Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mathematics
Scheme and Syllabus - CBCS – 2021 -2022

COURSE OBJECTIVE: This course is intended to impart to the students the skills of employing the basic tools of differential and linear algebra for solving basic and difficult engineering problems.

UNIT I
Differential Calculus-1: Recapitulation of differentiation, Taylor’s and Maclaurin’s series for single variable (no proof). Introduction to polar curves, expression for angle between radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature- Cartesian, parametric, polar and pedal forms.

Self-study: Indeterminate forms, center and circle of curvature.

UNIT II

Self-Study: Errors and approximations, Extended Euler’s theorem, Lagrange’s undetermined multiplier method.

UNIT III
Ordinary differential equations (ODE’s) of first order: Linear differential equations. Reducible to linear differential equation, Bernoulli’s equations. Exact and reducible to exact differential equations. Orthogonal trajectories in Cartesian and polar form. Introduction to general and singular solutions; solvable for $p$ only and Clairaut’s equations.

Self-study: Reducible to Clairaut’s equations. Application to Newton’s law of cooling.

UNIT IV

Self-study: Method of Undetermined co-efficients.

UNIT V

Self-study: Solution of system of linear equations by Jacobi method, eigenvalues and eigenvectors.
COURSE OUTCOMES: On completion of the course, student should be able to:

CO1: **Determine** the rate of changes, extreme values, Taylor’s series for the function of two variables and rank of a matrix.

CO2: **Solve** ordinary differential equation and system of linear equations.

CO3: **Test** for angle of polar curves, consistency of linear equations, the independency of two functions of two identical independent variables and orthogonally of two polar curves.

CO4: **Describe** Mathematical procedures to find integrating factors, orthogonal trajectories, complementary functions, particular integrals and consistency of system of equations.

CO5: **Identify** the mathematical techniques of solving ordinary differential equations.

CO6: **Apply** the terminologies of calculus and linear algebra for approximations.

TEXT BOOKS

REFERENCE BOOKS

ONLINE RESOURCES
1. http://www.nptel.ac.in

SCHEME FOR EXAMINATIONS

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**Strength of correlation:** Low-1, Medium- 2, High-3
Dr Ambedkar Institute of Technology, Bengaluru-56  
Department of Mathematics  
Scheme and Syllabus - CBCS – 2021 -2022

### Course Title
ADVANCED CALCULUS AND NUMERICAL METHODS

### Course Code
21MAT201

### Category
Basic Science Course (BS)

### Scheme and Credits

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CIE Marks: 50  
SEE Marks: 50  
Total Max. marks=100  
Duration of SEE: 03 Hours

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**Course Objective:** This course is intended to impart to the students the skills of employing the basic tools of Calculus and Numerical methods for solving basic and difficult engineering problems.

### UNIT I

**Multiple Integrals:** Evaluation of double and triple Integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find area as double integral and volume as triple integral.

**Beta and Gamma functions:** Definitions, properties, relation between Beta and Gamma functions.

*Self-Study: Centre of gravity, Moment of inertia.*

### UNIT II

**Vector Differentiation:** Scalar and vector point functions, gradient, directional derivative, divergence, curl and Laplacian of a vector field. Solenoidal and irrotational vector fields. Vector identities (without proof).

**Vector Integration:** Line integrals, Applications to work done by a force. Green’s theorem in a plane and Gauss Divergence theorem (without proof) involving cubes and rectangular parallelepiped.

*Self-Study: Surface integrals and Stoke’s theorem.*

### UNIT III

**Partial Differential Equations (PDE’s):** Formation of PDE’s by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDE’s involving derivative with respect to the one independent variable only. Solution of one-dimensional heat equation and wave equation by the method of separation of variables.

*Self-Study: Solution of Lagrange’s linear PDE. Derivation of one-dimensional heat equation and wave equation.*

### UNIT IV

**Numerical Methods-1:** Solution of polynomials and transcendental equations: Regula–Falsi and Newton–Raphson method (without proof), Interpolation-Newton’s forward and backward difference formulae, Newton’s divided difference formula, Lagrange’s interpolation formula and its inverse interpolation formula(without proof).


UNIT V

Self- Study: Euler’s method, Picard’s method, Adam- Bashforth method.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: At the end of the course the students are able to:

CO1: Show the equivalences of mathematical expressions involving differentiation and integration.
CO2: Find divergence, directional derivatives and root of equations.
CO3: Estimate the function value, area bounded, flux and work done.
CO4: Illustrate mathematical procedures to change the order of integration, method of separation, predictor and corrector.
CO5: Identify the mathematical tool for solving flow models, improper integrals, interpolation and quadrature.
CO6: Apply the integral operator and vector differential operator for mensuration and measurements in complex engineering field.

TEXT BOOKS

REFERENCE BOOKS

ONLINE RESOURCES
1. http://www.nptel.ac.in

SCHEME FOR EXAMINATIONS

MAPPING of COs with POs
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**Strength of correlation:** Low-1, Medium-2, High-3
COURSE OBJECTIVE: To introduce the Engineering students to the basics of elasticity, vibrations, quantum mechanics, electrical and dielectric properties of materials, laser and fiber optics, crystal structure and nanomaterials with an emphasis on inculcating strong analytical skills among them so that they can understand and analyze complex engineering problems with relative ease.

UNIT I


**Self-study component:** Types of beams and its engineering applications, application of damping in automobiles, LCR resonance.

UNIT II

**Modern Physics:** de- Broglie hypothesis: de Broglie wavelength for free and accelerated electron. Concept of wave packet. Phase velocity, group velocity (no derivation), relation between phase velocity and group velocity, relation between group velocity and particle velocity, relation between phase velocity, group velocity and velocity of light. Numerical problems.


**Self-study component:** Davisson and Germer experiment, Matter waves and their properties. Discussion of wave functions and probability density for a particle in a box for n=3, Quantum tunneling.

UNIT III

**Electrical properties:** Assumptions of quantum free electron theory, Fermi level, Fermi energy, Fermi velocity and Fermi temperature. Fermi factor f(E) and its dependence on temperature. Expression for density of states (qualitative), expression for Fermi energy at absolute temperature (derivation). Electrical conductivity using effective mass and Fermi velocity (derivation). Merits of quantum free electron theory. Numerical problems.

**Dielectric properties:** Introduction to dielectrics: types of dielectrics, polarization, polarizability, dielectric constant, relation between dielectric constant and polarizability. Polarization mechanism and types of

**Self-study component:** *Distinguish between CFET and CFET, applications of dielectric materials in engineering (Mica, glass, rubber, and porcelain), Piezo-electricity.*

### UNIT IV 8 hours


**Self-study component:** *Applications of laser in medical and industry. Discuss the causes for attenuation in optical fibers.*

### UNIT V 8 hours

**Crystal Structure:** Seven crystal systems, Miller indices, Interplanar spacing in terms of miller indices. X-ray diffraction, Bragg’s law (derivation), Bragg’s X-ray spectrometer (construction and working) and determination of crystal structure by Bragg’s X-ray spectrometer. Numerical Problems.

**Nanomaterials:** Nano Scale, Surface to Volume Ratio, Quantum Confinement, types of nanomaterials, Synthesis of nanomaterials: Top-down approach: High energy Ball-milling method and Bottom-Up approach: Sol-Gel method. Characterization Technique: Scanning Electron Microscope (SEM), Properties of nanomaterials: Mechanical, electrical, magnetic and optical.

**Self-study component:** *Co-ordination number, Atomic packing factor (APF) for simple cubic, body centered and face centered cubic structure. Applications of nanomaterials: Medical and Electronics.*

**TEACHING and LEARNING PROCESS:** Chalk and Talk, power point presentation, animations, videos

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

- **CO1:** Apply the knowledge of elasticity and vibrations to engineering.
- **CO2:** Apply the knowledge of basic quantum mechanics, to set up one-dimensional Schrodinger’s wave equation and its application to a matter wave system.
- **CO3:** Summarize the importance of free electrons in determining the properties of metals; understand the concept of Fermi energy. Gain the knowledge of the electrical and dielectric properties of a materials.
- **CO4:** Describe the basics of laser Physics, working of lasers, holography and principle of propagation of light in optical fibers.
- **CO5:** Recognize various planes in a crystal and describe the structure determination using X-rays.

**TEXT BOOKS**

5. Dr. K. Vijayakumar, Dr. S. Chandralingum, Modern Engineering Physics, S. Chand and Company Limited, 1st edition 2010

REFERENCE BOOKS
2. A Marikani, Engineering Physics, PHI Learning Private Limited, Delhi - 2013
3. Prof. S. P. Basavaraju, Engineering Physics, Subhas Stores, Bangalore.
4. V. Rajendran, Engineering Physics, Tata McGraw Hill Company Ltd., New Delhi -2012
5. S. Mani Naidu, Engineering Physics, Pearson India Limited – 2014

ONLINE RESOURCES
1. http://www.nptel.ac.in
3. https://physicsworld.com/

SCHEME FOR EXAMINATIONS
There shall be 10 questions
1) Two full questions to be set from each unit with internal choice
   • Minimum number of sub questions : 2
   • Maximum number of sub questions : 2
2) Each full question shall be for a maximum of 20 marks
3) Answer any Five full questions choosing at least One full question from each unit

Note: Questions from Self-study component will not be asked for CIE and SEE.

