Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY

SCHEME AND SYLLABUS
(AS PER 2022 SCHEME)

Scheme of Teaching and Examinations
For I Semester and II Semester

Dr. Ambedkar Institute of Technology, Bangalore
(An Autonomous Institution, Affiliated to Visvesvaraya Technological University, Belagavi, Aided by Govt. of Karnataka, Approved by All India Council for Technical Education (AICTE), New Delhi)
Outer Ring Road, Mallathahalli, Bengaluru - 560 056
# Dr. AMBEDKAR INSTITUTE OF TECHNOLOGY

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Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mathematics
Scheme and Syllabus - 2022 -2023

Course Title: Calculus, Differential Equations and Linear Algebra
Course Code: 22MAU101A
Category: Mathematics-I (CV)

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

COURSE OBJECTIVE:
1. **Familiarize** the importance of calculus associated with one variable and two variables.
2. **Analyze** Engineering problems by applying Ordinary Differential Equations.
3. **Develop** the knowledge of Linear Algebra to solve system of equation by using matrices
4. **Apply** the knowledge of curvature, partial differentiation, ordinary differential equations and linear algebra in various fields of civil engineering

Course Learning Objectives:

**Familiarize** the importance of calculus associated with one variable and two variables.

**Analyze** Engineering problems by applying Ordinary Differential Equations.

**Develop** the knowledge of Linear Algebra to solve system of equation by using matrices

**Apply** the knowledge of curvature, partial differentiation, ordinary differential equations and linear algebra in various fields of civil engineering

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**UNIT-I**
**Introduction to polar coordinates and curvature relating to Civil Engineering:** Introduction, Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms (without proof).

**Self -study:** Center and circle of curvature, evolutes and involutes.
**Applications:** Structural design and paths, Strength of materials, Elasticity.
(RBT Levels: L1, L2 and L3)

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**UNIT-II**
Introduction to series expansion and partial differentiation in the field of Civil Engineering: Taylor’s and Maclaurin’s series expansion for one variable (no proof). Indeterminate forms- L’Hospital’s rule.

**Self- study:** Extended Euler’s theorem and problems, Method of Lagrange’s undetermined multipliers with single constraint.
### Applications
Computation of stress and strain, Errors and approximations, Estimating the critical points and extreme values.  
*(RBT Levels: L1, L2 and L3)*

#### UNIT-III
**8 Hours**

**Introduction to first-order ordinary differential equations pertaining to the applications for Civil Engineering:**
- Linear and Bernoulli’s differential equations. Exact and reducible to exact differential equations. Applications of ODE’s - Orthogonal trajectories. **Nonlinear differential equations:** Introduction to general and singular solutions, Solvable for p only, Clairaut’s equations.

**Self-Study:** Applications of ODE’s: Solvable for x and y, Newton’s law of cooling, reducible to Clairaut’s equations.

**Applications:** Rate of Growth or Decay, Conduction of heat.  
*(RBT Levels: L1, L2 and L3)*

#### UNIT-IV
**8 Hours**

**Ordinary Differential Equations of higher order:** Higher-order linear ODE’s with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy’s and Legendre’s differential equations.

**Self-study:** Formulation and solution of Cantilever beam. Finding the solution by the method of undetermined coefficients.

**Applications:** Oscillations of a spring, Transmission lines, highway engineering.  
*(RBT Levels: L1, L2 and L3)*

#### UNIT-V
**8 Hours**


**Self-Study:** Solution of a system of linear equations by Gauss-Jacobi iterative method. Inverse and power of a square matrix by Cayley- Hamilton theorem.

**Applications:** Structural analysis, balancing equations.  
*(RBT Levels: L1, L2 and L3)*

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

**CO1:** Describe the translation of coordinate system, various types of series of functions, identify the variation of multi variable’s and match the system of equations in matrix form.

**CO2:** Explain the graph of function relate to polar coordinates, interpret series of continuous function and demonstrate the methods to describe mathematical solution to equations related to Engineering problems.

**CO3:** Apply the Mathematical properties to solve illustrative Engineering problems, calculate Maxima and minima of a function and calculate Eigenvalue relate to Eigenvector of system of equations.

