:** Evolution, Software development projects, Exploratory style of software developments, Emergence of software engineering, Notable changes in software development practices, Computer system engineering.

**Software Life Cycle Models:** Basic concepts, Waterfall model and its extensions, Rapid application development, Agile development model, Spiral model.

**UNIT - II**

**Software Project Management:** Software project management complexities, Responsibilities of a software project manager, Metrics for project size estimation, Project estimation techniques, Empirical Estimation techniques, COCOMO, Halstead's software science, risk management.

**Requirements Analysis And Specification:** Requirements gathering and analysis, Software Requirements Specification (SRS), Formal system specification, Axiomatic specification, Algebraic specification, Executable specification and 4GL.

**UNIT III**

**Software Design:** Overview of the design process, How to characterize a good software design? Layered arrangement of modules, Cohesion and Coupling. approaches to software design.

**Agility:** Agility and the Cost of Change, Agile Process, Extreme Programming (XP), Other Agile Process Models, Tool Set for the Agile Process (Text Book 2)

**Function-Oriented Software Design:** Overview of SA/SD methodology, Structured analysis, Developing the DFD model of a system, Structured design, Detailed design, and Design Review.

**User Interface Design:** Characteristics of a good user interface, Basic concepts, Types of user interfaces, Fundamentals of component-based GUI development, and user interface design methodology.

#### UNIT IV

**Coding And Testing:** Coding, Code review, Software documentation, Testing, Black-box testing, White-Box testing, Debugging, Program analysis tools, Integration testing, Testing object-oriented programs, Smoke testing, and Some general issues associated with testing.

**Software Reliability And Quality Management:** Software reliability. Statistical testing, Software quality, Software quality management system, ISO 9000. SEI Capability maturity model. Few other important quality standards, and Six Sigma.

#### UNIT V

**Computer-Aided Software Engineering (Case):** CASE and its scope, CASE environment, CASE support in the software life cycle, other characteristics of CASE tools, Towards second generation CASE Tool, and Architecture of a CASE Environment.

**Software Maintenance:** Characteristics of software maintenance, Software reverse engineering, Software maintenance process models and Estimation of maintenance cost.

**Software Reuse:** reuse- definition, introduction, reason behind no reuse so far, Basic issues in any reuse program, A reuse approach, and Reuse at organization level.

#### TEXTBOOKS

1. Fundamentals of Software Engineering, Rajib Mall, 5th Edition, PHI.
2. Software Engineering A practitioner's Approach, Roger S. Pressman, 9th Edition, Mc-Graw Hill International Edition.

#### REFERENCES

1. *Software Engineering*, Ian Sommerville, 10th Edition, Pearson.
2. *Software Engineering, Principles and Practices*, Deepak Jain, Oxford University Press.

#### ONLINE LEARNING RESOURCES:

1. <https://nptel.ac.in/courses/106/105/106105182/>
2. [https://infyspringboard.onwingspan.com/web/en/app/toc/lex\\_auth\\_01260589506387148827\\_shared/overview](https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_01260589506387148827_shared/overview)
3. [https://infyspringboard.onwingspan.com/web/en/app/toc/lex\\_auth\\_013382690411003904735\\_shared/overview](https://infyspringboard.onwingspan.com/web/en/app/toc/lex_auth_013382690411003904735_shared/overview)

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**(23CS0514) OPERATING SYSTEMS LAB  
(Common to All CSE & CSE Allied branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. Provide insights into system calls, file systems, semaphores,
2. Develop and debug CPU Scheduling algorithms, page replacement algorithms, thread implementation
3. Implement Bankers Algorithms to Avoid the Dead Lock

**COURSE OUTCOMES (COs)**

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

1. Trace different CPU Scheduling algorithms.
2. Implement Bankers Algorithms to Avoid the Dead Lock.
3. Describe the benefits of thread over process and implement synchronized programs using multithreading concepts
4. Evaluate Page replacement algorithms.
5. Illustrate the file organization techniques.
6. Illustrate Inter process Communication and concurrent execution of threads.

