B. TECH.

COURSE STRUCTURE AND SYLLABUS
For
CIVIL ENGINEERING

(Applicable for the batches admitted from 2025-26)

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT
(AN AUTONOMOUS INSTITUTION AFFILIATED TO JNTUGV, VIZIANAGARAM)

Approved By AICTE, New Delhi, Accredited By NBA, AICTE & NAAC, UGC, New Delhi, Listed Under 2(F) & 12(B), UGC, New Delhi, TEQIP Participated College. K.KOTTURU, TEKKALI,- 532 201, SRIKAKULAM DIST., AP

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
AR 25 – COURSE STRUCTURE (1ˢᵗ B.Tech.)
(Proposed for Civil Engineering)

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
I B.Tech. **(1ˢᵗSem)**	MC	25MCS101	Induction Program	3weeks			0
	BH	25BHT102	Linear Algebra & Calculus	2	1	0	3
	BH	25BHT104	Engineering Physics	3	0	0	3
	ES	25EST102	Basic Electrical and Electronics Engineering	3	0	0	3
	ES	25EST106	Computer Programming	3	0	0	3
	ES	25EST103	Engineering Graphics	1	0	4	3
	BH	25BHL102	Engineering Physics Lab	0	0	3	1.5
	ES	25ESL102	Basic Electrical and Electronics Engineering Lab	0	0	3	1.5
	ES	25ESL105	Computer Programming Lab	0	0	3	1.5
	MS	25MCS102	NSS/NCC/Scouts & Guides/Community Service	0	0	1	0.5
Total				**12**	**1**	**14**	**20**

Year/Sem.	Category	Code	Theory/Lab	L	T	P	C
I B.Tech. **(2ⁿᵈSem)**	BH	25BHT101	Communicative English	3	0	0	3
	BH	25BHT103	Differential Equations and Vector Calculus	2	1	0	3
	BH	25BHT105	Engineering Chemistry	3	0	0	3
	ES	25EST104	Engineering Mechanics	3	0	0	3
	PC	25CET101	Building Materials and Planning	3	0	0	3
	ES	25ESL104	Engineering Workshop	0	0	3	1.5
	BH	25BHL101	Communicative English Lab	0	0	3	1.5
	BH	25BHL103	Engineering Chemistry Lab	0	0	3	1.5
	MC	25MCS103	Health and Wellness, Yoga and Sports	0	0	1	0.5
	BH	25BHS104	Design Thinking and Sustainable Development	1	0	2	2
Total				**15**	**1**	**12**	**22**
Mandatory Socially Relevant Internship using Design Thinking and Sustainable Development of 02 weeks duration							

INDUCTION PROGRAMME
(Common to all branches of engineering)

L	T	P	C
	3 weeks		0

Subject Code: 25MCS101

S. No.	Course Name	Category	L-T-P-C
1	Physical Activities--Sports, Yoga and Meditation, Plantation	MC	0-0-6-0
2	Career Counseling	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

LINEAR ALGEBRA & CALCULUS
(Common to all branches of engineering)

Subject Code: 25BHT102

L	T	P	C
2	1	0	3

Course Objectives:

The objectives of this course are to:

1. Understand and apply fundamental concepts of matrices, including rank, inverse, and solutions of linear systems using direct and iterative methods.
2. Explore linear and orthogonal transformations, eigen values, eigenvectors, and apply the Cayley-Hamilton theorem and canonical forms.
3. Gain proficiency in calculus through the application of Mean Value Theorems and function approximations using Taylor's and Maclaurin's series.
4. Analyze and apply techniques in multi variable calculus including partial differentiation, Jacobian and optimization using Lagrange multipliers.
5. Apply double and triple integration techniques for calculating areas, volumes and other applications in engineering contexts.

Course Outcomes:

On successful completion of this course, students will be able to:

- **CO1:** solve systems of linear equations and analyze matrices using rank, inverse, and elimination methods.
- **CO2:** analyze and simplify matrices using eigenvalues, eigenvectors and the Cayley-Hamilton theorem.
- **CO3:** apply mean value theorems and function expansions to approximate and interpret real-valued functions.
- **CO4:** use multi-variable calculus to find partial derivatives and solve optimization problems.
- **CO5:** compute and apply double and triple integrals to evaluate areas and volumes in engineering contexts**.**

UNIT–I: Matrices:
Rank of a matrix by echelon form and normal form; inverse of non-singular matrices using Gauss-Jordan method. System of linear equations: Solving homogeneous and non-homogeneous systems using Gauss elimination method and Gauss-Seidel iteration method.

UNIT–II: Linear Transformation and Orthogonal Transformation:
Eigen values and eigenvectors and their properties (without proof); diagonalization of a matrix; Cayley-Hamilton Theorem (without proof); finding the inverse and powers of a matrix using the Cayley-Hamilton Theorem. Quadratic forms: Nature of quadratic forms; reduction of quadratic forms to canonical form using orthogonal transformation.

UNIT–III: Calculus:
Mean Value Theorems: Rolle's Theorem, Lagrange's Mean Value Theorem and Cauchy's Mean Value Theorem with geometrical interpretations.Taylor's and Maclaurin's Theorems with remainders (without proof); problems and applications based on the above theorems.

UNIT–IV: Partial Differentiation and Applications (Multivariable Calculus):
Partial derivatives, total derivatives, chain rule, change of variables; Taylor's and Maclaurin's series expansion for functions of two variables; Jacobians; maxima and minima of functions of two variables; method of Lagrange multipliers.

UNIT–V: Multiple Integrals (Multivariable Calculus):
Double integrals – change of variables (Cartesian and Polar coordinates); change of order of integration. Triple integrals – cylindrical and spherical coordinates. Applications of double integrals (Area) and triple integrals (Volumes).

Text Books*:*
1. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna Publishers, 2017.
2. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, JohnWiley & Sons, 2018.
3. B.V. Ramana, Higher Engineering Mathematics, McGraw Hill Education, 2018.

Reference Books:
1. T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham & M.V.S.S.N.Prasad, Engineering Mathematics-I, S.Chand Publisher, 2020.
2. R.K. Jainand S.R.K. Iyengar, Advanced Engineering Mathematics, 5/Ed, Alpha Science International Ltd.,2021 (9th reprint).
3. Michael Greenberg, Advanced Engineering Mathematics, 9[th]edition, Pearson edn.

ENGINEERING PHYSICS
(Common for all branches)

Subject Code: 25BHT104

L	T	P	C
3	0	0	3

Course Objectives

To introduce the basic concepts of physical optics phenomena, such as interference and diffraction. Understanding of the concepts of quantum mechanics and semiconductor physics, as well as dielectric and magnetic materials, that lead to potential applications in emerging micro devices.

Course Outcomes: The students will be able to

CO-1: Understand the phenomenon of interference and diffraction of light, enabling precise analysis of optical instruments.

CO-2: Acquire foundational insight into the quantum nature of the particles and electronic properties of the semiconductors.

CO-3: Develop insight into the dielectric and magnetic properties of materials

CO-4: Analyze the crystal structures by X-ray diffraction techniques.

CO-5: Apply the basic knowledge of lasers and fiber optics to analyze their construction.

UNIT-I: WAVE OPTICS   **10 hrs**

Interference: Introduction **-** Principle of superposition and its Analytical treatment - Interference of light - Interference in thin films (Reflection Geometry) - Colors in thin films- Newton's Rings- Determination of wavelength and refractive index.

Diffraction: Introduction –difference between interference and diffraction – difference between Fresnel and Fraunhofer diffractions - Fraunhofer diffraction due to single slit, double slit & Diffraction Grating (N-slit) – Maximum number of orders possible – determination of wavelength of laser.