**CO4:** Analyze the Mathematical model of differential and systems of equations of more than one variable classify various solutions to problems, enumerate numerical solutions to system of equations and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB.
TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXTBOOKS

REFERENCE BOOKS

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

List of Laboratory experiments (2 hours/week per batch/batch strength 15)
10 lab sessions + 1 repetition class + 1 Lab Assessment

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Suggested software’s: Mathematica/MatLab/Python/Scilab

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Strength of correlation: Low-1, Medium-2, High-3
Course Title: Calculus, Differential Equations and Linear Algebra
Course Code: 22MAU101B
Category: Mathematics-I for Computer Science and Engineering Stream

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

Course Learning Objectives:
1. **Familiarize** the importance of calculus associated with one variable and multivariable for computer science and engineering.
2. **Analyze** computer science and engineering problems by applying ordinary differential equations.
3. **Apply** the knowledge of modular arithmetic to computer algorithms.
4. **Develop** the knowledge of linear algebra to solve the system of equations.

**UNIT-I**
Calculus
Introduction to polar coordinates and curvature relating to Computer Science and Engineering applications.
Polar coordinates, polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms.

**Self-study:** Center and circle of curvature, evolutes and involutes.

**Applications:** Computer graphics, Image processing.
(RBT Levels: L1, L2 and L3)

**UNIT-II**
Series Expansion and Multivariable Calculus
Introduction of series expansion and partial differentiation in Computer Science & Engineering.
Taylor’s and Maclaurin’s series expansion for one variable (no proof) Indeterminate forms – L’Hospital’s rule.

**Self-study:** Extended Euler’s theorem. Method of Lagrange’s undetermined multipliers with single constraint.

**Applications:** Series expansion in computer programming, Errors and approximations, calculators.
(RBT Levels: L1, L2 and L3)

**UNIT-III**
Ordinary Differential Equations (ODEs) of first order
Introduction to first-order ordinary differential equations pertaining to the applications
Linear and Bernoulli’s differential equations. Exact and reducible to exact differential equations. Orthogonal trajectories.


Self-Study: Applications of ODEs to L-R and R-C circuits, Solvable for x and y. Reducible to Clairaut’s equations, Newton’s law of cooling.

Applications of ordinary differential equations: In gradient descent in back propagation-Neural networks, Support vector mechanics (SVM), and AI.

(RBT Levels: L1, L2 and L3)

UNIT-IV 8 Hours
Modular Arithmetic
Introduction of modular arithmetic and its applications in Computer Science and Engineering.


Self-Study: Divisibility, GCD, properties of prime numbers, fundamental theorem of arithmetic.

Applications: Cryptography-encoding and decoding, RSA applications in public key encryption.

(RBT Levels: L1, L2 and L3)

UNIT-V 8 Hours
Linear Algebra
Introduction of linear algebra related to Computer Science & Engineering.


Self-Study: Solution of system of equations by Gauss-Jacobi iterative method. Inverse and power of a square matrix by Cayley-Hamilton theorem.

Applications: Boolean matrix, Network Analysis, Markov Analysis, Critical point of a network system. Optimum solution.

(RBT Levels: L1, L2 and L3).

COURSE OUTCOMES

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

- **CO1**: apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions.

- **CO2**: analyze the solution of linear and nonlinear ordinary differential equations.

- **CO3**: get acquainted and to apply modular arithmetic to computer algorithms.
• **CO4:** make use of matrix theory for solving for system of linear equations and compute eigenvalues and eigenvector

• **CO5:** familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/ PYTHON/ SCILAB

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

### TEXTBOOKS

### REFERENCE BOOKS

### Web links and Video Lectures (e-Resources):
1. [http://nptel.ac.in/courses.php?disciplineID=111](http://nptel.ac.in/courses.php?disciplineID=111)
2. [http://www.class-central.com/subject/math(MOOCs)](http://www.class-central.com/subject/math(MOOCs))
4. VTU e-Shikshana Program
5. VTU EDUSAT Program
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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 - 2022 -2023

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**Course Learning Objectives:**
1. **Familiarize** the importance of calculus associated with one variable and two variables.
2. **Analyze** Engineering problems by applying Ordinary Differential Equations.
3. **Develop** the knowledge of Linear Algebra to solve system of equation by using matrices.
4. **Apply** the knowledge of Calculus, Ordinary Differential Equations and Linear Algebra in the field of mechanical engineering.

**UNIT-I**

**8 Hours**

**Introduction to polar coordinates and curvature relating to mechanical engineering:**

**Self-study:** Center and circle of curvature, evolutes and involutes.

**Applications:** Applied mechanics, Strength of materials, Elasticity.
(RBTLevels:L1, L2 and L3)

**UNIT-II**

**8 Hours**

**Introduction to series expansion and partial differentiation in the field of Mechanical engineering applications:**
Taylor’s and Maclaurin’s series expansion for one variable (no proof). Indeterminate forms - L’Hospital’s rule.