**Experiments covering the Topics:**

- UNIX fundamentals, commands & system calls
- CPU Scheduling algorithms, thread processing
- IPC, semaphores, monitors, deadlocks
- Page replacement algorithms, file allocation strategies
- Memory allocation strategies

**Sample Experiments:**

1. Practicing of Basic UNIX Commands.
2. Write programs using the following UNIX operating system calls  
fork, exec, getpid, exit, wait, close, stat, opendir and readdir
3. Simulate UNIX commands like cp, ls, grep, etc.,
4. Simulate the following CPU scheduling algorithms  
a) FCFS b) SJF c) Priority d) Round Robin
5. Control the number of ports opened by the operating system with  
a) Semaphore b) Monitors.

6. Write a program to illustrate concurrent execution of threads using pthreads library.
7. Write a program to solve producer-consumer problem using Semaphores.
8. Implement the following memory allocation methods for fixed partition
  - a) First fit b) Worst fit c) Best fit
9. Simulate the following page replacement algorithms
  - a) FIFO b) LRU c) LFU
10. Simulate Paging Technique of memory management.
11. Implement Bankers Algorithm for Dead Lock avoidance and prevention
12. Simulate the following file allocation strategies
  - a) Sequential b) Indexed c) Linked

## REFERENCES

1. *Operating System Concepts, Silberschatz A, Galvin P B, Gagne G, 10th Edition, Wiley, 2018.*
2. *Modern Operating Systems, Tanenbaum A S, 4th Edition, Pearson, 2016*
3. *Operating Systems -Internals and Design Principles, Stallings W, 9th edition, Pearson, 2018*
4. *Operating Systems: A Concept Based Approach, D.M Dhamdhare, 3rd Edition, McGraw- Hill, 2013*

## ONLINE LEARNING RESOURCES:

1. <https://www.cse.iitb.ac.in/~mythili/os/>
2. <http://peterindia.net/OperatingSystems.html>

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**(23CS0515) DATABASE MANAGEMENT SYSTEMS LAB  
(Common to All CSE & CSE Allied branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. *Populate and query a database using SQL DDL/DML Commands*
2. *Declare and enforce integrity constraints on a database*
3. *Writing Queries using advanced concepts of SQL*
4. *Programming PL/SQL including procedures, functions, cursors and triggers*

**COURSE OUTCOMES (COs)**

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

1. *Utilizing Data Definition Language (DDL), Data Manipulation Language (DML), and Data Control Language (DCL) commands effectively within a database environment*
2. *Constructing and execute queries to manipulate and retrieve data from databases.*
3. *Develop application programs using PL/SQL.*
4. *Determine the transaction atomicity, consistency, isolation, and durability for a given transaction-processing system.*
5. *Analyze requirements and design custom Procedures, Functions, Cursors, and Triggers, leveraging their capabilities to automate tasks and optimize database functionality*
6. *Establish database connectivity through JDBC (Java Database Connectivity)*

**Experiments covering the topics:**

- DDL, DML, DCL commands
- Queries, nested queries, built-in functions,
- PL/SQL programming- control structures
- Procedures, Functions, Cursors, Triggers,
- Database connectivity- ODBC/JDBC

**Sample Experiments:**

1. *Creation, altering and dropping of tables and inserting rows into a table (use constraints while creating tables) examples using SELECT command.*
2. *Queries (along with sub Queries) using ANY, ALL, IN, EXISTS, NOT EXISTS, UNION, INTERSET, Constraints. Example:- Select the roll number and name of the student who secured fourth rank in the class.*
3. *Queries using Aggregate functions (COUNT, SUM, AVG, MAX and MIN), GROUP BY, HAVING and Creation and dropping of Views.*