Unit-II: QUANTUM MECHANICS ANDSEMICONDUCTORS   **10hrs**

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

Semiconductors: Formation of energy bands – classification of crystalline solids - Intrinsic semiconductors and Extrinsic semiconductors - Drift and diffusion currents – Einstein's equation - Hall effect and its Applications.

UNIT-III: DIELECTRICS AND MAGNETIC MATERIALS   **8hrs**

Dielectric Materials: Introduction - Dielectric polarization - Dielectric polarizability, Susceptibility, Dielectric constant and Displacement Vector - Types of polarizations- Electronic (Quantitative), Ionic (Quantitative) and Orientation polarizations (Qualitative) - Lorentz internal field - Clausius-Mossotti equation.

Magnetic Materials: Introduction - Magnetic dipole moment – Magnetization-Magnetic susceptibility and permeability - Classification of magnetic materials: Dia, Para, Ferro, Antiferro & Ferri magnetic materials - Domain concept for Ferromagnetism (Qualitative) - Hysteresis - soft and hard magnetic materials.

UNIT IV: CRYSTALLOGRAPHY & X-RAY DIFFRACTION   **10 hrs**
Crystallography: Space lattice, Basis, Unit Cell and lattice parameters – Bravais Lattices – crystal systems (3D) – coordination number - packing fraction of SC, BCC & FCC
X-ray diffraction: Miller indices – separation between successive (hkl) planes - Bragg's law - X-ray Diffractometer – crystal structure determination by Laue method and Powder method.

Unit – V: LASERS & OPTICAL FIBER   **10 hrs**
LASERS: Introduction - Characteristics of Lasers - Principles of Laser: Absorption, Spontaneous emission, stimulated emission, principle of lasing action, population inversion, pumping, Types of Lasers: Helium-Neon Laser [Four Level System] –semiconductor laser - Applications of Lasers.
OPTICAL FIBER: Introduction - Construction of Optical Fiber - Principle of Optical Fiber: Total Internal Reflection - Numerical Aperture and Acceptance Angle - Classification of optical fibers based on refractive index profile - Applications of Optical Fibers in Communication.

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

Reference Books
1. "Fundamentals of Physics" - Halliday, Resnick and Walker, John Wiley &Sons.
2. "Engineering Physics" - M.R. Srinivasan, New Age international publishers (2009).
3. "Engineering Physics" - Shatendra Sharma, Jyotsna Sharma, Pearson Education, 2018.
4. "Engineering Physics" - Sanjay D. Jain, D. Sahasrabudhe and Girish, University Press.
5. "Semiconductor physics and devices:Basic principle" - A. Donald, Neamen, Mc GrawHill.
6. "Engineering Physics" - B.K. Pandey and S. Chaturvedi, Cengage Learning
7. "Solid state physics" – A.J.Dekker ,Pan Macmillan publishers
8. "Introduction to Solid State Physics" - Charles Kittel ,Wiley

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Common to CSE/IT/CSM/CSD/CSC/ME/CE)

Subject Code: 25EST102

L	T	P	C
3	0	0	3

Course Objectives

- To introduce the basic knowledge of electric circuits
- To analyze AC circuits.
- To provide knowledge on DC Machines.
- To understand the working, characteristics of PN Junction diode, Zener diode
- To explain the working of Rectifiers, Characteristics of transistor in Common base Configuration.

Course Outcomes

1. Able to summarize different electrical circuits.
2. Able to Summarize the behavior of AC circuits.
3. Able to examine the operation of DC Machines.
4. Able to Describe the working of PN Junction diode, Zener diode
5. Able to describe the working of Rectifiers and behavior of transistor (BJT) in Common base Configuration.

Unit–I
Introduction to Electric Circuits
Basic definitions, Electrical circuit elements (R, L and C), Voltage and current sources Independent and dependent sources, Ohm's Law, Series & Parallel circuits, Voltage and current division Rules, Source transformation, Kirchhoff's Laws, Faraday's laws of electromagnetic induction and simple problems.

Unit–II
AC Circuits
Basic definitions, Representation of sinusoidal waveforms, peak and RMS values, phasor representation, Analysis of single-phase ac circuits consisting of R, L, C, RL, RC, RLC combinations (series only), real power, reactive power, apparent power, power factor, simple problems.

Unit–III
DC Machines
DC Generator: Generator- Principle of Operation, Construction, EMF equation, Classification,
DC Motor: Motor- principle of operation, Torque equation, Classification, Speed Control Methods, Operation of three point starter

Unit–IV
Diode Characteristics
Formation of PN junction diode, V-I Characteristics of Diode, Diode as a switch, Zener Diode Characteristics, Zener Diode as Voltage Regulator.
Rectifiers: Hale wave Rectifier, Full Wave rectifier (Mid point Center tapped Connection Diode only)

Unit–V

Transistor Characteristics Bipolar Junction Transistors (BJT) - input & output Characteristics of transistor in CB configuration, Relationship between α, β and γ.

Text Books:
1. D.P. Kothari and I.J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill, 2010.
2. Integrated Electronics – Jacob Millman, Chritos C. Halkies, Tata Mc-Graw Hill 2009.

Reference Books:
1. Electronic Devices and Circuits–R.L. Boylestad and Louis Nashelsky, Pearson/Prentice Hall, 9th Edition, 2006.
2. Principles of Electrical and Electronics Engineering by V.K. Mehta, S. Chand & Co.

Computer Programming
(Common to all branches of engineering)

Subject Code: 25EST106

L	T	P	C
3	0	0	3

Course Objectives
- To provide a strong foundation in problem solving and programming is using the C language.
- This course introduces number systems, core programming concepts, control structures, arrays, functions, pointers, structures, and file handling.
- Emphasis is on writing efficient, modular, and error-free programs suitable for real-world applications.

Course Outcomes
Upon successful completion of this course, students will be able to:
1. Explore number systems and develop basic C programs using algorithms, flowcharts, and simple I/O operations.
2. Apply decision-making, looping, and branching statements to solve conditional and repetitive problems.
3. Use arrays and strings for data storage and manipulation.
4. Design modular programs using functions and apply pointer concepts for dynamic and memory optimized programs.
5. Devise programs to manage and store complex data using structures and files.

Unit–I
Introduction to Number System: Number Systems - Binary, Decimal, Octal, and Hexadecimal Systems, and Conversions
Introduction to Programming: Introduction to components of the Computer system, Algorithm, Flow chart, Program development steps, C Tokens, Data Types, Operator precedence and associativity, Expression Evaluation, Structure of C program, simple programs using formatted and unformatted I/O statements, preprocessor directives.

Unit–II
Control Structures:
Decision statements: if, if-else, nested if, if-else-if ladder, and switch case.
Iterative statements: while, do-while, for, nested loops.
Branching Statements: Break and continue.

Unit–III
Arrays: Definition, Types of Arrays, declaration, initialization, Operations on arrays.
Strings: Fundamentals, declaration, initialization, accessing string, String manipulation.

Unit–IV
Functions: Definition and use, Declaration, Types of Functions, Parameter passing (Call by value and call by reference), Passing Arrays, Recursion, Recursion vs. Iteration, function Vs Macro, Storage classes. **Pointers:** Definition, Declaration, Initialization, Pointer arithmetic, functions and pointers, Pointer to pointer, arrays and pointers, Pointers as Function Arguments, DMA.

Unit–V
Structures, Unions and File Handling
Structures: Definition, Declaration, Accessing the structure elements, Array of structures, Arrays with in structures, pointer to structure, passing structure to function, nested structures, self-referential structures, bit fields.