**Self-study:** Extended Euler’s theorem, Method of Lagrange’s undetermined multipliers with single constraint.

**Applications:** Computation of stress and strain, errors and approximations in manufacturing process and critical points and extreme values.
(RBTLevels:L1, L2 and L3)

**UNIT-III**

**8 Hours**

**Introduction to first-order ordinary differential equations pertaining to the applications for mechanical engineering:**
Linear and Bernoulli’s differential equations. Exact and reducible to exact
Applications of ODE’s - Orthogonal trajectories,
**Nonlinear differential equations:** Introduction to general and singular solutions, Solvable for p only.
Clairaut’s equations.

**Self-Study**: Applications to RC, LR Circuits: Solvable for x and y, reducible to Clairaut’s equations, Newton’s law of cooling.

**Applications**: Rate of growth or decay, conduction of heat.

(RBTLevels:L1, L2 and L3)

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<th>UNIT-IV</th>
<th>Importance of higher-order ordinary differential equations in Mechanical Engineering applications.</th>
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<td><strong>Self-study</strong>: Formulation and solution of Cantilever beam. Finding the solution by the method of undetermined coefficients. <strong>Applications</strong>: Applications to oscillations of a spring, Mechanical systems and Transmission lines, LRC circuits.</td>
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**COURSE OUTCOMES**: On completion of the course, student should be able to:

**CO1**: Describe the translation of coordinate system, various types of series of functions, identify the variation of multivariables and match the system of equations in matrix form

**CO2**: Explain the graph of function relate to polar coordinates, interpret series of continuous function and demonstrate the methods to describe mathematical solution to equations related to Engineering problems.

**CO3**: Apply the Mathematical properties to solve illustrative Engineering problems, calculate Maxima and minima of a function and calculate Eigen value relates to Eigenvector of system of equations.

**CO4**: Analyze the Mathematical model of differential and systems of equations of more than one variable classify various solutions to problems, enumerate numerical solutions to system of equations and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB

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

**TEXTBOOKS**


**REFERENCEBOOKS**

ONLINERESOURCES
1. http://www.nptel.ac.in

List of Laboratory experiments (2 hours/week per batch/batch strength 15)
10 lab sessions + 1 repetition class + 1 Lab Assessment

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**Strength of correlation:** Low-1, Medium-2, High-3
Dr Ambedkar Institute of Technology, Bengaluru-56  
Department of Mathematics  
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CIE Marks: 50  
SEE Marks: 50  
Total Max. marks = 100  
Duration of SEE: 03 Hours

Course Learning Objectives:
- **Familiarize** the importance of calculus associated with one variable and multivariable for computer science and engineering
- **Analyze** computer science and engineering problems by applying ordinary differential equations.
- **Apply** the knowledge of integral calculus.
- **Develop** the knowledge of linear algebra to solve the system of equations

**UNIT-I**  
Calculus

Introduction to polar coordinates and curvature relating to Electrical & Electronics Engineering applications.

Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature- Cartesian, Parametric, Polar and Pedal forms.

**Self-study:** Center and circle of curvature, evolutes and involutes.

**Applications:** Communication signals, Manufacturing of microphones and Image processing.  
(RBT Levels: L1, L2 and L3)

**UNIT-II**  
Series Expansion and Multivariable Calculus I

Introduction of series expansion and partial differentiation in Electrical & Electronics Engineering Engineering applications.

Taylor’s and Maclaurin’s series expansion for one variable (Statement only).

Indeterminate forms – L’Hospital’s rule.


**Self-study:** Extended Euler’s Theorem and problems. Method of Lagrange’s undetermined multipliers with single constraint.

**Applications:** Series expansion in communication signals, Errors and approximations and vector calculus.  
(RBT Levels: L1, L2 and L3)
**UNIT-III**  
Ordinary Differential Equations (ODEs) of first order  
Introduction to first-order ordinary differential equations pertaining to the applications for EC & EE Engineering.
Linear and Bernoullis differential equations. Exact and reducible to exact differential equations. Orthogonal trajectories.
**Non-linear differential equations:** Introduction to general and singular solutions, Solvable for p only, Clairaut’s equations.
**Self-Study:** Applications of ODEs, Solvable for x and y, reducible to Clairaut’s equations, L-R and C-R circuits.
**Applications of ordinary differential equations:** Rate of Growth or Decay, Conduction of heat.  
(RBT Levels: L1, L2 and L3)