4. Queries using Conversion functions (to\_char, to\_number and to\_date), string functions (Concatenation, lpad, rpad, ltrim, rtrim, lower, upper, initcap, length, substr and instr), date functions (Sysdate, next\_day, add\_months, last\_day, months\_between, least, greatest, trunc, round, to\_char, to\_date)
5.
  - i. Create a simple PL/SQL program which includes declaration section, executable section and exception –Handling section (Ex. Student marks can be selected from the table and printed for those who secured first class and an exception can be raised if no records were found)
  - ii. Insert data into student table and use COMMIT, ROLLBACK and SAVEPOINT in PL/SQL block.
6. Develop a program that includes the features NESTED IF, CASE and CASE expression. The program can be extended using the NULLIF and COALESCE functions.
7. Program development using WHILE LOOPS, numeric FOR LOOPS, nested loops using ERROR Handling, BUILT –IN Exceptions, USE defined Exceptions, RAISE-APPLICATION ERROR.
8. Programs development using creation of procedures, passing parameters IN and OUT of PROCEDURES.
9. Program development using creation of stored functions, invoke functions in SQL Statements and write complex functions.
10. Develop programs using features parameters in a CURSOR, FOR UPDATE CURSOR, WHERE CURRENT of clause and CURSOR variables.
11. Develop Programs using BEFORE and AFTER Triggers, Row and Statement Triggers and INSTEAD OF Triggers
12. Create a table and perform the search operation on table using indexing and non-indexing techniques.
13. Write a Java program that connects to a database using JDBC
14. Write a Java program to connect to a database using JDBC and insert values into it
15. Write a Java program to connect to a database using JDBC and delete values from it

## REFERENCES

1. *Oracle: The Complete Reference by Oracle Press*
2. *Nilesh Shah, "Database Systems Using Oracle", PHI, 2007*
3. *Rick F Vander Lans, "Introduction to SQL", Fourth Edition, Pearson Education, 2007*
4. *RamezElmasri, Shamkant, B. Navathe, "Database Systems", Pearson Education, 6th Edition, 2013.*
5. *Database Principles Fundamentals of Design Implementation and Management, 10th edition, Corlos Coronel, Steven Morris, Peter Robb, Cengage Learning, 2022*

## ONLINE LEARNING RESOURCES:

1. <http://www.scoopworld.in>
2. <http://vlabs.iitb.ac.in/vlabs-dev/labs/dblab/index.php>

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**(23CS0550) FULL STACK DEVELOPMENT – 1  
(Common to All CSE & CSE Allied branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

4. *Make use of HTML elements and their attributes for designing static web pages*
5. *Build a web page by applying appropriate CSS styles to HTML elements*
6. *Experiment with JavaScript to develop dynamic web pages and validate forms*

**COURSE OUTCOMES (COs)**

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

7. *Design Websites.*
8. *Understand basic concepts of HTML and creation of static webpages*
9. *Apply Styling to web pages.*
10. *Make Web pages interactive.*
11. *Design Forms for applications.*
12. *Choose Control Structure based on the logic to be implemented.*

**Experiments covering the Topics:**

- Lists, Links and Images
- HTML Tables, Forms and Frames
- HTML 5 and Cascading Style Sheets, Types of CSS
- Selector forms
- CSS with Color, Background, Font, Text and CSS Box Model
- Applying JavaScript - internal and external, I/O, Type Conversion
- JavaScript Conditional Statements and Loops, Pre-defined and User-defined Objects
- JavaScript Functions and Events

**Sample Experiments:**

1. Lists, Links and Images

- a. Write a HTML program, to explain the working of lists.

Note: It should have an ordered list, unordered list, nested lists and ordered list in an unordered list and definition lists.

- b. Write a HTML program, to explain the working of hyperlinks using <a> tag and href, target Attributes.

- c. Create a HTML document that has your image and your friend's image with a specific height and width. Also when clicked on the images it should navigate to their respective

profiles.

d. Write a HTML program, in such a way that, rather than placing large images on a page, the preferred technique is to use thumbnails by setting the height and width parameters to something like to 100\*100 pixels. Each thumbnail image is also a link to a full sized version of the image. Create an image gallery using this technique

## 2. HTML Tables, Forms and Frames

a. Write a HTML program, to explain the working of tables. (use tags: <table>, <tr>, <th>, <td> and attributes: border, rowspan, colspan)

b. Write a HTML program, to explain the working of tables by preparing a timetable. (Note: Use <caption> tag to set the caption to the table & also use cell spacing, cell padding, border, rowspan, colspan etc.).

c. Write a HTML program, to explain the working of forms by designing Registration form. (Note: Include text field, password field, number field, date of birth field, checkboxes, radio buttons, list boxes using <select>&<option> tags, <text area> and two buttons ie: submit and reset. Use tables to provide a better view).

d. Write a HTML program, to explain the working of frames, such that page is to be divided into 3 parts on either direction. (Note: first frame ' image, second frame ' paragraph, third frame ' hyperlink. And also make sure of using "no frame" attribute such that frames to be fixed).