MAPPING of COs with POs

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Strength of correlation: Low-1, Medium- 2, High-3
COURSE OBJECTIVE:
1. Understand the basic laws of electrical engineering and energy billing.
2. Explain the working of basic electrical parameters under sinusoidal excitation.
3. Analyze the series and parallel electrical circuits for voltage, current, power, and energy.
4. Describe the construction and working principles of electrical machines.
5. Explain electric power generation, transmission and distribution, wiring schemes and equipment and personal safety measures.

UNIT I
DC circuits: Ohm’s law and Kirchhoff’s laws, analysis of series, parallel, and series-parallel circuit excited by independent voltage sources. Power and energy, maximum power transfer theorem applied to the series circuit and its applications.

Electromagnetism and AC Fundamentals: Faraday’s laws, Lenz’s law. Fleming's rules & dynamically induced e.m.f. Statically induced e.m.f.s., the concept of self and mutual inductance & coefficient of coupling, force on the current-carrying conductor. Generation of sinusoidal voltage, average and RMS value, form factor, and peak factor.
Self-Study: Basics of lead acid batteries, nickel - iron batteries, lithium – ion batteries, advantages and disadvantages of batteries, rating of batteries in ampere-hour.

UNIT II
Three-phase circuits: advantages of three-phase systems, generation of three-phase power, representation of the balanced star (3 wire and 4 wire system) and delta connected loads, phase and line relations of voltages and currents from phasor diagrams. Measurement of three-phase power by the two-wattmeter method.
Self-Study: Electric Wiring: Casing and cap wiring, Open conduit and closed conduit systems. Advantages and disadvantages. Types of wires used for lighting and heating (power) circuits.

UNIT III
DC Machines: (a) Principle of operation, constructional details, induced emf equation, types of generators, and the relation between induced emf and terminal voltage.
(b) Principle of operation, back emf and torque equations, types of motors, characteristics (shunt and series only), and applications.
Transformers: Necessity of transformer, the principle of operation, Types, and construction of single-phase transformers, emf equation, losses, efficiency, and condition for maximum efficiency.
Self-Study: DC compound generators, compound motors, three phase transformers – types and constructions.
UNIT IV

Three-phase induction Motors: Concept of rotating magnetic field, the principle of operation, constructional features of motor, types – squirrel cage and wound rotor and their applications., slip, the significance of slip, and problems on slip calculations.

Three-phase synchronous generators: Principle of operation, constructional features of salient and non-salient pole generators, synchronous speed, frequency of generated voltage, emf equation, with the concept of winding factor (excluding the derivation and calculation of winding factors).


UNIT V

Power transmission and distribution- Concept of electric power transmission and distribution. Low voltage distribution system (400 V and 230 V) for domestic, commercial, and small scale industry through block diagram/single line diagrams only

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.


Self-Study: Electrical Power Generation: Sources of energy – renewable and non-renewable, working principle of hydel, thermal, nuclear, wind and solar power plants through block diagrams, environmental effects and advantages and disadvantages.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

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

CO1: Describe the basic concepts in electrical engineering.
CO2: Analyze-dc circuits, single-phase, and three-phase ac circuits.
CO3: Explain the construction and operation principle of electrical machines.
CO4: Solve basic problems on electrical machines.
CO5: Explain the concept of electric power transmission, distribution, electricity billing, equipment, and personal safety measures.

TEXT BOOKS
3. Lecture Notes (for module 5), Dr. AIT.

REFERENCE BOOKS

ONLINE RESOURCES
1. http://www.nptel.ac.in
2. https://www.youtube.com/watch?v=IZA_bJiGJc&list=PL_mruqjnuVd8LP2z0c4yBwKAGEiEW_Si9&index=1
3. https://www.youtube.com/watch?v=3TR_DS_7z2w&list=PLbRMhDVUMngfdEXVcdf_ijj2Eub-UHs_y

SCHEME FOR EXAMINATIONS
(i) The question paper will have ten full questions carrying equal marks.
(ii) Each full question will be for 20 marks.
(iii) There will be two full questions from each module.
(iv) Each full question will have sub-questions (subject to a maximum of four sub-questions)
(v) SEE and CIE will not carry any questions from Self study component.
(vi) The students have to answer five full questions, selecting one full question from each module.

**MAPPING of COs with POs and PSOs**

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**Strength of correlation:** Low-1, Medium-2, High-3
Dr Ambedkar Institute of Technology, Bengaluru-56  
Department of Civil Engineering  
Scheme and Syllabus – OBE - CBCS – 2021 -2022

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**Course Objectives:** Students will be exposed to apply the knowledge of the principles of mechanics in various fields of engineering curricula and develop analytical ability and powers of reasoning. To become conversant with basic concepts of equilibrium with reference to support reactions and friction. To understand the significance of centroid and moment of inertia and to determine the coordinates of the centroid and moment of inertia of the composite sections. To familiarize with laws of motion, kinematics of motion and their inter relationships.

**UNIT I:**  
**Basics of Civil Engineering:** Introduction to Civil engineering: Scope of different fields of civil engineering – Surveying, Building materials, Construction technology, Geotechnical engineering, Structural engineering, Hydraulics, Water resource engineering and Irrigation engineering, Transportation engineering, Environmental engineering.  
Infrastructure: Types of infrastructure, role of civil engineer in the infrastructure development, Effect of the infrastructure facilities on socio-economic development of a country.  
Roads: Types of roads, components and their function.  
Bridges and Dams: Different types with simple sketches.

**UNIT II:**  
**Fundamental principles of mechanics:** Introduction, basic principles and concepts of mechanics, laws of mechanics, idealization of mechanics  
**Basic principles of statics:** Force and its characteristics, equivalent system of forces, principles of transmissibility of a force, systems of forces, resultant of coplanar concurrent forces, component of a force, moment of a force with respect to a point, principles of moments (Varignon’s theorem), Couples, effects of a force at another point, equations of static equilibrium, free body diagram.  
**Co-planar forces (forces in a plane):** Resultant of co-planar concurrent forces, equilibrium of co-planar concurrent forces and Numerical problems.  
**Co-planar non concurrent force system:** Resultant of co-planar non-concurrent forces, equilibrium of coplanar non concurrent forces and Numerical problems.

**UNIT III:**  
**Support Reactions:** Introduction, Beam, Classification of beams, types of loads and supports, support reactions in statically determinate beams - Numerical problems.  
**Friction:** Introduction, laws of dry friction, limiting friction, co-efficient of friction, angle of friction, angle of repose and cone of friction. Numerical problems on Blocks (horizontal and inclined plane), Ladder friction and Wedge friction.

**UNIT IV:**  
**Centroid:** Introduction, centroid and centre of gravity. Derivations of simple geometrical sections – rectangle, triangle, semicircle and quarter circle. Numerical problems on composite sections.  
**Moment of Inertia:** Introduction, Moments of Inertia of an area, Parallel axis theorem, Perpendicular axis theorem,

UNIT V: 7 Hours

COURSE OUTCOMES: The students will be able to
CO1: Discuss the basics of Civil Engineering, Concept of Engineering Mechanics, Forces and Force Systems to determine the resultant
CO2: Define the effect of forces on the bodies in respect of its contact surfaces and the reactions developed in the system
CO3: Identify the geometrical properties like, coordinates of the centroid and Moment of Inertia of regular, irregular and built-up sections
CO4: Illustrate the kinetics, kinematics and rectilinear motion of a body with numerical approach.

TEXT BOOKS:
1. Irving H Shames, Engineering Mechanics, Prentice Hall.
   New Delhi.

REFERENCE BOOK(S):
2. Endy Ruina and Rudraprathap, Introduction to Statics and Dynamics, Oxford University Press.

ONLINE RESOURCES
1. http://www.nptel.ac.in

SCHEME FOR EXAMINATION
# MAPPING OF CoS WITH POs

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<th>PO7</th>
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<th>PO10</th>
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Dr Ambedkar Institute of Technology, Bengaluru-56  
Department of Mechanical Engineering  
Scheme and Syllabus - CBCS – 2021 -2022

<table>
<thead>
<tr>
<th>Course Title</th>
<th>ENGINEERING GRAPHICS</th>
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<tr>
<td>Course Code</td>
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</table>

| CIE Marks: 50 | SEE Marks: 50 | Total Max. Marks=100 | Duration of SEE: 03 Hours |

**Course Objectives:**
1. To understand the basic principles and conventions of engineering drawing
2. To use drawing as a communication mode
3. To generate pictorial views using CAD software
4. To understand the development of surfaces
5. To visualise engineering components

**Teaching-Learning (General Instructions):**
- Students should be made to aware of powerful communication tool – Drawing.
- Simple Case studies can be suitably selected by the teacher for hands on practice to induce the feel of fruitfulness of learning.
- Appropriate Models, Power Point Presentation, Charts, Videos, shall be used to enhance visualization before hands on practice.
- For application problems use very generally available actual objects. (Example: For rectangular prism / object; matchbox, carton boxes, book, etc can be used. Similarly for other shapes).
- Use any CAD software for generating orthographic and pictorial views.
- Make use of sketch book with graph sheets for manual / preparatory sketching.