**UNIT-IV**  
Integral Calculus  
Introduction to Integral Calculus in Electrical & Electronics Engineering applications.  
**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 by double integration and volume by triple integration.  
**Beta and Gamma functions:** Definitions, properties, relation between Beta and Gamma functions.  
**Self-Study:** Volume by triple integration, Centre of gravity.  
**Applications:** Antenna and wave propagation, Calculation of optimum power in electrical circuits, field theory.  
(RBT Levels: L1, L2 and L3)

**UNIT-V**  
Linear Algebra  
Introduction of linear algebra related to Electrical & Electronics Engineering.  
**Self-Study:** Solution of system of equations by Gauss-Jacobi iterative method. Inverse and power of a square matrix by Cayley- Hamilton theorem.  
**Applications of Linear Algebra:** Network Analysis, Markov Analysis, Critical point of a network system. Optimum solution.  
(RBT Levels: L1, L2 and L3).

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

- **CO1:** apply the knowledge of calculus to solve problems related to polar curves and learn the notion of partial differentiation to compute rate of change of multivariate functions.
- **CO2:** analyze the solution of linear and nonlinear ordinary differential equations.  
**CO3:** apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume.  
- **CO4:** make use of matrix theory for solving for system of linear equations and compute eigenvalues and eigenvectors.
- CO5: familiarize with modern mathematical tools namely MATHEMATICA/MATLAB/ PYTHON/ SCILAB

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Web links and Video Lectures (e-Resources):

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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 - 2022-2023

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<tr>
<th>Course Title</th>
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Course Learning Objectives:
1. **Familiarize** the fundamentals of Integral calculus, Vector calculus, Numerical Techniques
2. **Analyze** Engineering problems by applying Partial Differential Equations Methods
3. **Develop** the knowledge of solving engineering problems by using numerical Technique
4. **Apply** the knowledge of calculus, partial differential equations and numerical techniques in various fields of civil engineering

**UNIT-I**  
Integral Calculus  
*8 Hours*

**Introduction to Integral Calculus in Civil Engineering applications:** 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 by double integration and Volume by triple integration.

**Beta and Gamma functions**: Definitions, properties, relation between Beta and Gamma functions. Evaluation of Euler’s integrals of first and second kind.

**Self-Study**: Duplication formula, Center of gravity

**Applications**: Applications to mathematical quantities (Area, Surface area, Volume). Analysis of probabilistic models.  

(RBT Levels: L1, L2 and L3)

**UNIT-II**  
Vector Calculus  
*8 Hours*

**Introduction to Vector Calculus in Civil Engineering applications**: Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Vector identities.

**Vector Integration**: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green’s theorem and Stoke’s theorem.

**Self-Study**: Volume integral and Gauss divergence theorem.

**Applications**: Heat and mass transfer, oil refinery problems, environmental engineering. Analysis of stream lines, velocity and acceleration of a moving particle.

(RBT Levels: L1, L2 and L3)

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

**Self-Study:** Derivation of one-dimensional heat equation and wave equation.

**Applications:** Design of structures (vibration of rod/membrane).

(RBT Levels: L1, L2 and L3)

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**UNIT-IV**

**Numerical methods-1**

**Importance of Numerical methods for discrete data in the field of Civil Engineering:**

**Finite differences:** Interpolation using Newton’s forward and backward difference formulae, Newton’s divided difference formula (no proof).

**Numerical differentiation:** Numerical differentiation using Newton’s forward and backward interpolation formulae (All formulae without proof) and Applications to Maxima and Minima.

**Numerical integration:** Trapezoidal rule, Simpson’s (½)² rule, Simpson’s (½)³ rule and Weddle’s rule (no proof).

**Self-Study:** Sterling’s formula, Lagrange’s interpolation and Lagrange’s inverse Interpolation formula.  

**Applications:** Estimating the approximate roots, extremum values, Area, volume, surface area. Finding approximate solutions to civil engineering problems.

(RBT Levels: L1, L2 and L3)

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**UNIT-V**

**Numerical methods - 2**

**Introduction to various numerical techniques for handling Civil Engineering application:**

**Solution of algebraic and transcendental equations:** Regula-Falsi and Newton- Raphson methods (no proof).

**Numerical Solution of Ordinary Differential Equations (ODE’s):** Numerical solution of ordinary differential equations of first order and first degree - Taylor’s series method, Modified Euler’s method, Runge-Kutta method of fourth order and Milne’s predictor-corrector formula (no proof).