File Handling: Purpose, Types of files, file opening modes, closing a file, file I/O, Error Handling, Random Access to Files, Command line arguments.

Text Books:
1. B. W. Kernighan and D. M. Ritchie, The C Programming Language, 2nd ed., Englewood Cliffs, NJ, USA: Prentice-Hall, 1988.
2. Y.Kanetkar, Let UsC,20th ed., New Delhi, India: BPB Publications,2024.
3. N.Kamthane, Programming in C, 3rded.,New Delhi,India:Pearson Education,2015.

Reference Books
1. E.Balagurusamy, Programming in ANSIC,9thed.,NewDelhi,India:McGraw-HillEducation, 2024.
2. B.S.Gottfried, Programming with C,2nded.,NewYork,NY,USA:McGraw-HillEducation,2006.

Resource Links
1. https://www.programiz.com/c-programming
2. https://www.geeksforgeeks.org/c/c-programming-language/
3. https://www.tutorialspoint.com/cprogramming/index.htm

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ENGINEERING GRAPHICS

(Common to ME and CE)

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Subject Code: 25EST103

L	T	P	C
1	0	4	3

COURSE OBJECTIVES:

- To enable the students with various concepts like dimensioning, conventions andstandards related to Engineering Drawing
- To impart knowledge on the projection of points, lines, planes, and solids
- To develop the imaginative skills of the students required to understand the development of surfaces
- To improve the visualization skills for better understanding of conversion of orthographic to isometric views and vice-versa

COURSE OUTCOMES:

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

CO1:   Draw engineering curves (Conics, Cycloids, and Involutes)
CO2:   Draw projection of points, straight lines and planes using first angle projection
CO3:   Draw projection of solids in various positions
CO4:   Draw the development of lateral surface for different solids.
CO5:   Convert orthographic views into isometric projections and vice-versa.

UNIT - I

Introduction: Drawing Instruments and their uses, Types of Lines and Dimensioning, Line bisecting, Angle bisecting, Line divided into equal number of parts, Construction of Regular Polygons (general method).
Construction of ellipse, parabola, and hyperbola (general method)
Construction of ellipse (Oblong method and Concentric circles method)
Construction of Cycloid and Involutes

UNIT - II

Introduction to Orthographic Projections (First Angle Projection only).
Projections of Points: A point situated in I,II,III & IV quadrants.
Projections of Straight Lines: Line parallel to one or both the planes, Line contained by one or both the planes, Line perpendicular to one of the planes, Line inclined to one plane and parallel to other.
Projections of Planes: Types of planes, plane parallel to one of the planes, and plane inclined to one reference plane.

UNIT - III

Projections of Solids (Polyhedra): Types of Solids, Projections of Solids in simple positions, Projections of Solids axis inclined to the VP and parallel to the HP. Projections of Solids axis inclined to the HP and parallel to the VP.
Projections of Solids (Solids of revolution): Projections of Solids axis inclined to the VP and parallel to the HP. Projections of Solids axis inclined to the HP and parallel to the VP.

UNIT - IV
Development of Surfaces:
Parallel line method of development, Developments of lateral surfaces of right Solids i.e.,
Cube, Prisms, Cylinders.
Radial line method of development, Development of lateral surfaces of right Solids i.e.,
Pyramids, Cones.

UNIT - V
Orthographic Projections: Conversion of pictorial view (Isometric views) into orthographic
views.
Isometric Projections: Isometric axes, lines & planes. Isometric scale, Isometric drawing,
Isometric drawing of plane figures, prisms and pyramids. Conversion of orthographic views
into Isometric views.

Text Books
1. Engineering Drawing, N. D. Bhatt, V. M. Panchal, Charotar Pub
2. Engineering Drawing, K. L .Narayana, P.Kanniah, Scitech Pub.

Reference Books
1. Engineering Drawing and Graphics, 2nd ed., K. Venugopal, New Age International
   Pub.
2. Fundamentals of Engineering Drawing, 11th ed., Luzadder, J. Warren, D.M. Jon,
   Prentice Hall IndiaPub

AR25 - B. Tech. –Civil   **I Year I Semester**
Engineering Physics Lab
(Common to all branches of engineering)

Subject Code: 25BHL102

L	T	P	C
0	0	3	1.5

Course Objectives
Applying the basic concepts of optical phenomena like interference and diffraction for verifying dimensions of thin objects, recognising the importance of the energy gap in the study of electrical properties of semiconductors, and investigating the parameters and applications of lasers and optical fibers through experiments.

Course Outcomes: The students will be able to
CO-1: Verify the microscopic dimensions of the objects by applying principles of interference and diffraction.
CO-2: Acquire a practical understanding of semiconductor physics by analyzing electronic Properties of the semiconductors.
CO-3: Analyze the induced magnetic field in a current-carrying circular coil.
CO-4: Corroborate the mechanical properties of the materials
CO-5: Evaluate the characteristics of the lasers and fiber optics

List of Experiments
1. Determination of the radius of curvature of a given Plano-convex lens by Newton's rings.
2. Determination of the thickness of a thin object using wedge shaped film.
3. Determination of wave lengths of different spectral lines in the mercury spectrum using a diffraction grating in normal incidence configuration.
4. Determination of the width of a slit using the diffraction phenomenon.
5. Determination of the temperature coefficient of a thermistor.
6. Determination of the energy band gap of a given semiconductor
7. To study the V-I characteristics of a pn junction diode in forward and reverse biasing conditions.
8. Magnetic field along the axis of a current-carrying circular coil by Stewart Gee's Method.
9. DeterminationofaccelerationduetogravityandradiusofGyrationbyusingacompound pendulum.
10. Determination of the rigidity modulus of the material of the given wire using the Torsional pendulum
11. Determination of the wave length of Laser light using a diffraction grating.
12. Determination of Numerical Aperture and Bending Loss of an Optical Fiber
13. Determination of Hall voltage and Hall coefficient of a given semiconductor using the Hall effect.
14. Sonometer: Verification of laws of stretched string.
15. Determination of the Frequency of the electrically maintained tuning fork by Melde's experiment.

16. Determination of crystal structure and lattice parameter of a given crystal using powder diffraction data.
17. Determination of Young's modulus of the given beam by non-uniform bending.
18. Determination of dielectric constant using the resonance method.

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

References:
- A Text book of Practical Physics-S. Balasubramanian, M.N. Srinivasan, S.Chand Publishers, 2017.

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

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING LAB
(Common to CSE/IT/CSM/CSD/CSC/ME/CE)

Subject Code: 25ESL102

L	T	P	C
0	0	3	1.5

Course Objective:
- To introduce the basic laws related to electrical and electronics Circuits.
- To provide knowledge on Speed control Methods on DC motors.
- To analyze V-I characteristics of P-N diode and Zener diode.
- To provide knowledge on transistor Common base Configuration.
- To provide knowledge on Half and Full Wave Rectifiers.

Course Outcomes:

Students will be able to
1. Demonstrate various basic electrical Circuits.
2. Demonstrate Speed control Methods of DC motors.
3. Analyze the V-I characteristics of P-N diode and zener diode.
4. Analyze the Transistor Common base Configuration characteristics.
5. Demonstrate the performance of on Half and Full Wave Rectifiers.

List of Experiments

1. Verification of Ohm'slaw.
2. Verification of Kirchhoff's current law
3. Verification of Kirchhoff's voltage law.
4. Verification of total resistance of the series and parallel connected circuits.
5. Verification on Measurement of power factor of series RL circuit.
6. Verification on Speed control Methods of DC motor.
7. Verification of PN Junction diode forward and reverse bias characteristics.
8. Verification of Zener diode characteristics.
9. Verification of Transistor CB characteristics (Input and Output).
10. Verification of Half wave rectifier (With and without Capacitor).