**UNIT I**  
**Introduction: (Not for SEE)**
Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Scales.

Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP, RPP & LPP of 2D/3D environment. Selection of drawing sheet size and scale. Commands and creation of Lines, coordinate points, axes, polylines, square, rectangle, polygons, splines, circles, ellipse, text, move, copy, offset, mirror, rotate, trim, extend, break, chamfer, fillet and curves.

**Orthographic Projections of Points, Lines and Planes:**
Introduction to Orthographic projections, Orthographic projections of points in all the quadrants. Orthographic projections of line. (Inclined to HP/VP and placed in first quadrant only)
Orthographic projections of planes; resting on HP and on VP, inclined to HP and to VP viz. triangle, square, rectangle, pentagon, hexagon and circular laminae. (Placed in first quadrant only)

Application on projections of Lines & Planes (Not for SEE)

<table>
<thead>
<tr>
<th>UNIT II</th>
<th>10 hours</th>
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<tbody>
<tr>
<td>Orthographic Projection of Solids:</td>
<td></td>
</tr>
<tr>
<td>Orthographic projection of right regular solids (solids resting on HP only); Prisms and Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes, Tetrahedron. Applications problems on projections of Solids (Not for SEE)</td>
<td></td>
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<tr>
<td>Projections of Frustum of cone, pyramid &amp; truncated sphere (Not for SEE)</td>
<td></td>
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<table>
<thead>
<tr>
<th>UNIT III</th>
<th>10 hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isometric Projections:</td>
<td></td>
</tr>
<tr>
<td>Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids. Conversion of simple isometric drawings into orthographic views.</td>
<td></td>
</tr>
<tr>
<td>Problems on applications of Isometric projections of simple objects / engineering components (Not for SEE)</td>
<td></td>
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<tr>
<td>Introduction to drawing views using 3D environment (Not for SEE)</td>
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</table>

<table>
<thead>
<tr>
<th>UNIT IV</th>
<th>10 hours</th>
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<tbody>
<tr>
<td>Development Of Lateral Surfaces Of Solids:</td>
<td></td>
</tr>
<tr>
<td>Development of lateral surfaces of right regular prisms, cylinders, pyramids, and cones resting with base on HP only. Development of their frustums and truncations.</td>
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</tr>
<tr>
<td>Problems on applications of development of lateral surfaces like funnels, trays (Not for SEE)</td>
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<tr>
<td>Problems on applications of development of lateral surfaces of transition pieces connecting circular duct and rectangular duct (Not for SEE)</td>
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</table>

<table>
<thead>
<tr>
<th>UNIT V</th>
<th>10 hours</th>
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</thead>
<tbody>
<tr>
<td>Multidisciplinary Applications &amp; Practice (Not for SEE):</td>
<td></td>
</tr>
<tr>
<td>Free hand Sketching; True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools &amp; Furniture’s etc.</td>
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</tr>
<tr>
<td>Drawing Simple Mechanisms; Gear trains, Ratchets, two wheeler cart &amp; Four wheeler carts to dimensions etc.</td>
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<tr>
<td>Electric Wiring and lighting diagrams; Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software</td>
<td></td>
</tr>
<tr>
<td>Basic Building Drawing; Like, Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using Auto CAD or suitable software,</td>
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</tr>
<tr>
<td>Electronics Engineering Drawings- Like, Simple Electronics Circuit Drawings.</td>
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</tr>
<tr>
<td>Graphs &amp; Charts: Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or any suitable software.</td>
<td></td>
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</tbody>
</table>

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

CO1. Understand and visualize the objects with definite shape and dimensions
CO2. Analyse the shape and size of objects through different views
CO3. Develop the lateral surfaces of the object
CO4. Create a 3D view using CAD software
CO5. Identify the interdisciplinary engineering components or systems through its graphical representation

TEXT BOOKS:

REFERENCE BOOKS:

<table>
<thead>
<tr>
<th>SCHEME FOR CIE</th>
<th>DETAILS</th>
<th>MAX. MARKS</th>
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<tbody>
<tr>
<td>Manual Sketching (25)</td>
<td>Classwork</td>
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<tr>
<td>Assignment</td>
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<tr>
<td>Computer Printout (15)</td>
<td>Classwork</td>
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<tr>
<td>Test (All Five Units)</td>
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<td>TOTAL CIE MARKS</td>
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<table>
<thead>
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<th>QUESTION PAPER PATTERN (SEE)</th>
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<tbody>
<tr>
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<tr>
<td>UNIT</td>
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<tr>
<td>Marks</td>
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1. Question paper shall be set jointly by both Internal and External Examiners and made available for each batch as per schedule. Questions are to be set preferably from Text Books.
2. Four Questions are to be set, one each from unit 1,2,3,4 as per the below tabled weightage details.

<table>
<thead>
<tr>
<th>SCHEME OF EVALUATION FOR SEE</th>
<th>Unit</th>
<th>Maximum Marks</th>
<th>Manual Sketching</th>
<th>Computer display and print out</th>
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<tbody>
<tr>
<td>1</td>
<td>20</td>
<td>05</td>
<td>15</td>
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<tr>
<td>2</td>
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<td></td>
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<tr>
<td>4</td>
<td>25</td>
<td>05</td>
<td>20</td>
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<td>Total</td>
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1. Evaluation shall be carried jointly by both the examiners.
2. After evaluation, marks obtained is reduced to 50.
<table>
<thead>
<tr>
<th>COs/POs</th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
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<th>PO8</th>
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**Strength of correlation:** Strongly related-3, Moderately related-2, Weakly related-1, Not related-0
Course Title: ENGINEERING PHYSICS LABORATORY

Course Code: 21PHL106/206
Category: Basic Science Course (BS)

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Title of the Experiment</th>
<th>Unit</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Determination of Young’s Modulus of a material by single cantilever.</td>
<td>Unit I</td>
</tr>
<tr>
<td>2</td>
<td>Determination of Rigidity modulus of a material by torsional pendulum.</td>
<td>Unit I</td>
</tr>
<tr>
<td>3</td>
<td>Determination of acceleration due to gravity by using bar pendulum.</td>
<td>Unit I</td>
</tr>
<tr>
<td>4</td>
<td>Determination of resonant frequency &amp; quality factor in Series &amp; Parallel LCR Circuits</td>
<td>Unit I</td>
</tr>
<tr>
<td>5</td>
<td>Determination of Planck’s constant using LED’s</td>
<td>Unit II</td>
</tr>
<tr>
<td>6</td>
<td>Determination of knee voltage and resistance from I-V characteristics of Zener Diode.</td>
<td>Unit III</td>
</tr>
<tr>
<td>7</td>
<td>Measurement of dielectric constant.</td>
<td>Unit III</td>
</tr>
<tr>
<td>8</td>
<td>Determination of Fermi energy of copper.</td>
<td>Unit III</td>
</tr>
<tr>
<td>9</td>
<td>Determination of wavelength of Semiconductor Laser by diffraction method.</td>
<td>Unit IV</td>
</tr>
<tr>
<td>10</td>
<td>Determination of Acceptance angle and numerical aperture of an optical fiber.</td>
<td>Unit IV</td>
</tr>
<tr>
<td>11</td>
<td>Radius of curvature of Plano convex lens using Newton’s rings</td>
<td>Unit IV</td>
</tr>
<tr>
<td>12</td>
<td>Energy gap of a given semiconductor</td>
<td>Unit III</td>
</tr>
</tbody>
</table>

COURSE OUTCOMES: At the end of the course the students will be able to:

CO1: Apply the Physics concepts relevantly and appropriately where ever required.

CO2: The mechanical properties of solids will be understood by carrying out experiments of Young’s Modulus, rigidity modulus and bar pendulum.

CO3: The optics experiments such as wavelength of laser by diffraction and numerical aperture of an Optical fiber will help the students to understand the significance of Physics in various fields of Science and Technology.

CO4: Understand the importance of Physics in electronics.

REFERENCE BOOKS:

Web link for Physics virtual lab: https://www.vlab.co.in/broad-area-physical-sciences
COURSE OBJECTIVE:

1. To understand and measure electrical quantities and parameters.
2. To verify the relation between line and phase quantities, measure power and power factor in three-phase circuits.
3. To demonstrate fundamental laws of electrical engineering.
4. To determine the efficiency of single-phase transformers
5. To understand the significance of power, power factor, and control electrical Lamps from different places.