## 3. HTML 5 and Cascading Style Sheets, Types of CSS

a. Write a HTML program, that makes use of <article>, <aside>, <figure>, <figcaption>, <footer>, <header>, <main>, <nav>, <section>, <div>, <span> tags.

b. Write a HTML program, to embed audio and video into HTML web page.

c. Write a program to apply different types (or levels of styles or style specification formats) - inline, internal, external styles to HTML elements. (identify selector, property and value).

## 4. Selector forms

a. Write a program to apply different types of selector forms

i. Simple selector (element, id, class, group, universal)

ii. Combinator selector (descendant, child, adjacent sibling, general sibling)

iii. Pseudo-class selector

iv. Pseudo-element selector

v. Attribute selector

## 5. CSS with Color, Background, Font, Text and CSS Box Model

a. Write a program to demonstrate the various ways you can reference a color in CSS.

b. Write a CSS rule that places a background image halfway down the page, tilting it horizontally. The image should remain in place when the user scrolls up or down.

c. Write a program using the following terms related to CSS font and text:

- i. font-size      ii. font-weight      iii. font-style
- iv. text-decoration      v. text-transformation      vi. text-alignment
- d. Write a program, to explain the importance of CSS Box model using
  - i. Content      ii. Border      iii. Margin      iv. padding

#### 6. Applying JavaScript - internal and external, I/O, Type Conversion

- a. Write a program to embed internal and external JavaScript in a web page.
- b. Write a program to explain the different ways for displaying output.
- c. Write a program to explain the different ways for taking input.
- d. Create a webpage which uses prompt dialogue box to ask a voter for his name and age. Display the information in table format along with either the voter can vote or not

#### 7. JavaScript Pre-defined and User-defined Objects

- a. Write a program using document object properties and methods.
- b. Write a program using window object properties and methods.
- c. Write a program using array object properties and methods.
- d. Write a program using math object properties and methods.
- e. Write a program using string object properties and methods.
- f. Write a program using regex object properties and methods.
- g. Write a program using date object properties and methods.
- h. Write a program to explain user-defined object by using properties, methods, accessors, constructors and display.

#### 8. JavaScript Conditional Statements and Loops

- a. Write a program which asks the user to enter three integers, obtains the numbers from the user and outputs HTML text that displays the larger number followed by the words "LARGER NUMBER" in an information message dialog. If the numbers are equal, output HTML text as "EQUAL NUMBERS".
- b. Write a program to display week days using switch case.
- c. Write a program to print 1 to 10 numbers using for, while and do-while loops.
- d. Write a program to print data in object using for-in, for-each and for-of loops
- e. Develop a program to determine whether a given number is an 'ARMSTRONG NUMBER' or not. [Eg: 153 is an Armstrong number, since sum of the cube of the digits is equal to the number i.e.,  $13 + 53 + 33 = 153$ ]
- f. Write a program to display the denomination of the amount deposited in the bank in terms of 100's, 50's, 20's, 10's, 5's, 2's & 1's. (Eg: If deposited amount is Rs.163, the output should be 1-100's, 1-50's, 1- 10's, 1-2's & 1-1's)

#### 9. JavaScript Functions and Events

- a. Design a appropriate function should be called to display
  - i. Factorial of that number

- ii. Fibonacci series up to that number
- iii. Prime numbers up to that number
- iv. Is it palindrome or not
- b. Design a HTML having a text box and four buttons named Factorial, Fibonacci, Prime, and Palindrome. When a button is pressed an appropriate function should be called to display
  - i. Factorial of that number
  - ii. Fibonacci series up to that number
  - iii. Prime numbers up to that number
  - iv. Is it palindrome or not
- c. Write a program to validate the following fields in a registration page
  - i. Name (start with alphabet and followed by alphanumeric and the length should not be less than 6 characters)
  - ii. Mobile (only numbers and length 10 digits)
  - iii. E-mail (should contain format like xxxxxxxx@xxxxxx.xxx)

### TEXTBOOKS

- 5. John Dean, Web Programming with HTML5, CSS and JavaScript, Jones & Bartlett Learning, 2019.

### REFERENCES

- 7. *Programming the World Wide Web, 7th Edition*, Robert W Sebesta, Pearson, 2013.
- 8. *Pro MERN Stack: Full Stack Web App Development with Mongo, Express, React, and Node*, Vasan Subramanian, 2nd edition, APress, O'Reilly.