Additional Experiments

11. Verification of Full wave rectifier (With and without Capacitor).
12. Verification of operation and working of three point starter.

Computer Programming Lab
(Common to all branches of engineering)

Subject Code: 25ESL105

L	T	P	C
0	0	3	1.5

Course Objectives
- To equip students with hands-on programming skills using the C language by solving a variety of real-life and algorithmic problems.
- The course emphasizes the use of control structures, arrays, functions, pointers, structures, and file handling through practical implementation.
- It aims to develop logical thinking and modular coding practices aligned with foundational computing principles.

Course Outcomes
Upon successful completion of this course, students will be able to:
- Apply basic C programming constructs such as variables, data types, operators, and input/output operations to solve simple problems.
- Develop programs using control structures to implement decision making and iterative tasks.
- Demonstrate the usage of arrays to solve problems related to lists of elements.
- Implement modular and memory optimized programs using functions and pointers.
- Design programs using structures and file handling techniques to manipulate stored data.

List of Experiments
1. Write the C programs to perform the following
    a) Simple and compound interest calculation
    b) Find the maximum of 3values using the conditional operator.
    c) Inter changing values of two variables.
2. Write the C programs to perform the following
    a) Demonstrate the precedence and associativity among operators using single expression
    b) Demonstrate the type casting operations
    c) Demonstrate different format specifies on different data types
3. Write C programs for the following using decision making statements
    a) Find roots of quadratic equation.
    b) Find the max and min of three numbers using if-else.
    c) Determine type of character (vowel, consonant, digit, specialcharacter).
4. Write the C programs to perform the following
    a) Read a number and display in reverse.
    b) Check for Armstrong number property
    c) Convert a binary number (entered as an integer) into its decimal equivalent.
5. Write a menu-driven C program using switch-case and loops to display:
    a) Prime numbers in a given range
    b) Fibonacci series
    c) Different patterns like Pascal triangle

6. Implement the following using arrays
   a) Largest and smallest from a list of elements.
   b) Program for Linear Search.
   c) Program for arranging elements.

7. Implement the following using arrays
   a) To count the total number of duplicate elements in anarray.
   b) Matrix addition
   c) Matrix multiplication
8. Write a program in C using functions
   a) Implementation of strong number property.
   b) Implementation of call by value and call by reference
   c) Demonstratethestringoperationswithandwithoutlibraryfunctions(length,reverse,copy, concatenation, compare)
9. Write the C programs to perform the following
   a) GCD using recursion and non-recursion.
   b) Demonstrate working of macros vs functions.
10. Write the C programs to perform the following
   a) Find the sum and average of the list of elements using DMA Functions
   b) Demonstrate pointer arithmetic.
11. Write the C programs to perform the following
   a) Passing structure as a parameter to a function
   b) Nested structures.
12. Write the C programs to perform the following
   a) Count the number of lines, words, and characters in a file using command line arguments.
   b) Merging the contents of two files into a new file.

Text Books
   1. B.W.Kernighan and D.M.Ritchie, The C Programming Language,2nded.,EnglewoodCliffs,NJ, USA: Prentice-Hall, 1988.
   2. Y.Kanetkar, Let UsC,20thed.,NewDelhi,India:BPBPublications,2024.
   3. N.Kamthane, Programming in C,3rded.,NewDelhi,India:PearsonEducation,2015.

Reference Books
   1. E.Balagurusamy, Programming in ANSIC,9thed.,NewDelhi,India:McGraw-HillEducation, 2024.
   2. B.S.Gottfried,Programming with C,2nded.,NewYork,NY,USA:McGraw-HillEducation,2006.

Reference Links
   1. https://www.programiz.com/c-programming
   2. https://www.geeksforgeeks.org/c/c-programming-language/
   3. https://www.tutorialspoint.com/cprogramming/index.htm

NSS/NCC/Scouts & Guides/Community Service
(Common to all branches of engineering)

Subject Code: 25MCS102

L	T	P	C
0	0	1	0.5

Course Objectives
The objective of introducing this course is to impart discipline, character, fraternity, teamwork, social consciousness among the students and engaging them in selfless service.
Course Outcomes
Up on successful completion of this course, students will be able to:
1. Understand the importance of discipline, character and service motto.
2. Solve some societal issues by applying acquired knowledge, facts, and techniques.
3. Explore human relationships by analyzing social problems.
4. Determine to extend their help for the fellow beings and down trodden people.
5. Develop leader ship skills and civic responsibilities.

Unit – I Orientation
General Orientation on NSS/NCC/Scouts & Guides/Community Service activities, career guidance.
Activities:
   i). Conducting –ice breaking sessions-expectations from the course-knowing personal talents and skills
   ii). Conducting orientations programs for the students –future plans-activities-releasing road map etc.
   iii). Displaying success stories-motivational biopic-award winning movies on societal issues etc.
   iv). Conducting talent show in singing patriotic songs-paintings-any other contribution.

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

Unit – III Community Service
Activities:
   1. Conducting One Day Special Campina village contacting village-area leaders-Survey in the village, identification of problems- helping them to solve via media-authorities- experts-etc.
   2. Conducting awareness programs on Health-related issues such as General Health, Mental health, Spiritual Health, HIV/AIDS,
   3. Conducting consumer Awareness. Explaining various legal provisions etc.

4. Women Empowerment Programmes Sexual Abuse, Adolescent Health and Population Education.
5. 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,VidyaKutirPublication,2021(ISBN978-81-952368-8-6)
2. Red Book-National Cadet Corps–Standing Instructions VolI & II, Directorate General of NCC, Ministry of Defence, New Delhi
3. DavisM.L.andCornwellD.A.,―IntroductiontoEnvironmentalEngineeringǁ,McGrawHill,New York 4/e 2008
4. Masters G.M.,Joseph K.and Nagendran R.―Introduction to Environmental Engineering and Scienceǁ, Pearson Education, New Delhi. 2/e 2007
5. Ram Ahuja. Social Problems in India, Rawat Publications, New Delhi.

COMMUNICATIVE ENGLISH
(Common to all branches of engineering)

Subject Code: 25BHT101

L	T	P	C
3	0	0	3

Course Objectives:

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

Course Outcomes

By the end of this course, learners will be able to:
1. **Identify** and **comprehend** the main ideas, supporting details, and context from literary texts and audio materials. *(Remembering, Understanding)*
2. **Demonstrate** the ability to participate in conversations and discussions by **expressing** ideas clearly on familiar and academic topics. *(Applying, Analyzing)*
3. **Compose** grammatically accurate sentences, paragraphs, and emails using appropriate structure and punctuation. *(Applying, Creating)*
4. **Apply** reading strategies such as skimming, scanning, and inference to **analyze** written texts effectively. *(Applying, Analyzing)*
5. **Use** a range of vocabulary, including synonyms, antonyms, and technical terms, to **enhance** both spoken and written communication. *(Understanding, Applying)*

Instructions:

1. There adding texts can be given as podcasts to the students so that their listening skills can be enhanced.
2. While listening and reading to the text can be given as home work, the class work for the s tudent's can be to discuss and critically evaluate the texts based on the context, purpose or writing the text and understanding it from the author's as well as reader's point of view.
3. Reading as habit for both academic and non-academic (pleasure) purposes has to be inculcated in the students. So training has to be given in intensive and extensive reading strategies.
4. Writing for both academic(assignments, examinations, reports, e-mails/letters etc)
5. The writing tasks given in the class are to be self and peer evaluated by the students before they are finally graded by the faculty. Note: Please note that the texts given here are just contexts for teaching various language skills and sub skills. The students' ability to use language cannot be confined to comprehending or using the language related to the given texts (textbooks).The given texts can be used only for practice.
6. All the activities to develop language skills have to be integrated and interconnected, within each unit and across the units.