<table>
<thead>
<tr>
<th>Expt No</th>
<th>Syllabus Contents</th>
<th>No.of Hours</th>
<th>Blooms Taxonomy level</th>
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<tbody>
<tr>
<td>1</td>
<td>Measurement of Resistance using Voltmeter-Ammeter method and verification using Wheatstone bridge.</td>
<td>2</td>
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</tr>
<tr>
<td>2</td>
<td>Measurement of Inductance in single-phase circuit by the three-voltmeter method.</td>
<td>2</td>
<td>L2</td>
</tr>
<tr>
<td>3</td>
<td>Measurement of voltage, current, power, and power factor and verify line and phase relationship in the three-phase star-connected circuit.</td>
<td>2</td>
<td>L3</td>
</tr>
<tr>
<td>4</td>
<td>Verification of Kirchhoff’s Laws in DC circuits</td>
<td>2</td>
<td>L2</td>
</tr>
<tr>
<td>5</td>
<td>Verification of maximum power theorem in DC circuits.</td>
<td>2</td>
<td>L2</td>
</tr>
<tr>
<td>6</td>
<td>Comparison of domestic lamps against their power consumption.</td>
<td>2</td>
<td>L3</td>
</tr>
<tr>
<td>7</td>
<td>Improvement of power factor in inductive circuits.</td>
<td>2</td>
<td>L3</td>
</tr>
<tr>
<td>8</td>
<td>Control of electrical Lamp from one, two and three points.</td>
<td>2</td>
<td>L2</td>
</tr>
<tr>
<td>9</td>
<td>Load test on a single-phase transformer.</td>
<td>2</td>
<td>L3</td>
</tr>
<tr>
<td>10</td>
<td>Demonstration of FUSE and MCB by creating overload and fault.</td>
<td>2</td>
<td>L1</td>
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EXPERIMENTS BEYOND SYLLABUS

<table>
<thead>
<tr>
<th>Expt No</th>
<th>Syllabus Contents</th>
<th>No.of Hours</th>
<th>Blooms Taxonomy level</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Speed load characteristics of a three-phase induction motor.</td>
<td>2</td>
<td>L2</td>
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<tr>
<td>2</td>
<td>Voltage regulators to control electrical output.</td>
<td>2</td>
<td>L3</td>
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</table>
Course Outcomes:
CO1: Verify basic laws and theorem of electrical circuits.
CO2: Understand the power consumption of different types of lamps and control of lamps from different points.
CO3: Determine the impedance of an electrical circuit and power consumption by a 3-phase load.
CO4: Evaluate the performance of single-phase transformers.
CO5: Demonstrate the effects of fault and protection of electrical circuits.

References.
1. Dr. Eranna Dr. S. Vasudevamurthy, “Department manual.

Web Links.
1. http://vlab.amrita.edu/?sub=1&brch=75&sim=217&cnt=1/
2. http://vlab.amrita.edu/?sub=1&brch=75&sim=322&cnt=1

MAPPING of COs with POs and PSOs

<table>
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Strength of correlation: Low-1, Medium-2, High-3
Course Title: COMMUNICATIVE ENGLISH
Course Code: 21HST108

Category: Humanities & Social Sciences (HS)
Scheme and Credits: 
<table>
<thead>
<tr>
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</table>

CIE Marks: 50  SEE Marks: 50  Total Max. Marks: 100  Duration of SEE: 02 Hours

COURSE OBJECTIVE: To enable the students to assimilate the correct patterns of the language, & to develop students insight into the structure of English language. To enrich vocabulary bank, to communicate more effectively in English, to express opinions including facts & ideas & maintain conversation in everyday situations. To use digital literacy tools their LSRW skills can be enhanced and to master good speaking skills with different strategies.

UNIT I 4 hours

UNIT II 6 hours
Grammar: Preposition, kinds of Preposition and Prepositions often confused / used in different situations. Word Accent – Rules for Word Accent, Stress Shift, Question Tags, Question Tags for Assertive Sentences (Statements) – Some Exceptions in Question Tags and Exercises, Vocabulary: One Word Substitutes and Exercises, Synonyms and Antonyms, Exercises on it. Idioms & Phrases, Words often confused, Homophones, homonyms

UNIT III 6 hours
Grammar: Articles – Definite & Indefinite articles, Spelling Rules and Words often Misspelt, Word Pairs (Minimal Pairs), Sequence of Tenses (Rules in use of Tenses), Situational dialogues: Self-introduction, greeting, thanking, accepting thanks, apologizing, invitations, making complaints, Wh-questions/ yes-no questions. Vocabulary: Contractions/Abbreviations, strong and Weak forms of verbs, Words Formation-Prefixes and Suffixes.

UNIT IV 5 hours
Communication Skills: LSRW Skills

UNIT V 5 hours
Speaking Skills: Extempore / Public Speaking, Difference between Extempore / Public Speaking, and Guidelines for Practice. Listening Comprehension. Oral Presentation, Role Plays Just a minute (JAM), Group Discussion, Persuasion Speech, Description.

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, videos
COURSE OUTCOMES: On completion of the course, student will be able to:
CO1: Learn basic grammar rules, developed the mastery of language.
CO2: Enhance vocabulary and fluency will be increased.
CO3: Gain the ability to communicate confidently in various situations.
CO4: improve listening, speaking, reading and writing skills.
CO5: Overcome their stage freight and express their views freely without hesitation.

TEXT BOOKS
1. Workbook
2. English Grammar and composition by WREN AND MARTIN
3. Contemporary English Grammar by JAYANTHI DAKSHINAMURTHY
4. English for Technical Communication by LAKSHMINARAYANA K.R
5. Effective English for Technical Communication by FARATULLAH T.M

REFERENCE BOOKS
1. Objective English (Multiple choice questions with answers for competitive examinations) by Dr. B. James
2. The English Errors of Indian Students by T.L.H Smith Pearse.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:
CIE- Objective type (Max. marks: 30 marks)
SEE- Objective type (Max. marks: 50 marks)

MAPPING of COs with POs

<table>
<thead>
<tr>
<th>Ss</th>
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Strength of correlation: Low-1, Medium-2, High-3
Dr Ambedkar Institute of Technology, Bengaluru-56  
Department of Humanities & Social Sciences  
Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<thead>
<tr>
<th>Course Title</th>
<th>PROFESSIONAL WRITING SKILLS IN ENGLISH</th>
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<tbody>
<tr>
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CIE Marks: 50 SEE Marks: 50 Total Max. Marks: 100 Duration of SEE: 02 Hours

Course objective:
To implement English vocabulary at command and ensure language proficiency, to achieve better Technical writing and Presentation skills, identify the common errors in speaking and writing English. Learn better sentence structures, acquire Employment and Workplace communication skills, to learn about Techniques of Information Transfer through presentation in different levels.

UNIT I
Identifying Common Errors in Writing and Speaking English, Subject Verb Agreement (Concord Rules with Exercises), Common errors in Subject-verb agreement, Noun-pronoun agreement, Adjective, Adverb, Verb, Sequence of Tenses, Misplaced modifiers, Common errors in Conjunctions, Common errors in the use of Idioms and phrases.

UNIT II
Nature and Style of sensible writing, organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Redundancies & Clichés.

UNIT III

UNIT IV
Communication for Employment, Components of a formal letter, Formats and types of business letters, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing and other recent communication types, Reading Skills and Reading Comprehension.

UNIT V

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Identify common errors in spoken and written communication.
CO2: Get familiarized with English vocabulary and language proficiency.
CO3: Improve nature and style of sensible writing & acquire employment and workplace skills.
CO4: Improve their Technical Communication Skills through Technical Reading and Writing practices.
CO5: Perform well in campus recruitment, engineering and all other general competitive examinations.
TEXT BOOKS:

1. Workbook

REFERENCE BOOKS


SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:
CIE- Objective type (Max. marks: 30 marks)
SEE- Objective type (Max. marks: 50 marks)

MAPPING of COs with POs

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<th>CO1</th>
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Strength of correlation: Low-1, Medium-2, High-3
Course Title: HEALTH & WELLNESS
Course Code: 21HST109
Category: Ability Enhancement Course (AE)

<table>
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<tr>
<th>Scheme and Credits</th>
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CIE Marks: 50  
SEE Marks: 50  
Total Max. Marks: 100  
Duration of SEE: 02 Hours

Course objective:
The definition of Health and quality of life will teach the learner the necessity for a balanced strength and well-being. The Determinants of Health and Wellness topics like Diet, Food & Nutrition, life style, bring the points of understanding. Physical health, mental health, Social Health, Spiritual health, etc is a point to learn. The adolescent chooses the food as per the taste rather than the usefulness. Warming up exercises, physical exercises, yogasanas, pranayama and certain aspects of personality development may help in going a long way to improve the health and personality of the youth.

UNIT I  
Fundamentals of Balanced Health: Health and quality of life, Definition of Health (WHO), Five Pillars of Balanced Health, Body and Mind concepts, Disease and Healing, Genetics & Environment.

UNIT II  
Determinants of Health and Wellness: Lifestyle and Health, Sleep and health, Relaxation and Meditation, Physical Fitness and Stamina, Reproductive health and hygiene.

UNIT III  
Seven dimensions of Health & Wellness: Physical health, Mental health, Social Health, Spiritual health, Cultural health, Moral health, Economical health.

UNIT IV  
Healthy Eating- Diet and Nutrition: Food and Diet – Difference, Concept of DIET, Nutrition.

UNIT V  
Physical activity and personality Development: Warming up exercise, Physical exercise, Yogasanas, Pranayama etc. Special training for the challenged students. A few words on personality development (personal quality).