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

**Applications:** Finding approximate solutions to ODE related to civil engineering fields.

(RBT Levels: L1, L2 and L3)

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

**CO1: Knowledge** to Evaluate double and triple integration and identify the scalar, vector notation of functions of two and three dimensions, recognize the partial differential equations and Numerical differences.

**CO2: Understand** to explain Area, Volume by double integration, change to polar coordinates describe divergence and flux in vector field; classify method of solutions of PDE’s, Numerical differentiation and integrations.

**CO3: Apply** the Mathematical properties to evaluate triple integral and improper integral to interpret the irrotational and solenoidal vector field, find the solutions to problem arises in engineering field.

**CO4: Analyze** multiple integrals, vector differentiations and integration, the Mathematical model by partial differential equations, Numerical solution to algebraic and transcendental, ordinary differential equations and familiarize with modern mathematical tools namely SCILAB/PYTHON/MATLAB
TEACHING – LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos.

TEXTBOOKS

REFERENCE BOOKS

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

List of Laboratory experiments (2 hours/week per batch/ batch strength 15) 10 lab sessions + 1 repetition class + 1 Lab Assessment

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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 - 2022 -2023

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

Course Learning Objectives:

1. **Familiarize** the fundamentals of Integral calculus and Vector calculus.
2. **Learn** vector spaces and linear transformations.
3. **Develop** the knowledge of solving numerical methods and apply them to solve transcendental and differential equations.
4. **Apply** the knowledge of calculus, vector space, linear transformation and numerical techniques in various fields of computer science and engineering.

**UNIT-I**

**Integral Calculus**

**Introduction to Integral Calculus in Computer Science & Engineering.**

**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 by double integral and volume by triple integral.

**Beta and Gamma functions:** Definitions, properties, relation between Beta and Gamma functions. Evaluation of Euler’s integral of first and second kind.

**Self-Study:** Center of gravity, Duplication formula.

**Applications:** Antenna and wave propagation, Calculation of optimum value in various geometries. Analysis of probabilistic models.

(RBT Levels: L1, L2 and L3)

**UNIT-II**

**Vector Calculus**

**Introduction to Vector Calculus in Computer Science & Engineering.**

Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields, vector identities.

**Curvilinear coordinates:** Scale factors, base vectors, Cylindrical polar coordinates, Spherical polar coordinates, transformation between cartesian and curvilinear systems, orthogonality.

**Self-Study:** Volume integral. Expressions of curl, divergence and gradient in O.C.C.

**Applications:** Conservation of laws, Electromagnetic waves, Analysis of streamlines.
Vector Space and Linear Transformations

UNIT-III  
8 Hours
Importance of Vector Space and Linear Transformations in the field of Computer Science & Engineering.

Vector spaces: Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension.


Self-study: Angles and Projections. Rotation, reflection, contraction and expansion.

Applications: Image processing, AI & ML, CS & BS graphs and networks, computer graphics.
(RBT Levels: L1, L2 and L3)

UNIT-IV  
8 Hours
Numerical methods -1
Importance of numerical methods for discrete data in the field of computer science & engineering.

Solution of algebraic and transcendental equations – Ramanujan’s method, Regula-Falsi and Newton-Raphson methods (no proof).

Finite differences, Interpolation formula-Newton’s Gregory forward and backward, Gauss forward and backward, Stirling’s, Bessel’s, and Everett’s (no proofs). Newton’s divided difference formula and Lagrange’s interpolation formula (no proofs).

Numerical integration: Trapezoidal, Simpson's (1/3)rd and (3/8)th rules, and Weddle’s rule(without proof).


Applications: Estimating the approximate roots, extremum values, Area, volume, and surface area. Errors in finite precision.
(RBT Levels: L1, L2 and L3)

UNIT-V  
8 Hours
Numerical methods -2
Introduction to various numerical techniques for handling Computer Science & Engineering applications.


Applications: Estimating the approximate solutions of ODE. (RBT Levels: L1, L2 and L3)

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

CO1: Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing area and volume.

CO2: Understand the applications of vector calculus refer to solenoidal and irrotational vectors. Orthogonal curvilinear coordinates.

CO3: Demonstrate the idea of Linear dependence and independence of sets in the vector space and linear transformation

CO4: Apply the knowledge of numerical methods in analyzing the discrete data and solving the physical and engineering problems.