UNIT- I

Lesson: **HUMAN VALUES: Luck by Mark Twain (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: Capital Letters and Punctuation; Commonly Misspell Words (That has to be part of the bridge course- 2 weeks before the actual academic Programme starts)

    Grammar: Verbs; Tenses; Types of Sentences

    Vocabulary: Synonyms, Antonyms, Affixes (Prefixes/Suffixes), Root-words, One word Substitutes

UNIT-II

    Lesson: **NATURE: Ode to the West wind by P B Shelly (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: Use of Articles; Prepositions; Active & Passive Voice

    Vocabulary: Homonyms, Homophones, Homographs.

UNIT-III

    Lesson: **BIOGRAPHY: The Knowledge Society – A P J Abdul Kalam)**

    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: Writing structured essays on specific topics.

    Grammar: Adjectives; Degrees of Comparison; Clauses and Phrases

    Vocabulary: Compound words, Collocations.

UNIT-IV

Lesson:	**INSPIRATION: Like a Tree, Unbowed by Wangari Maaathai**
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; E-Mail
Grammar:	Direct & Indirect speech; Cohesive devices-linkers; Formation of Simple, Compound and Complex Sentences.
Vocabulary:	Words often confused and Jargons.

UNIT-V

Lesson:	**MOTIVATION: The Secret of Work – Swami Vivekananda**
Listening:	Identifying key terms, understanding concepts and answering a series of relevant
Speaking:	Formal oral presentations on topics from academic contexts
Reading:	**Reading comprehension.**
Writing:	Summarizing, Product Description Paraphrasing
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, 1stEdition,OrientBlackSwan, 2023 (Units 1,2 & 3)

Reference Books:

1. Professional Communicative English, Maruti Publications,2019
2. Epitome of Wisdom, Maruti Publications, 2013
3. Infotech English, Maruti Publications, 2021
4. English Essentials, Maruti Publications, 2014
5. Bailey, Stephen .Academic writing: A Hand book for International Students.Routledge,2014.
6. Murphy, Raymond. English Grammar in Use, Fourth Edition, Cambridge UniversityPress,2019.
7. Lewis, Norman. Word Power Made Easy-The Complete Handbook for Building a Superior Vocabulary. Anchor, 2014.

Web Resources:

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

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

DIFFERENTIAL EQUATIONS AND VECTOR CALCULUS
(Common to all branches of engineering)

Subject Code: 25BHT103

L	T	P	C
2	1	0	3

Course Objectives:

The objectives of this course are to:
1. Develop understanding of first-order and first-degree differential equations and their real-world applications.
2. Introduce methods to solve higher-order linear differential equations with constant coefficients and apply them to engineering systems.
3. Equip students with techniques for forming and solving partial differential equations relevant to physical processes.
4. Provide knowledge of vector differentiation operators—gradient, divergence and curl—and their physical interpretations.
5. Enable students to evaluate vector integrals and apply the fundamental vector theorems (Green's, Stoke's and Divergence) in practical scenarios.

Course Outcomes:
On successful completion of this course, students will be able to:
- **CO1:** apply first-order differential equations to model and solve problems in growth and electric circuits.
- **CO2:** solve higher-order linear differential equations.
- **CO3:** use Lagrange's method to solve partial differential equations arising from physical and engineering problems.
- **CO4:** calculate and interpret the gradient, divergence and curl of vector fields and verify standard identities.
- **CO5:** evaluate line and surface integrals and apply vector calculus theorems to real-world applications

UNIT–I: Differential Equations of First Order and First Degree:
Exact differential equations and equations reducible to exact form; linear differential equations; Bernoulli's equations.
Applications: Newton's Law of Cooling, Law of Natural Growth and Decay and Electrical Circuits.

UNIT–II: Linear Differential Equations of Higher Order (with Constant Coefficients):
Definitions of homogeneous and non-homogeneous equations; complementary function; general and particular integrals; method of variation of parameters.
Application: L–C–R Circuit.

UNIT-III: Partial Differential Equations:
Introduction and formation of partial differential equations by eliminating arbitrary constants and arbitrary functions; solutions of first-order linear equations using Lagrange's method.

UNIT-IV: Vector Differentiation:
Scalar and vector point functions; vector operator Del; Del applied to scalar point functions – Gradient; Del applied to vector point functions – Divergence and Curl; vector identities.

UNIT–V: Vector Integration:
Line integral -Work done, surface integral- Flux. Integral theorems- Green's Theorem, Stoke's Theorem and Divergence Theorem (without proof).

Text Books:
1. Erwin Kreyszig, Advanced Engineering Mathematics, 10/e, John Wiley & Sons, 2018.
2. B.S. Grewal, Higher Engineering Mathematics, 44/e, Khanna publishers,2017.
3. B.V. Ramana, Higher Engineering Mathematics, McGraw Hill Education, 2017.

Reference Books:
1. Dennis G.Zill and Warren S.Wright, Advanced Engineering Mathematics, Jones and Bartlett, 2018.
2. Micheael Greenberg, Advanced Engineering Mathematics, 9th edition, Pearson edn.
3. T. K. V. Iyengar, B. Krishna Gandhi, S. Ranganatham & M.V.S.S.N.Prasad, Engineering Mathematics-I, S.Chand Publisher, 2020.
4. R. K. Jain and S. R. K. Iyengar, Advanced Engineering Mathematics, 5/e, Alpha Science International Ltd., 2021 (9th reprint).

ENGINEERING CHEMISTRY
(Common to CE and ME)

Subject Code: 25BHT105

L	T	P	C
3	0	0	3

Course Objectives:
- To familiarize engineering chemistry and its applications
- To impart the concept of soft and hard waters, softening methods of hard water
- To train the students on the principles and applications of electrochemistry, polymers, surface chemistry, and cement

Course Outcomes: At the end of the course, the students will be able to
.
CO1: Demonstrate the importance of water for society and industrial needs.
CO2: Summarize the concepts of Instrumental methods and distinguish the ranges of the electromagnetic spectrum used for exciting different molecular energy levels in various spectroscopic techniques.
CO3: Demonstrate the corrosion prevention methods and factors affecting corrosion.
CO4: Demonstrate the preparation, properties, and applications of polymer materials and fuels.
CO5: Demonstrate the importance of modern engineering materials like cement, refractories, composites, and lubricants.

UNIT I Water Technology
Soft and hard water, Estimation of hardness of water by EDTA Method, Numerical Problems on Temporary and Permanent Hardness - Disadvantages of Hard Water**,** Boiler troubles – Priming, foaming, scale and sludge, Caustic embrittlement, Industrial water treatment –Ion-exchange processes, Desalination of brackish water- Reverse osmosis (RO) and electrodialysis. Wastewater treatment-Block diagram (primary, secondary, tertiary).

UNIT II Instrumental Methods and Applications
Electromagnetic spectrum. Absorption of radiation: Beer-Lambert's law-Statements. UV-Visible Spectroscopy, Instrumentation, electronic transition, Definition of Chromophore – Definition of Auxochrome – Absorption and Intensity Shifts, IR spectroscopy-Instrumentation fundamental modes and Fingerprint Region. NMR – Principle - Equivalent and Non-Equivalent Protons - Chemical Shift- Splitting – Coupling Constant.