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, videos

COURSE OUTCOMES: On completion of the course, student will be able to:

CO1: Understand the necessity for a balanced health and well-being.
CO2: Know one’s life style, physical fitness and stamina.
CO3: Differentiate types of health.
CO4: understand ‘Food is medicine’ or ‘Medicine is food’ concept.
CO5: Have the knowledge of yogasanas & pranayama for an overall personality.

TEXT BOOKS
REFERENCE BOOKS

SCHEME FOR EXAMINATIONS
Theory Question Paper Pattern:
CIE- Objective type (Max. marks: 30 marks)
SEE- Objective type (Max. marks: 50 marks)

MAPPING of COs with POs

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Strength of correlation: Low-1, Medium-2, High-3
Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Civil Engineering
Scheme and Syllabus – OBE - CBCS – 2021 -2022

<table>
<thead>
<tr>
<th>Course Title</th>
<th>RURAL DEVELOPMENT ENGINEERING</th>
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CIE Marks: 50  SEE Marks: 50  Total Max. Marks: 100  Duration of SEE: 02 Hours

Course Objectives: Describe the scope of Rural Development Planning and Concept of Appropriate Technology and implementation of various national policies. Understand the need and concept of low-cost construction materials for individual and group housing; Illustrate the concept of Water Supply and Rural Sanitation. Interpret the concept of rural transport system and issues related to it. Summarize the need of effective Watershed and catchments area development methods and problems relating to watershed management, watershed structures.

**UNIT I**
Rural Development Planning and Concept of Appropriate Technology:
Scope; development plans; various approaches to rural development planning; concept of appropriate technology. Rural development program / projects.

**UNIT II**
Rural Housing:
Low-cost construction materials for housing; Composite material - ferro-cement & fly ash, soil-stabilized un-burnt brick; Water-proof and fire-retardant roof treatment for thatch roofs. Pre-cast stone masonry; rat-trap bond for walls; Panels for roof, ferro-cement flooring / roofing units.

**UNIT III**
Rural Water Supply and Sanitation:
Sources of water. BIS & WHO water standards. Quality, Storage and distribution for rural water supply works; low-cost water treatment technologies; conservation of water; rainwater harvesting; drainage in rural areas, septic tank; low-cost community & individual Garbage disposal systems

**UNIT IV**
Rural Transportation System:
Categories of Pavement Layers, Types of roads, Surface Treatments for roads in rural areas. Soil Stabilization, Lime, Lime Fly ash and Cement Treated Course.

**UNIT V**
Irrigation Techniques: Consideration of low-cost irrigation techniques, drip & sprinkler irrigation systems. Watershed and catchments area development - problems and features of watershed management, watershed structures

COURSE OUTCOMES: The students will be able to,

**CO1:** Understand the concepts and relative Technology for implementation of various National Policies relating to Rural Development in the Country

**CO2:** Apply the knowledge for Designing and selection of the Construction Materials for Rural Housing

**CO3:** Analyze and Conceptualize Rural Water Supply and Rural Sanitation.

**CO4:** Evaluate and interpret the aspects of Rural Transport System
**CO5:** Appraise and Evaluate the effectiveness of Watershed and Catchment Management for Modern Irrigation System

**TEXT BOOKS:**
1. Rural Development by Katar Singh, SAGE Publication

**REFERENCE BOOK(S):**
1. Rural Infrastructure by P.Nair, SBS Publication
4. Document on Rural Road Development in India Volume1& 2; Central Road Research Institute, New Delhi.

**ONLINE RESOURCE:**
1. http://www.nptel.ac.in

**MAPPING of COs with POs**

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**Course Title:** Career Development Skills - I  
**Course Code:** 21HSN110  
**Category:** HSS (Humanities)  
**Scheme and Credits**

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**CIE Marks:** 50  
**SEE Marks:** -  
**Total Max. marks=50**  
**Duration of SEE:** NIL

**COURSE OBJECTIVE:**

1. The lessons under this unit are designed to enable the students to plan their career on correct measures and motivate them to set their goals on prior basis.

2. This unit aims to develop the personality skills of the students and teach them to lead a corporate discipline nurture. It also helps them to get groomed with professional ethics.

3. This unit is designed to give the awareness to the students about the job market to prepare themselves at their own pace and potential. It also teaches them about the self-developing attitude through their emotions and intelligence.

4. This unit complies with the overcoming ability of students dealt in stress and it also teaches the punctuality and time managing.

5. This lesson will help students make inferences and predictions about spoken, writing & listening discourse. And by utilizing digital literacy tools, their LCRW skills can be enhanced.

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<tr>
<th>Unit no</th>
<th>Syllabus content</th>
<th>Hours/COs</th>
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</table>
| 1       | 1. Career Planning  
          2. Goal Settings | 5  
          CO1 |
| 2       | 1. Personality Effectiveness  
          2. Building Personality and Discipline  
          3. Grooming, hygiene and Cleanliness | 6  
          CO2 |
| 3       | 1. Self- Awareness & Self Confidence  
          2. Attitudes  
          3. Emotional & Intelligent Quotient | 6  
          CO3 |
| 4       | 1. Time Management  
          2. Stress Management | 4  
          CO4 |
| 5       | 1. LICRW Skills (Listening, Interpersonal, Conversation, Reading & Writing skills) | 5  
          CO5 |
COURSE OUTCOME:

1. The students will be able to learn about the overview of their goals and also gets to know diversities in the field of their career planning.
2. The student will develop and improve their personal and professional effectiveness. At the end of this unit, students will have deploy themselves about the corporate culture.
3. At the completion of this unit, students will develop the self-confidence and emerge as the confident person.
4. After the completion of this unit students will understand the stress, time and emotional management. Also they will learn about the overcoming the fear and uncomfortable situations such as Public speaking.
5. After the completion of this unit, students will gain knowledge about the assertiveness of Listening, Reading, Writing & Interpersonal segments.

REFERENCE:

1. Soft skills for Managers by Dr. T. KALYANA CHAKRAVATHI
2. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education
3. The Emotionally Intelligent Workplace by DANIEL GOLEMAN.
4. Communication skills and soft skills an integrated approach by E. SURESH KUMAR, P. SREEHARI, J SAVITHRI.
5. Top Talking in English (international communication skills) by CHARLES T. RAJENDRA
6. Soft skills by RAJ LAKSHMI SURYAVANSHI, Gurucool Publishing
Dr Ambedkar Institute of Technology, Bengaluru-56  
Career Guidance and Placement Cell  
Scheme and Syllabus - CBCS – 2021 -2022

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<td>3. Group Discussion (Each student will be assessed based on their body language,</td>
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COURSE OBJECTIVE:

1. The main goal of this unit is to help students to overcome the fear of speaking in both personal and professional culture and it also focuses on the presenting the topics with confidence. This unit also teaches the students about the team building activities

2. This unit depicts the easier decision making and problem solving techniques for overcoming the hardships of interview process. It also teaches on behavior & mannerism that should be maintained during the interview.

3. The lessons under this unit help students’ to learn to business communication activities which sought to help them to become an entrepreneur.

4. This unit deals with the preparation of Interview skill and also teaches the students about the various interview structures like Resume Building, GD etc..

5. This unit is completely an activity session, constructed to overcome the stage presence or fear.
COURSE OUTCOME:

1. The students will have learnt about the way of quality communication with the co-workers and it will also help to build a strong social relationship with outside society. And students will also learn to deliver the presentation in a more powerful and persuasive way.

2. At the end of this unit, students will have deploy themselves in the active thinking and also learns about the effective usage of words. And students will learn about the synchronization with the workmate and also gives them an opportunity to unlock their individual potentials.

3. After the completion of this unit, student will have learnt how to undergo business etiquettes with proper negotiations and customization.

4. After the completion of this unit student have learnt about the interview standards that being asked during the recruitment process. It also improves the clarity and confidence of the students.

5. At the end of this sessions, students will be confident on their speech and will be exposed to interview standards that being asked during the recruitment process.

REFERENCE:

1. Soft skills for Managers by Dr. T. KALYANA CHAKRAVATHI
2. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education
3. The Emotionally Intelligent Workplace by DANIEL GOLEMAN.
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5. Top Talking in English (international communication skills) by CHARLES T. RAJENDRA
6. Soft skills by RAJ LAKSHMI SURYAVANSHI, Gurucool Publishing
7. Enhancing English and Employability Skills by State Board of Technical.
8. Soft skills an integrated approach to maximize personality by SANGEETHA SHARMA, GAJENDRA SINGH CHAUHAN, and Wiley Publishing.
COURSE OBJECTIVE: To expose first year engineering students to various physicochemical aspects of engineering materials such as metals, alloys, plastics, conducting polymers etc. with a view to highlight their significance and importance in application oriented systems.

UNIT I

Electrochemical energy sources:

Electrochemical cells
Introduction to electro chemical cells, origin of single electrode potential, sign convention and cell notation, standard electrode potential, derivation of Nernst equation for single electrode potential, numerical problems.


Batteries and fuel cells
Basic concepts – principal components of a battery, operation of a battery during charging and discharging. Battery characteristics – voltage, capacity, energy efficiency, cycle life and shelf life. Classifications of batteries, Construction, working and applications of Lead acid, Ni-metal hydride and Li-ion battery, significance of Lithium.