### ONLINE LEARNING RESOURCES:

- 1. <https://www.w3schools.com/html>
- 2. <https://www.w3schools.com/css>
- 3. <https://www.w3schools.com/js/>
- 4. <https://www.w3schools.com/nodejs>
- 5. <https://www.w3schools.com/typescript>

**SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR  
(AUTONOMOUS)**

**II B.Tech – II Sem.**

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**(23HS0815) DESIGN THINKING FOR INNOVATION  
(Common to All Engineering Branches)**

**COURSE OBJECTIVES**

*The objectives of this course*

1. *Is to familiarize students with design thinking process as a tool for breakthrough innovation. It aims to equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems.*

**COURSE OUTCOMES (COs)**

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

1. *Define the concepts related to design thinking.*
2. *Explain the fundamentals of Design Thinking and innovation*
3. *Apply the design thinking techniques for solving problems in various sectors.*
4. *Analyze to work in a multidisciplinary environment*
5. *Evaluate the value of creativity*
6. *Formulate specific problem statements of real time issues*

**UNIT - I**

**Introduction to Design Thinking**

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

**UNIT - II**

**Design Thinking Process**

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

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

**UNIT III**

**Innovation**

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

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

**UNIT IV****Product Design**

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

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

**UNIT V****Design Thinking in Business Processes**

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

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

**TEXTBOOKS**

1. Tim Brown, Change by design, Harper Bollins (2009)
2. Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.

**REFERENCES**

1. David Lee, *Design Thinking in the Classroom*, Ulysses press
2. Shruti N Shetty, *Design the Future*, Norton Press
3. William Lidwell, *Universal Principles of Design*- Kritina Holden, Jill Butter.
4. Chesbrough, H, *The Era of Open Innovation* – 2013

**ONLINE LEARNING RESOURCES:**

1. <https://nptel.ac.in/courses/110/106/110106124/>
2. <https://nptel.ac.in/courses/109/104/109104109/>
3. [https://swayam.gov.in/nd1\\_noc19\\_mg60/previe](https://swayam.gov.in/nd1_noc19_mg60/previe)

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**II B.Tech – II Sem.**

**SUGGESTIVE LIST OF PROGRAMMES UNDER COMMUNITY SERVICE PROJECT**  
**(Common to All Engineering Branches)**

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The following the recommended list of projects for engineering students. The lists are not exhaustive and open for additions, deletions, and modifications. Colleges are expected to focus on specific local issues for this kind of project. The students are expected to carry out these projects with involvement, commitment, responsibility, and accountability. The mentors of a group of students should take the responsibility of motivating, facilitating, and guiding the students. They have to interact with local leadership and people and appraise the objectives and benefits of this kind of project. The project reports shall be placed in the college website for reference. Systematic, Factual, methodical and honest reporting should be ensured.

**For Engineering Students**

1. *Water facilities and drinking water availability*
2. *Health and hygiene*
3. *Stress levels and coping mechanisms*
4. *Health intervention programmes*
5. *Horticulture*
6. *Herbal plants*
7. *Botanical survey*
8. *Zoological survey*
9. *Marine products*
10. *Aqua culture*
11. *Inland fisheries*
12. *Animals and species*
13. *Nutrition*
14. *Traditional health care methods*
15. *Food habits*
16. *Air pollution*
17. *Water pollution*
18. *Plantation*
19. *Soil protection*
20. *Renewable energy*
21. *Plant diseases*
22. *Yoga awareness and practice*
23. *Health care awareness programmes and their impact*
24. *Use of chemicals on fruits and vegetables*
25. *Organic farming*
26. *Crop rotation*
27. *Floury culture*
28. *Access to safe drinking water*

29. *Geographical survey*
30. *Geological survey*
31. *Sericulture*
32. *Study of species*
33. *Food adulteration*
34. *Incidence of Diabetes and other chronic diseases*
35. *Human genetics*
36. *Blood groups and blood levels*
37. *Internet Usage in Villages*
38. *Android Phone usage by different people*
39. *Utilization of free electricity to farmers and related issues*
40. *Gender ration in schooling level- observation.*