UNIT III Electrochemistry and Applications
Electrodes –electrochemical cell, Nernst equation, cell potential calculations (emf formula). Primary cells – Zinc-air battery, Secondary cells –lithiumion batteries - working principle of the batteries including cell reactions; Fuel cells-Basic Concepts, the principle and working of hydrogen-oxygen Fuel cell.

Corrosion: Introduction to corrosion, Dry corrosion - Pilling Bedworth rule, Electrochemical theory of corrosion, Factors affecting the corrosion, cathodic (sacrificial anodic protection and impressed current cathodic protection) and Metallic (Anodic and Cathodic) Coatings-working principle**.**

UNIT IV Polymers and Fuel Chemistry

Introduction to polymers, functionality of monomers, chain growth, step growth polymerization. Thermoplastics and Thermo-setting plastics-: Preparation, properties and applications of poly styrene. PVC, Nylon 6,6 and Bakelite. Biodegradable polymers – Introduction- Polyl Lactic Acid (PLA)-Applications.

Fuels – Types of fuels, calorific value of fuels (HCV, LCV and Theoretical calculations of calorific value), numerical problems based on calorific value; Analysis of coal (Proximate and Ultimate analysis), Liquid Fuels, refining of petroleum-Fractional distillation.

UNIT V Modern Engineering Materials

Composites- Definition, Constituents, Classification- Particle, Fibre and Structural reinforced composites, properties and Engineering applications

Refractories - Introduction-Definition, Classification, Properties, and applications.

Lubricants- Introduction-Definition, Functions of lubricants, Mechanism, Properties of lubricating oils – Viscosity, Flash point, Fire point, Cloud and Pour Points, Acid Number or neutralization number.

Building materials- Portland Cement- Constituents- Setting and Hardening of cement.

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

Reference Books:
1. H.F.W. Taylor, Cement Chemistry, 2/e, Thomas Telford Publications, 1997.
2. D.J. Shaw, Introduction to Colloids and Surface Chemistry, Butterworth-Heineman, 1992.
3. Textbook of Polymer Science, Fred W. Billmayer Jr, 3rd Edition

ENGINEERING MECHANICS
(Common to CE and ME)

Subject Code: 25EST104

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:
- To enable students to apply fundamental laws and basic concepts of rigid body mechanics to solve problems of bodies under rest or in motion.
- To enable the students to apply conditions of static equilibrium to analyse physical systems.
- To compute the geometric sectional properties of various areas.
- To make students to learn the effect of friction on different planes

COURSE OUTCOMES:
Upon the completion of this course, the students will be able to

CO1: Compute the resultant of system of forces acting on bodies in two dimensional plane

CO2: Solve, statically-determinate problems in the field of engineering

CO3: Determine the centroid of regular geometrical sections and apply transfer theorems to determine moment of inertia of various sections

CO4: Analyze perfect plane trusses and solve problems involving rigid bodies under the influence of frictional forces

CO5: Predict motion parameters of bodies under rectilinear, fixed axis rotation and general plane motion and solve the problems involving dynamics of rigid bodies

UNIT - I
Basics of Statics: Fundamental Principles, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.

UNIT - II
Equilibrium of coplanar force system: Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, support reactions of statically determinate beams subjected to various types of loads, Equilibrium of coplanar non-concurrent force system, Numerical examples.

UNIT - III
Analysis of Trusses: Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples.
Friction: Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, wedge friction, Numerical examples.

UNIT - IV

Centroid of Plane areas: Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, centroid of composite areas and simple built up sections, Numerical examples.

Moment of inertia of plane areas: Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built up sections, Numerical examples.

UNIT - V

Kinematics: Displacements, Velocity and Acceleration – Rectilinear motion

Kinematics of rigid bodies: Fixed axis rotation, Numerical examples, Concept of analysis of plane motion

Kinetics of rigid bodies: Introduction, Work energy and D 'Alembert's principle of dynamic equilibrium and its application in rectilinear, fixed axis rotation and connected bodies including pulleys, Numerical examples.

Text Books

3. Engineering Mechanics, S.Timoshenko, D.H.Young, J.V.Rao, S.Pati., McGraw Hill Education 2017. 5th Edition.
4. Engineering Mechanics, P.C.Dumir- S.Sengupta and Srinivas V veeravalli University press. 2020. First Edition.
5. Engineering Mechanics, S.S Bhavikatti. New age international publications 2018. 4th Edition.

Reference Books

3. Engineering Mechanics, Statics and Dynamics, Rogers and M A. Nelson., McGraw Hill Education. 2017. First Edition
4. Engineering Mechanics, Statics and Dynamics, I.H.Shames., PHI, 2002. 4th Edition
5. Engineering Mechanics, Volume-I: Statics, Volume-II: Dynamics, J. L. Meriam and L.G. Kraige., John Wiley, 2008. 6th Edition
6. Engineering Mechanics Statics And Dynamics, A. K. Tayal, Umesh Publications, 2019, 14th Edition
7. Introduction to Statics and Dynamics, Basudev Battachatia, Oxford University Press,2014. Second Edition
8. Engineering Mechanics: Statics and Dynamics, Hibbeler R.C., Pearson Education, Inc., New Delhi, 2022, 14th Edition

BUILDING MATERIALS AND PLANNING

Subject Code: 25CET101

L	T	P	C
3	0	0	3

COURSE OBJECTIVES:
1. To analyse the physical properties of different building materials.
2. To list the properties of cement.
3. To examine the function of various additives in cement that classifies cement type.
4. To explain the principles of building bye-laws and regulations.
5. To explain the principles and orientation of residential buildings along with their minimum standards.

COURSE OUTCOMES:
After completion of the course the student able to:
1. Analyse the physical properties of different building materials.
2. List the properties of cement along with their standards.
3. Examine the functions of various additives in cement which classifies cement types.
4. Explain the building bye laws and regulations.
5. Describe the principles of planning and orientation of residential buildings along with their standards.

UNIT - I (8 classes)
Properties of Materials: Classification and Characteristics of stones, brick- Classification, Manufacturing, Composition and Properties.
Timber – Classification, Structure. Seasoning and defects, Coarse aggregate and Fine aggregate - Classification, Properties – tests – Bulk density, Specific gravity, Sieve analysis, Water absorption, Bulking (only fine aggregate), Grading of aggregates.

UNTI –II (10 classes)
Cement: Brief history, Manufacturing Process- Composition & Properties of cement, Property tests- Fineness, specific gravity, Consistency, setting time, soundness and compressive strength. Hydration of cement and Structure of hydrated cement paste.
Types of Cement: OPC, PPC, PSC, Rapid hardening, Sulphate resistant, low heat and Coloured Cement.

UNIT-III (10 classes)
Sustainable materials: Necessity of Sustainable materials. Constituents, types and uses of sustainable materials - Fly ash, Silica fume, Ground Granulated Blast Furnace slag (GGBS), Rice Husk Ash (RHA) and Matakoline, recycle aggregate, eco friendly bricks, light weight aggregates.

UNIT-IV (10 classes)
Building Bye-laws and Regulations: Introduction-Objectives of building bye-laws -Floor area ratio (FAR)-Floor space Index (FSI)-Principles underlying building bye-laws-classification of buildings-Open space requirements, lighting and ventilation requirements.

UNIT-V (10 classes)
Principles of Planning and Orientation of the Residential Building: Orientation of the building, Grouping, Privacy, Elegance, Flexibility, Roominess, Circulation, Furniture requirements, Sanitation and economy. Effect of Sun, factors effecting the orientation. Minimum standards for various parts of buildings and requirements of different rooms. Introduction to various software tools in building planning.
Planning of Public buildings: Planning of educational institutions and hospitals (line plan).