Fuel cells – Construction, working and applications of CH3OH-O2 fuel cell using H2SO4 electrolyte.

Self-study: Introduction to Reference electrode, Ag-AgCl electrode, Introduction to fuel cells & battery, H2-O2 Fuel cell.

UNIT II

Corrosion and Metal finishing

Corrosion science
Metallic coatings – Anodic metallic coating ex: Galvanizing, Cathodic metallic coating ex: Tinning
Organic coatings – examples, Corrosion inhibitors – definition, anodic and cathodic inhibitors,
Cathodic protection – definition, sacrificial anode method.

**Metal finishing**
Technological importance, Electroplating – pre-treatment, process.
Significance of Polarization, Decomposition potential and Overvoltage in electroplating and their applications. Effect of plating variables on the nature of electrodeposit – metal ion concentration, organic additives (Complexing agents, brighteners, levelers, structure modifiers and wetting agents), current density, pH, temperature and throwing power of the plating bath. Electroplating of chromium.
Electroless plating: difference between electroplating and electroless plating. Pre-treatment and activation of the surface, electroless plating of copper in the manufacture of PCBs.

**Self-study : Metallic coating : Anodic metallic coating- Galvanization, Cathodic metallic coating- Tinning, Organic coating**

**UNIT III**

**Energy: Sources & Conversion**

**Chemical fuels:** Hydrocarbon fuels, classification. Calorific value – GCV and NCV. Bomb calorimeter, numerical problems.
Petroleum cracking – Fluidized catalytic cracking process, Knocking – mechanism and harmful effects, Octane and Cetane numbers, Reforming of petrol. Unleaded petrol, power alcohol, Biodiesel, Catalytic converters – construction and working.

**Solar energy:** Photovoltaic cells – Introduction, definition, production of solar grade silicon, purification of silicon by zone refining process, construction and working of silicon-photovoltaic cell, advantages and disadvantages.

**Self-study : Determination of GCV & NCV of gaseous fuel by Buoys calorimeter and numerical problems.**

**UNIT IV**

**Polymer science and Environmental Pollution**

**Polymer science**

**Environmental Pollution:** Introduction, Air pollutants: Sources and effects of primary & Secondary air Pollutants, Ozone depletion, greenhouse effect - global warming. Sources of water pollution, Determination of BOD and COD

**Self-study : Characterization of nanomaterials- FT-IR, XRD, SEM, TGA, BET-surface area analysis.**
### UNIT V

**8 hours**

**Instrumental methods of chemical analysis:** theory, instrumentation and applications- Colorimetric estimation of Cu, Potentiometric estimation of FAS, Conductometric estimation of acid mixture.

**Water technology**

- Impurities in water –water analysis: Hardness – types, determination by EDTA method, dissolved oxygen by Winkler’s method.
- Potable water- desalination of water by electrodialysis method.

**Green chemistry:** Introduction, Principles, green synthesis – Aspirin and ibuprofen
- Green catalyst – Zeolite and Silica, Microwave assisted reaction in water – Methyl benzoate to Benzoic acid, oxidation of toluene, Ultrasound assisted reaction – Sonochemical simmons-smith reaction

**Self –study:** Importance of green chemistry in industry, environment related issues.

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**TEACHING AND LEARNING PROCESS:** Chalk and Talk, power point presentation, animations, videos

---

**Course Outcomes:**

1. **CO1:** At the end of the first unit the student will be able to understand the basic concepts electrochemistry and its applications, in the construction of electrochemical energy sources.
2. **CO2:** At the end of the second unit the student will be able to understand concepts of corrosion and its control in the fabrication and design of structural materials and importance of metal finishing in enhancing physicochemical properties.
3. **CO3:** At the end of the third unit the student will be able to understand concepts of renewable and non-renewable energy sources.
4. **CO4:** At the end of the fourth unit the student will be able to understand the application of polymeric materials for different applications.
5. **CO5:** At the end of the fifth unit the student will be able to understand the instrumental techniques and water quality parameters.

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**REFERENCE:**

2. Text Book of Polymer Science by F.W.Billmeyer, John Wiley & Sons
5. Engineering Chemistry by Dr Renu bapna, Macmilan publisher India limited
7. Nano Metal Oxides For Environmental Remediation. United Publications Dr. Jahagirdar A.A and Dr. Nagaswarupa H P
COURSE OBJECTIVES:
1. Elucidate the basic architecture and functionalities of a Computer.
2. Apply programming constructs of C language to solve the real-world problems.
3. Explore user-defined data structures like arrays, structures and pointers in implementing solutions to problems.
4. Design and Develop Solutions to problems using modular programming constructs such as functions and procedures.

UNIT I
10 hours
Fundamentals of Problem Solving:
Art of programming through Algorithm and Flowchart, Designing solutions to various problems.
Overview of C: Basic structure of C program, executing a C program. Constant, variable and data types, Operators and expressions
Self Study Component: Introduction to Computer: Computer generations, computer types, CPU, Primary memory, Secondary memory, input devices, output devices.

UNIT II
10 hours
Managing Input and output operations: Conditional Branching and Loops: Example programs, finding roots of a quadratic equation, computation of binomial coefficients, plotting of Pascal’s triangle.
Self Study Component: Hardware and Software: Computers in a network, Network hardware, Software basics, software types.

UNIT III
11 hours
Arrays: Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms: Searching and Sorting Algorithms (Linear search, Binary search, Bubble sort and Selection sort).
Self Study Component: Programming Examples

UNIT IV
10 hours
User Defined Functions and Recursion.
Example programs: Finding Factorial of a positive integer, GCD of two numbers and Fibonacci sequence.
Self Study Component: Storage classes: auto, extern, static, register.

UNIT V
11 hours
Structures, Unions and Pointers, Programs like Addition of two complex numbers using structures, compute the sum, mean and standard deviation of all elements stored in an array of N real numbers using pointers.
Self Study Component: Case Study related to Functions and Structures:
Example: Implement structures to read, write and compute average marks and the students scoring above and below average marks for a class of 'N' students with the structure definition as
```
struct student
{
    char name[20];
    int rollno;
    int m1, m2, m3;
    int avg;
}
```

TEACHING LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos

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

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

CO1: Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.

CO2: Apply programming constructs of C language to solve the real world problem

CO3: Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting

CO4: Explore user-defined data structures like structures, unions and pointers in implementing solutions

CO5: Design and Develop Solutions to problems using modular programming construct Using functions

TEXT BOOKS

REFERENCE BOOKS
1. “Programming in C” by Reema Thereja, , Cengage publication.
2. “C- Programming Techniques” by A.M. Padma Reddy, Sri Nandi Publications

ONLINE RESOURCES
1. elearning.vtu.ac.in/econtent/courses/video/BS/15PCD23.html
2. https://nptel.ac.in/courses/106/105/106105171/
   MOOC courses can be adopted for more clarity in understanding the topics and varieties of problem solving methods.

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:
1. Answer ANY ONE from Question No. 1 and 2
2. Answer ANY ONE from Question No. 3 and 4
3. Answer ANY ONE from Question No. 5 and 6
4. Answer ANY ONE from Question No. 7 and 8
5. Answer ANY ONE from Question No. 9 and 10
### MAPPING of COs with POs

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**Strength of correlation:** Low-1, Medium-2, High-3
COURSE OBJECTIVES:

1. Preparation: To prepare students with fundamental knowledge/overview in the field of Electronics and Communication Engineering.

2. Core Competence: To equip students with a basic foundation in electronic engineering fundamentals required for comprehending the operation and application of electronic circuits, logic design, embedded systems and communication systems.

3. Professionalism & Learning Environment: To inculcate in first year engineering students an ethical and a professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context and life-long learning needed for a successful professional career.

UNIT I

11 hours

Electronic Circuits: Rectifiers, Reservoir and smoothing circuits, Full-wave rectifiers, Bi-phase rectifier circuits, Bridge rectifier circuits, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers, Power Supplies—Block diagram, (No Derivations, Numericals on Rectifiers included).

Amplifiers: Types of amplifiers, Class of operation, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback.

Operational amplifiers: Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits, Multi-stage amplifiers.

Oscillators: Positive feedback, Conditions for oscillation, Ladder network oscillator, Wein bridge oscillator. (No Derivations, Numericals on Op-amp included).

Self-study component: BJT types, comparison of BJT, FET & FinFET.

UNIT II

11 hours

Logic Circuits: Boolean Algebra, Logic gates, Realization of Boolean Expressions using basic gates and their truth table.

Half Adder and Full Adder, Multiplexer and decoder. Shift registers and its types—operation and truth table, Counters and asynchronous counters. Bistables, R-S Bistables, D-type Bistables, J-K Bistables. Text 4

Data representation, Data types, Data storage, A microcontroller system.