**Complementing the community service project the students may be involved to take up some awareness campaigns on social issues/special groups. The suggested list of programs**

#### **Programs for School Children**

1. *Reading Skill Program (Reading Competition)*
2. *Preparation of Study Materials for the next class.*
3. *Personality / Leadership Development*
4. *Career Guidance for X class students*
5. *Screening Documentary and other educational films*
6. *Awareness Program on Good Touch and Bad Touch (Sexual abuse)*
7. *Awareness Program on Socially relevant themes.*

#### **Programs for Women Empowerment**

1. *Government Guidelines and Policy Guidelines*
2. *Women's Rights*
3. *Domestic Violence*
4. *Prevention and Control of Cancer*
5. *Promotion of Social Entrepreneurship*

#### **General Camps**

1. *General Medical camps*
2. *Eye Camps*
3. *Dental Camps*
4. *Importance of protected drinking water*
5. *ODF awareness camp*
6. *Swatch Bharath*
7. *AIDS awareness camp*
8. *Anti-Plastic Awareness*
9. *Programs on Environment*
10. *Health and Hygiene*
11. *Hand wash programmes*
12. *Commemoration and Celebration of important days*

**Programs for Youth Empowerment**

1. *Leadership*
2. *Anti-alcoholism and Drug addiction*
3. *Anti-tobacco*
4. *Awareness on Competitive Examinations*
5. *Personality Development*

**Common Programs**

1. *Awareness on RTI*
2. *Health intervention programmes*
3. *Yoga*
4. *Tree plantation*
5. *Programs in consonance with the Govt. Departments like –*
  - i. *Agriculture*
  - ii. *Health*
  - iii. *Marketing and Cooperation*
  - iv. *Animal Husbandry*
  - v. *Horticulture*
  - vi. *Fisheries*
  - vii. *Sericulture*
  - viii. *Revenue and Survey*
  - ix. *Natural Disaster Management*
  - x. *Irrigation*
  - xi. *Law & Order*
  - xii. *Excise and Prohibition*
  - xiii. *Mines and Geology*
  - xiv. *Energy*

**Role of Students:**

- *Students may not have the expertise to conduct all the programmes on their own. The students then can play a facilitator role.*
- *For conducting special camps like Health related, they will be coordinating with the Governmental agencies.*
- *As and when required the College faculty themselves act as Resource Persons.*
- *Students can work in close association with Non-Governmental Organizations like Lions Club, Rotary Club, etc or with any NGO actively working in that habitation.*
- *And also, with the Governmental Departments. If the program is rolled out, the District Administration could be roped in for the successful deployment of the program.*
- *An in-house training and induction program could be arranged for the faculty and participating students, to expose them to the methodology of Service Learning.*

### Timeline for the Community Service Project Activity

**Duration: 8 weeks**

#### **1. Preliminary Survey (One Week):**

- *A preliminary survey including the socio-economic conditions of the allotted habitation to be conducted.*
- *A survey form based on the type of habitation to be prepared before visiting the habitation with the help of social sciences faculty. (However, a template could be designed for different habitations, rural/urban.*
- *The Governmental agencies, like revenue administration, corporation and municipal authorities and village secretariats could be aligned for the survey.*

#### **2. Community Awareness Campaigns (One Week):**

- *Based on the survey and the specific requirements of the habitation, different awareness campaigns and programmes to be conducted, spread over two weeks of time. The list of activities suggested could be taken into consideration.*

#### **3. Community Immersion Programme (Three Weeks):**

- *Along with the Community Awareness Programmes, the student batch can also work with any one of the below-listed governmental agencies and work in tandem with them. This community involvement programme will involve the students in exposing themselves to experiential learning about the community and its dynamics. Programs could be in consonance with the Govt. Departments.*

#### **4. Community Exit Report (One Week):**

- *During the last week of the Community Service Project, a detailed report of the outcome of the 8 weeks' works to be drafted and a copy shall be submitted to the local administration. This report will be a basis for the next batch of students visiting that habitation. The same report submitted to the teacher-mentor will be evaluated by the mentor and suitable marks are awarded for onward submission to the University. Throughout the Community Service Project, a daily logbook need to be maintained by the students batch, which should be countersigned by the governmental agency representative and the teacher-mentor, who is required to periodically visit the students and guide them*