TEXT BOOKS:
 1. S.C.Rangwala, "Engineering Materials", 33rd Edition, Charota Publishing House Pvt. Ltd. 2019.
 2. S.K.Duggal, "Building Materials", NEW AGE; 4th revised edition, 2020.
 3. Gurucharan Singh, "Building Planning, Scheduling and Design", 2nd Edition, Khanna Publishers, 2020.

REFERENCES:
1. Building byelaws by State and Central Governments and Municipal Corporations
2. M.L.Gambhir, Concrete Technology, 5th Ed., Tata Mc.Graw Hill Publishers New Delhi, 2024 A.M.
3.Neville, Properties of Concrete, Pearson Education India; 5th edition, 2021.
4.'A' Series & 'B' Series of JNTU Engineering College, Anantapur.
5.Dr. B.C. Punmia and A K Jain , "Building Construction", Laxmi publications (p) Ltd New Delhi, 2005.

ENGINEERING WORKSHOP
(Common to ME, CE, ECE, and EEE)

Subject Code: 25ESL104

L	T	P	C
0	0	3	1.5

COURSE OBJECTIVES:
• The Engineering Workshop Practice for engineers is a training lab course spread over entire semester. The modules include training on different trades like Fitting, Carpentry, Black smithy etc., which makes the students to learn how various joints are made using wood and other materials.

COURSE OUTCOMES:
Upon the completion of this course, the students will be able to

CO1: Make half-lap, mortise & tenon, corner dovetail or bridle wooden joints
CO2: Develop sheet metal into objects like square tray, taper side tray, conical funnel or elbow pipe
CO3: Fabricate metal plates into a straight, square, dovetail or V-fit joints
CO4: Forge MS rod to round or round to square cross-section, or into L- or S- bend.
CO5: Construct wiring system for staircase or a godown, parallel and series or tube light wiring.

List of experiments

I. **Wood Working:** Familiarity with different types of wood and tools used in wood Working.
Tasks to be performed:
i. Half - Lap joint   **ii.**Corner Dovetail joint   **iii.**Mortise and Tenon jointiv.Bridle joint

II. Sheet Metal Working: Familiarity with different types sheet metal and tools used in sheet metal work, development of sheet metal jobs from sheet metal & knowledge of basic concepts of soldering.
Tasks to be performed:
i.Square Tray **ii.** Taper side Tray **iii.**Conical Funnel   **iv**. Elbow Pipe.

III. Fitting: Familiarity with different types of metals & tools used in fitting.
Tasks to be performed:
i."V" – fitting **ii.** Square fitting **iii.**Dovetail fitting **iv.** Semi Circular fitting

IV. Forging: Familiarity with different types of metals to be forged and the tools used in forging. Knowledge of different types of furnaces like coal fired, electrical furnaces etc.
Tasks to be performed:
i. Round M.S rod to Square bar   **ii.** L- bend from given M.S. Rod.
iii.S- bend from given M.S. Rod.   iv. Heat treatment tests like annealing, normalizing etc.

V. House wiring

i. Series & Parallel wiring connection   **ii**. Staircase wiring connection

iii. Godown Lighting   **iv**. Tube light connection

Text Books

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

References

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

COMMUNICATIVE ENGLISH LAB
(Common to all branches of engineering)

Subject Code: 25BHL101

L	T	P	C
0	0	3	1.5

Course Objectives

The course is designed to:

1. Develop a strong foundation in **phonetics** and **pronunciation** for effective verbal communication.
2. Enhance students' **listening comprehension skills** through exposure to varied audio materials.
3. Improve **speaking skills** in formal and informal contexts through interactive exercises.
4. Train students in **presentation techniques** to express ideas clearly and confidently.
5. Equip students with **interview skills**; resume writing, and workplace communication essentials.

Course Outcomes (COs)

By the end of this course, students will be able to:

1. **Recognize** and **produce** English speech sounds accurately using the phonetic alphabet, and **demonstrate** correct stress, intonation, and rhythm in spoken communication. *(Remembering, Applying)*
2. **Develop** critical listening skills by **interpreting** gist, specific details, and speaker attitudes from a variety of authentic audio materials. *(Understanding, Analyzing)*
3. **Engage** in everyday conversations and **demonstrate** effective spoken interaction through structured activities such as role plays, JAM sessions, and telephone etiquette. *(Applying, Creating)*
4. **Plan**, **design**, and **deliver** effective oral presentations using visual aids, PowerPoint slides, and public speaking strategies. *(Applying, Creating)*
5. **Prepare** for professional interviews by **writing** resumes and cover letters, and **demonstrating** appropriate verbal and non-verbal communication skills in mock interviews. *(Creating, Evaluating)*

List of Topics:

Unit – 1: Introduction to Phonetics

- Introduction to the Phonetic Alphabet
- The Sounds of English: Speech Sounds – **Vowels and Consonants**
- Word Stress and Sentence Stress
- **Intonation Patterns** and their role in communication
- Accent and Rhythm in Connected Speech

Focus: Familiarizing students with correct pronunciation, phonetic transcription, and stress-timing features of spoken English.

Unit – 2: Listening Skills

- Listening for **Gist and Specific Information**
- Listening for **Note-Taking and Summarizing**
- Interpreting **Opinions and Attitudes** through listening
- Exposure to **Speeches and Talks** by Eminent Personalities (TED Talks, etc.)

Focus: Enhancing critical listening, comprehension, and note-making abilities through diverse audio inputs.

Unit – 3: Speaking Skills

- **Self-Introduction** and Peer Introduction
- Everyday **Conversation Skills** (greetings, taking/ending leave, casual dialogue)
- **Asking and Giving Information**
- **Role Plays** based on real-life situations
- **Just A Minute (JAM)** Sessions for spontaneity and fluency
- **Telephone Etiquette** and formal phone conversations

Focus: Developing interactive spoken English skills, fluency, and verbal etiquette through guided practice.

Unit – 4: Presentation Skills

- Basics of **Public Speaking and Presentation Techniques**
- Planning and Delivering **Poster Presentations**
- Designing and Presenting using **PowerPoint Slides**
- Using **Visual Aids** effectively during presentations

Focus: Equipping students with the skills to design, organize, and deliver structured oral presentations with confidence.

Unit – 5: Interview & Career Skills

- Writing a **Professional Resume** and Cover Letter
- Preparation for **Job Interviews**: Frequently Asked Questions
- Participating in **Mock Interviews** with Feedback
- Body Language, Tone, and Confidence Building

Focus: Preparing students for placement activities and professional communication contexts.

Suggested Software: Walden Info tech,Young India Films

Reference Books:
1. MeenakshiRaman,Sangeeta-Sharma.TechnicalCommunication.OxfordPress.2018.(This can be for theory and not for lab)

2. Samson T:Innovate with English, Foundations

3. Grant Taylor: English Conversation Practice, Tata McGraw-Hill Education India, 2016

4. Jayashree, M Let's Hear them Speak: Developing Listening –Speaking skills in English.
   Sage Publications

5. Hewing's, Martin. Cambridge Academic English (B2).CUP,

   2012.(That is for reading and writing and can be used in theory classes

   but not in Lab)

6. T. Balasubramanyam, A Text book of English Phonetics for
   Indian Students, (3rdEd) Trinity Press. (This is all theory and
   can be for MA English students but not for B. Tech students)

Web Resources:

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

Voice &Accent:
1..https://www.youtube.com/user/letstalkaccent/videos
2. https://www.youtube.com/c/EngLanguageClub/featured
3. https://www.youtube.com/channel/UC_OskgZBoS4dAnVUgJVexc
4. https://www.youtube.com/channel/UCNfm92h83W2i2ijc5Xwp_IAquestionsthattest comprehension

ENGINEERING CHEMISTRY LAB
(Common to CE and ME)

Subject Code: 25BHL103

L	T	P	C
0	0	3	1.5

Course Objectives:

- To verify the fundamental concepts with experiments

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

CO1: Determine the cell constant, conductance, potential of solutions.