Sensors and Interfacing: Instrumentation and control systems, Transducers, Sensors. Text 1

Actuators, LED, 7-Segment LED Display, Optocoupler, Stepper Motor, Relay, Piezo Buzzer, Push Button Switch, Keyboard. Text 2

Self-study component: Actuator types, LCD, Touch screen displays

UNIT III

10 hours

Embedded Systems: Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC, Harvard vs Von-Neumann, Big-Endian vs Little-Endian, Memory, Program storage memory (ROM), RAM, Embedded firmware, other system components. Text 2
**Communication Interface:** UART, Parallel Interface, USB, Bluetooth, Wi-Fi, GPRS. **Text 2**

**Self-study component:** Block diagrams of the architectures of RISC, CISC, Harvard and Von-Neumann.

### UNIT IV

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**Analog and Digital Communication:** Modern communication system scheme, Information source and input transducer, Transmitter, Channel – Hardware and Software, Noise, Receiver, Multiplexing, Types of communication systems. **Text 3**

Types of modulation (only concepts) – AM, FM, Phase Modulation, Pulse Modulation, PAM, PWM, PPM, PCM. Concept of Radio wave propagation. Concepts of Sampling theorem, Nyquist rate, Digital Modulation Schemes– ASK, FSK, PSK

**Self-study component:** Evolution of Wireless Network Communication Technologies (1G, 2G, 3G and 4G, 5G).

### UNIT V

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**Data Transmission:** Asynchronous Transmission, Synchronous Communication, Data Compression, Encryption.

Radio Waves, Antennas, Satellite Communication, Microwave Communication, Optical Fiber Communication (OFC): Block diagram of OFC, Advantages of OFC, Applications of OFC. **Text 4**

**Cellular Wireless Networks** - Introduction, cellular telephone system, cellular concept and frequency reuse. **Text 3**

**Self-study component:** Co-ordination number, Atomic packing factor (APF) for simple cubic, body centered and face centered cubic structure. Applications of nanomaterials: Medical and Electronics.

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**TEACHING LEARNING PROCESS:** Chalk and Talk, power point presentation, animations, videos

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

- **CO1:** Describe the concepts of electronic circuits encompassing power supplies, amplifiers and oscillators.
- **CO2:** Explain the concepts of digital logic circuits, sensors, actuators and I/O subsystems.
- **CO3:** Discuss the characteristics of embedded systems and types of communication interface.
- **CO4:** Describe the fundamental concepts of analog communication, digital communication and radio wave propagation.
- **CO5:** discuss the techniques of data transmission, different modes of communication, wired and wireless communication systems.

**TEXT BOOKS**


**REFERENCE BOOK**

**ONLINE RESOURCES**
1. https://onlinecourses.nptel.ac.in/noc21_ee55/preview

**MODERN TOOLS:**
1. PSPICE

**MAPPING of COs with POs**

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*Strength of correlation: Low-1, Medium-2, High-3*
COURSE OBJECTIVE:

1. Acquire a basic understanding role of Mechanical Engineering in the industry and society, formation of steam and its industrial application, renewable energy resources and basic concepts of Hydraulic turbines.
2. Acquire knowledge on automobile technology in transport application and basics of Refrigeration and Air-Conditioning.
3. Acquire knowledge of various engineering materials, and metal joining techniques.
4. Acquire essential experience on basic Power transmission systems and Robotics.
5. Acquire knowledge of basic concepts on manufacturing principles and machine tools and their advancement.

UNIT 1

Introduction to Mechanical Engineering (Overview only): 10 hours
Role of Mechanical Engineering in Industries and Society
Sources of energy: Classification, renewable and non-renewable sources of energy and comparison.
Steam: Steam formation at a constant pressure: properties of steam, simple numerical problems to understand the use of steam tables. Applications of steam in industries.
Power absorbing systems: Introduction, classification of pumps and compressors.
Self-study:
Harnessing of renewable energy sources: Wind energy, Solar energy, Bio-mass and their applications
Boilers- Introduction, classification of boilers, difference between fire tube and water tube boilers.
Laboratory Components:
1. Study/Visit any one Conventional or Renewable Energy Power Plant and prepare a comprehensive report.
2. Demonstration of Components of any one Turbo-machine.
3. Study/Visit to an Industry using steam for their process and prepare a comprehensive report.

UNIT 2

Internal combustion engines: Introduction, classification, parts and terminology of IC engines, working of 4-stroke petrol & diesel engines, simple numerical problems on four stroke engines. Applications of IC engines.
Hybrid and Electrical vehicles: Introduction, basic working principle of electrical and hybrid vehicles.
Refrigeration and Air conditioning: Introduction, definition and unit of refrigeration. Refrigerants and their properties. Types of refrigeration systems- Vapour absorption and Vapour compression refrigeration systems
and their comparison. Principle & working of room air conditioner. Applications of Refrigerators and Air conditioning system.

**Self-study:**

*Engines: Two stroke petrol and diesel engines, emission norms.*

**Laboratory Components:**

1. Study of Engine Components through Cut Sections
2. Demonstrate Components and Working principles of Domestic Refrigerator and prepare a comprehensive report OR Study/visit any commercial centralized Air-Conditioning unit, understand various components and operations, and prepare a comprehensive report.

<table>
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<tr>
<th>UNIT III</th>
<th>10 hours</th>
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<tbody>
<tr>
<td><strong>Engineering Materials:</strong> Types and applications of ferrous, nonferrous metals and alloys. Composite Materials: Introduction, classification and applications.</td>
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<td><strong>Heat treatment:</strong> Introduction to heat treatment, Types of Heat Treatment: Annealing, quenching, carburizing, and hardening.</td>
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<td><strong>Metal Joining Processes:</strong></td>
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<tr>
<td><strong>Soldering and brazing:</strong> Definition, types, advantages, limitations and applications of soldering and brazing. Working principle of soldering iron and torch brazing methods.</td>
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<tr>
<td><strong>Welding:</strong> Introduction, classification and applications of welding. Working principle of electric arc welding and oxy-acetylene gas welding. Introduction to TIG and MIG welding.</td>
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<td><strong>Self-study:</strong></td>
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<tr>
<td><em>Engineering materials: Polymers, Ceramics, Bio materials, Smart materials and its engineering applications.</em></td>
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<tr>
<td><strong>Laboratory Components</strong></td>
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<tr>
<td>1. One exercise each involving Welding, Soldering, and Brazing.</td>
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<td>2. Study oxy-acetylene gas flame structure and its application to gas welding</td>
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<td>3. Demonstration of anyone Heat transfer application device and prepare a comprehensive report</td>
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<table>
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<th>UNIT IV</th>
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<tr>
<td><strong>Power transmission:</strong></td>
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<tr>
<td><strong>Belt drives</strong> – Introduction, types of belts and belt drive. Terminology - velocity ratio, creep and slip.</td>
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<td><strong>Gear drives</strong> - Introduction, classification; Gear trains – types of gear train. Simple numerical problems on gear drives.</td>
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<tr>
<td><strong>Robotics:</strong> Robot anatomy, Joints &amp; links, common Robot configurations. Applications of Robotics in Material Handling, Processing, Assembly, and Inspection.</td>
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<tr>
<td><strong>Self-study:</strong></td>
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<tr>
<td><em>Power transmission: Rope drives, Chain drives and Pulleys.</em></td>
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<tr>
<td><strong>Laboratory Components:</strong></td>
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<tr>
<td>1. Demonstration of the machine consists of Gear Trains</td>
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<td>2. Demonstration of various elementary mechanisms and their motion.</td>
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<tr>
<td>3. Demonstration of any one model of Robot</td>
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<th>UNIT V</th>
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<tr>
<td><strong>Manufacturing process:</strong> Introduction and classification of manufacturing process.</td>
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<tr>
<td><strong>Introduction to Mechatronics:</strong> Concept of open-loop and closed-loop systems, Examples of Mechatronic systems and their working principle.</td>
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</table>
**Rapid prototyping (3D printing)** - Definition, Classifications, Advantages, Disadvantages, Applications, Brief introduction of 3D Printers -SLA, SLS, FDM.

**Self-study:**

*Introduction to Modern Manufacturing Tools and Techniques:*

CNC: Introduction, components of CNC, advantages and applications of CNC, CNC Machining centres and Turning Centers.

**Laboratory Components:**

1. Demonstration of developing one model involving Lathe, Milling and Drilling
2. Study/Visit an Industry using CNC/ modern techniques and submit a report.

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**TEACHING LEARNING PROCESS:** Chalk and Talk, power point presentation, animations, videos

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

**CO1:** Demonstrate the working of various power generation devices such as steam, gas, hydraulic turbines and power absorbing devices like air compressors.

**CO2:** Analyze about the various IC engines, and power absorbing devices such as refrigerators and air conditioning.

**CO3:** Describe the engineering materials, heat treatment, joining processes for various applications.

**CO4:** Describe power transmission methods for various applications.

**CO5:** Demonstrate the principle, application of various basic and advanced manufacturing processes.

**TEXT BOOKS**


**REFERENCE BOOKS**

2. Hand books of Mechanical Engineering.
3. Material science, by Callister, Reprint 2008, Wiley India(P) LTD

**ONLINE RESOURCES**

1. [http://www.nptel.ac.in](http://www.nptel.ac.in)
2. [https://en.wikipedia.org](https://en.wikipedia.org)
3. [https://mechanicalengineeringworld.com/](https://mechanicalengineeringworld.com/)
Assessment Details both (CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) and Semester End Exam (SEE) is 50% each. The students have to obtain a minimum of 40% marks individually both in CIE and SEE to pass.

**CIE:** The CIE has two components – CIE - theory component and CIE – laboratory component. Students have to score a minimum of 40% Marks in the total of CIE - theory and CIE – laboratory components put together, provided students have to score a minimum of 40% marks in CIE laboratory component alone to qualify to take SEE.

Theory Semester End Exam (SEE) is conducted for 100 marks (3 Hours duration) and reduced to 50%.

### CONTINUOUS INTERNAL EVALUATION (CIE)

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<th>Max Marks</th>
<th>Minimum Marks to be scored in CIE, to qualify to take SEE (40% individually)</th>
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<tr>
<td>Weightage of CIE1 and CIE2 Tests</td>
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<td>Any two Activities- namely activities, quizzes, assignment, seminar/presentation, mini-project leading to demonstration.</td>
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<td><strong>Laboratory components</strong></td>
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<tr>
<td>Lab demonstration components: Rubrics for each Experiment taken average for all lab components (more emphasized on demonstration topics).</td>
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### QUESTION PAPER PATTERN (SEE)

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1. Two full questions (each of 20 Marks) are to be set from each unit.

2. Student shall answer five full questions selecting one full question from each unit.
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</table>

**Strength of correlation:** Low-1, Medium-2, High-3
COURSE OBJECTIVE: To expose first year engineering students to various experimental technique related to potentiometric, conductometric, colourimetric and PKa with a view to highlight their significance and importance in application oriented systems. Students will be able to analyze hardness of water, COD of waste water.

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Syllabus content</th>
</tr>
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<tbody>
<tr>
<td>PART-A</td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>Potentiometric estimation of FAS using standard K₂Cr₂O₇ solution.</td>
</tr>
<tr>
<td>2</td>
<td>Colorimetric determination of Copper.</td>
</tr>
<tr>
<td>3</td>
<td>Conductometric estimation of acid mixture using standard NaOH solution.</td>
</tr>
<tr>
<td>4</td>
<td>Determination of pKa of a weak acid using pH meter.</td>
</tr>
<tr>
<td>5</td>
<td>Determination of viscosity coefficient of a given liquid using Ostwald’s viscometer.</td>
</tr>
<tr>
<td>6</td>
<td>Flame photometric estimation of Sodium and Potassium in the given sample of water. (Demonstration)</td>
</tr>
<tr>
<td>PART-B</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Determination of Total Hardness of water using disodium salt of EDTA.</td>
</tr>
<tr>
<td>8</td>
<td>Determination of Calcium Oxide in the given cement by Rapid EDTA method.</td>
</tr>
<tr>
<td>9</td>
<td>Determination of percentage of Copper in the given brass solution using standard Sodium thiosulphate solution.</td>
</tr>
<tr>
<td>10</td>
<td>Determination of Iron in Hematite ore solution using Potassium dichromate crystals by external indicator method.</td>
</tr>
<tr>
<td>11</td>
<td>Determination of Chemical Oxygen Demand of the given industrial waste water sample.</td>
</tr>
<tr>
<td>12</td>
<td>Determination of Total Alkalinity of given water sample using standard Hydrochloric acid.(Demonstration)</td>
</tr>
</tbody>
</table>

Course Outcomes:
1. Students will be able to apply the basic concepts electrochemistry in experiments such as potentiometry and determination of PKa of weak acid, conductometry experiments etc
2. Students will be able to understand concepts of electromagnetic radiation and perform coulorimetric experiments.
3. Students will be able to analyze the total hardness of water sample and COD of the wastewater
4. Students will be able to analyze the hematite ore in the given sample.

References Books:

VIRTUAL LAB LINK DETAILS:
- https://www.labster.com/chemistry-virtual-labs/
- https://youtu.be/OwZbw6Mhrqc
- https://youtu.be/UOLOsKZxi6Y

SCHEME FOR EXAMINATIONS

MAPPING of COs with POs

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<tr>
<th></th>
<th>PO1</th>
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Strength of correlation: Low-1, Medium- 2, High-3
Dr Ambedkar Institute of Technology, Bengaluru-56  
Department of Computer Science and Engineering  
Scheme and Syllabus – OBE - CBCS – 2021 -2022

**COMPUTER PROGRAMMING LABORATORY**

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Category</th>
<th>Scheme and Credits</th>
<th>No. of Hours/Week</th>
<th>L</th>
<th>T</th>
<th>P</th>
<th>SS</th>
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<th>Credits</th>
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</tbody>
</table>

CIE Marks: 50  
SEE Marks: 50  
Total Max. Marks: 100  
Duration of SEE: 03 Hours

**Course objectives to:**
- Explain problem statements and identify appropriate solutions
- Demonstrate the use of IDE, C Compiler, and identify and rectify the syntax and syntactic errors during programming.
- Development of algorithms and programs using constructs of C programming language
- Reporting the observations

**Practice Programs**

1. To calculate simple interest (SI) for a given principal (P), time (T), and rate of interest (R) (SI = \( P\times T\times R/100 \)).
2. To print the ASCII value of the given input.
3. To find largest of three numbers.
4. To perform simple calculator using switch case statement.
5. To find factorial of a number.
6. To print even and odd numbers using looping Construct.
7. To print sum of N natural Numbers
8. Write a C Program to search for the given key element with the help of Linear search technique.
9. Develop a c program to implement selection sort technique.
10. Develop a C program to swap two numbers using pointers (Call by Reference).

**Lab Programs**

1. a Write a C program to find the roots of a quadratic equation.
   
   b Write a C program to print the numbers in triangular form
   
   1  
   1 2  
   1 2 3  
   1 2 3 4  

2. a Write a C program to check whether the given four digit number is palindrome or not.
<p>| | |</p>
<table>
<thead>
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<tbody>
<tr>
<td>b</td>
<td>Write a C program using function to sort the given array elements using bubble sort technique.</td>
</tr>
</tbody>
</table>
| 3 | a | Develop a C program to store age of n students and perform the following operations  
   i. Find minimum age of student in the list  
   ii. Find maximum age of a student in the list |
|   | b | Develop a C Program to compute \( \sin(x) \) using Taylor series approximation. Compare your result with the built-in Library function. Print both the results with appropriate messages. |
| 4 | a | If cost price and selling price of an item is input through the keyboard, write a program to determine whether the seller has made profit or incurred loss and determine how much profit or loss incurred in percentage. |
|   | b | Write a C program to implement Recursive functions for Binary to Decimal Conversion. |
| 5 | a | Write a C program to generate N Fibonacci series. |
|   | b | Develop a C program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers. |
| 6 | a | Write a C program to check whether the given number is prime or not. |
|   | b | Write a C program to  
   i. read N Bank Employees name  
   ii. Search for an employee in the list using Binary Search Technique.  
   Note: Use 2-D character array to store Bank employees names |
| 7 | a | Develop a C program to calculate tax based on given yearly salary and tax percentages. Read monthly salary of an employee as an input from the user.  
   Conditions to calculate tax, if yearly salary is:  

<table>
<thead>
<tr>
<th>Income Range</th>
<th>Tax Charges</th>
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<tr>
<td>( \leq 1,50,000 )</td>
<td>No tax</td>
</tr>
<tr>
<td>1,50,001 to 3,00,000</td>
<td>10%</td>
</tr>
<tr>
<td>3,00,001 to 5,00,000</td>
<td>20%</td>
</tr>
<tr>
<td>5,00,001 and above</td>
<td>30%</td>
</tr>
<tr>
<td>b</td>
<td>Write a menu driven C Program to compute Trace and Norm of a matrix Using Functions.</td>
</tr>
<tr>
<td>8</td>
<td></td>
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<tr>
<td>9</td>
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</tr>
</tbody>
</table>
**MATRIX MULTIPLICATION**

Write a C program by considering 2 matrices \( A (M x N) \) and \( B (P x Q) \) that uses functions to perform the following: i. Reading data to \( p1, p2, p3 \) (Matrix A) ii. Reading data to \( s1, s2 \) (Matrix B) iii. Multiplication of Two Matrices(\( C=A\times B \))

| 10 | Write a C Program To maintain a record of bank customer’s with four fields (Customer ID, Customer Name, Address and ACC-Num). Read and display the bank customer details. Note: Using array of structures. |

**Note:** In the practical examination the student need to select one question and both a, b (if present) should be executed. All the questions listed in the syllabus have to be included in the lots. The change of question has to be considered by deducting marks (20% of execution), provided the request is made for the same, within half an hour from the start of the examination.

**Course Outcomes:**

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

**CO1:** Define the problem statement and identify the need for computer programming

**CO2:** Make use of C compiler, IDE for programming, identify and correct the syntax and syntactic errors in programming

**CO3:** Develop algorithm, flowchart and write programs to solve the given problem

**CO4:** Demonstrate use of functions, recursive functions, arrays, strings, structures and pointers in problem solving.

**Suggested Learning Resources:**


**Weblinks and Video Lectures (e-Resources):**


2. https://nptel.ac.in/courses/106/105/106105171/
MAPPING of COs with POs

<table>
<thead>
<tr>
<th>CO-PO Mapping</th>
<th>PO1</th>
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