CO2: Measure molecular/system properties such as surface tension and viscosity and prepare advanced polymer Bakelite materials.

CO3: Determine the molecular/system properties such as kinematic viscosity, Flash and fire point and acid number etc.

CO4: Estimate the Iron (by colurimeter) and Calcium in cement and determine the pH of solutions.

CO5: Measure molecular/system properties such as chloride content, hardness of water, dissolved oxygen.

List of Experiments:

1.   Determination of Hardness of a groundwater sample.
2.   Estimation of Dissolved Oxygen by Winkler's method
3.   Determination of Strength of an acid in Pb-Acid battery.(P^HMETRY)
4.   Preparation of a polymer (Bakelite)
5.   Determination of percentage of Iron sample by colorimetry
6.   Estimation of Calcium in port land Cement
7.   Preparation of nanomaterials by precipitation method.
8.   Adsorption of acetic acid by charcoal
9.   Determination of percentage Moisture content in a coal sample
10. Determination of Viscosity of lubricating oil by Redwood Viscometer 1
11. Determination of Viscosity of lubricating oil by Redwood Viscometer 2
12. Determination of Calorific value of gases by Junker's gas Calorimeter
13. Conductometric titration of strong acid vs. strong base.
14. Potentiometry - determination of redox potentials and emfs.
15. Determination of surface tension and viscosity.
16. Determination of acid number of lubricating oil.
17. Determination of flash and fire point of lubricating oil.

Reference:

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

HEALTH AND WELLNESS, YOGA AND SPORTS
(Common to all branches of engineering)

Subject Code: 25MCS103

L	T	P	C
0	0	1	0.5

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

Course Outcomes: After completion of the course the student will be able to
Understand the importance of yoga and sports for Physical fitness and sound health.
Demonstrate an understanding of health-related fitness components.
Compare and contrast various activities that help enhance their health.
Assess current personal fitness levels.
Develop Positive Personality

UNIT I
Concept of health and fitness, Nutrition and Balanced diet, basic concept of immunity Relationship between diet and fitness, Globalization and its impact on health, Body Mass Index (BMI) of all age groups.
Activities:
   (i) Organizing health awareness programmes in community
   (ii) Preparation of health profile
   (iii)Preparation of chart for balance diet for all age groups.

UNIT II
Concept of yoga, need for and importance of yoga, origin and history of yoga in Indian context, classification of yoga, Physiological effects of Asanas- Pranayama and meditation, stress management and yoga, Mental health and yoga practice.
Activities:
Yoga practices – Asana, Kriya, Mudra, Bandha, Dhyana, Surya Namaskar.

UNIT III
Concept of Sports and fitness, importance, fitness components, history of sports, Ancient and Modern Olympics, Asian games and Commonwealth games.
Activities:
   (i) Participation in one major game and one individual sport viz., Athletics, Volleyball, Basketball, Handball, Football, Badminton, Kabaddi, Kho-kho, Table tennis, Cricket etc.
   (ii) Practicing general and specific warm up, aerobics
   (iii)Practicing cardiorespiratory fitness, treadmill, run test, 9 min walk, skipping andrunning.

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

DESIGN THINKING AND SUSTAINABLE DEVELOPMENT
(Common to all branches of engineering)

Subject Code: 25BHS104

L	T	P	C
1	0	2	2

COURSE OBJECTIVES:
- Understand the principles of creativity, innovation, and entrepreneurship in an engineering context.
- Apply the process of design thinking to real-life problems
- Recognize and evaluate the importance of sustainable development and responsible engineering.
- Explore user pain points and identify real-world problems through empathy and market analysis.
- Apply ideation techniques to validate feasible and viable solutions for the identified problems.

COURSE OUTCOMES:
Upon the completion of this course, the students will be able to
CO1: Describe innovation ecosystems, and entrepreneurial processes
CO2: Analyze the global sustainable development goals (SDGs) and connect them to engineering practices
CO3: Understand and explore design thinking methodology to identify and solve real-world problems
CO4: Develop understanding to identify and validate user problem statement
CO5: Develop approach towards generation and feasibility assessment of ideas

UNIT - I
Introduction to Innovation and Entrepreneurship: Innovation and its types – Incremental, Disruptive, Frugal, Social, Real-world examples of innovation – Indian and global, Introduction to entrepreneurial mindset, Journey of a startup – Idea to Market, Role of engineers in entrepreneurship
Activity: Conducting case studies on selected startups (e.g., Airbnb, Uber, etc.) and performing an in-depth sectoral analysis

UNIT - II
Sustainable Development Goals: Introduction to UN Sustainable Development Goals (SDGs), Link between engineering, sustainability, and society, Circular economy, Green technologies, Lifecycle thinking, Frugal innovation, Resource optimization
Activity: Conduct an analysis of a minimum of five Sustainable Development Goals (SDGs), including a comprehensive review of their objectives, targets, and key performance indicators

UNIT - III
Design Thinking – A Human-Centred Approach: Introduction to Design Thinking, Practical case studies of Design Thinking, The 5 stages of Design Thinking – Empathize, Define, Ideate, Prototype, Test

UNIT – IV

Problem Statement Identification and Validation: Empathize towards understanding user pain points, Tools and approaches for empathizing with users, Define – Confirm the problem the user is facing, Market analysis – Market size, Competitor analysis

Activity:
- For the identified problem, build empathy maps and create detailed user personas based on insights gathered from surveys and interviews.
- Determine the total market size, perform an in-depth market analysis, and analyze competitors to identify opportunities and gaps.
- Define the Problem statement and write HMW Statements.

UNIT - V

Ideation to solve user problems: Tools and approaches to identify ideas for solving identified problems, Feasibility and viability of ideas for prototype development

Activity: Apply brainstorming techniques to generate solutions for the identified problem and organize them visually through mind mapping.

Text Books
1. Eric Ries. (2011). The Lean Startup: How Today's Entrepreneurs Use Continuous Innovation to Create Radically Successful Businesses. Crown Business.
2. Anuja Agarwal. (2023). Design Thinking: A Framework for Applying Design Thinking in Problem Solving. Cengage Learning India
3. Akhilesh A. Waoo. (2024). Sustainable Development Goals. Forever Shinings Publication

References
1. Rob Fitzpatrick. (2013)**.** The Mom Test: How to Talk to Customers and Learn If Your Business is a Good Idea When Everyone is Lying to You.
2. Tim Brown. (2009)**.** Change by Design: How Design Thinking Creates New Alternatives for Business and Society
3. Bill Aulet. (2013). Disciplined Entrepreneurship: 24 Steps to a Successful Startup. Wiley
4. Peter Thiel with Blake Masters. (2014). Zero to One: Notes on Startups, or How to Build the Future. Crown Business.
5. Don Norman. (2013). The Design of Everyday Things: Revised and Expanded Edition. Basic Books.
6. Lewrick, Michael, Patrick Link & Larry Leifer. (2018). The Design Thinking Playbook: Mindful Digital Transformation of Teams, Products, Services, Businesses and Ecosystems. Wiley