CO5: Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB /PYTHON/ SCILAB
Textbooks


REFERENCE BOOKS:


ONLINE RESOURCES:

- [http://nptel.ac.in/courses.php?disciplineID=111](http://nptel.ac.in/courses.php?disciplineID=111)
- [http://www.class-central.com/subject/math(MOOCs)](http://www.class-central.com/subject/math(MOOCs))
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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 - 2022 -2023

Course Title | Integral Calculus, Partial Differential Equations and Numerical methods |
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Course Code | 22MAU201C |
Category | Mathematics for Mechanical Engineering streams -II |
| Scheme and Credits | Theory/Practical/Integrated | Total teaching hours | Lab slots | Credits |
| | L | T | P | SDA | Total |
| | 02 | 02 | 02 | 00 | 04 |
| CIE Marks: 50 | SEE Marks: 50 | Total Max. marks=100 | Duration of SEE: 03 Hours | 04 |

**COURSE OBJECTIVE:**
1. **Familiarize** the fundamentals of Integral calculus and Vector calculus
2. **Analyze** Engineering problems by applying Partial Differential Equations
3. **Develop** the knowledge of solving engineering problems by using numerical Technique

**UNIT-I**  
**Integral Calculus**

**Introduction to Integral Calculus in Mechanical Engineering applications:**
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 by double integral and volume by triple integral.

**Beta and Gamma functions:** Definitions, properties, relation between Beta and Gamma functions. Evaluation of Euler’s integrals of first and second kind.

**Self-Study:** Duplication formula, Center of gravity.

**Applications:** Applications to mathematical quantities (Area, Surface area, Volume), Analysis of probabilistic models.

(RBT Levels: L1, L2 and L3)

**UNIT-II**  
**Vector Calculus**

**Introduction to Vector Calculus in Mechanical Engineering applications.**
- **Vector Differentiation:** Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Vector identities.
- **Vector Integration:** Line integrals, Surface integrals. Applications to work done by a force and flux. Green’s theorem and Stoke’s theorem (no proof).

**Self-Study:** Volume integral and Gauss divergence theorem.

**Applications:** Heat and mass transfer, oil refinery problems, environmental engineering, velocity and acceleration of moving particles, analysis of streamlines.

(RBT Levels: L1, L2 and L3)

**UNIT-III**  
**Partial Differential Equations (PDE's):**

**Importance of partial differential equations for Mechanical Engineering application.**
Formation of PDE's by elimination of arbitrary constants and functions. Solution of non-homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Method of separation of variables. Solution of one-dimensional heat equation and wave equation by the method of separation of variables.
Self-Study: Derivation of one-dimensional heat equation and wave equation, Fourier series

Applications: Vibration of a rod/membrane and boundary problem

(RBT Levels: L1, L2 and L3)

UNIT-IV  8 Hours
Numerical methods-1:
Importance of numerical methods for discrete data in the field of Mechanical Engineering.

Finite differences: Interpolation using Newton’s forward and backward difference formulae, Guass
Forwards and Backwards formula Newton’s divided difference formula (no proof).

Numerical differentiation: Numerical differentiation using Newton’s forward and backward
interpolation formulae, (no proof)

Numerical integration: Trapezoidal rule, Simpson’s ($\frac{1}{3}$)rd rule, Simpson’s ($\frac{3}{8}$)th rule, and Weddle’s
rule (no proof)

Self-Study: Sterling’s formula, Lagrange’s interpolation and Lagrange’s inverse Interpolation
formula, Boole’s rule

Applications: Finding approximate solutions to solve mechanical engineering problems involving
numerical Input output data.

(RBT Levels: L1, L2 and L3)

UNIT-V  8 Hours
Numerical methods -2:
Introduction to various numerical techniques for handling Mechanical Engineering applications.

Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods
(no proof), Ramanujan’s method.

Numerical Solution of Ordinary Differential Equations (ODE’s): Numerical solution of ordinary
differential equations of first order and first degree - Taylor’s series method, Modified Euler’s
method, Runge-Kutta method of fourth order and Milne’s predictor-corrector formula (no proof).

Self-Study: Bisection method, Euler’s method Adam-Bashforth method, Picard’s method, N-R
method for Repeated roots.

Applications: Finding approximate solutions to solve mechanical engineering problems.

Semester

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

CO1: Knowledge to Evaluate double and triple integration and identify the scalar, vector
notation of functions of two and three dimensions, recognize the partial differential
equations and Numerical differences.

CO2: Understand to explain Area, Volume by double integration, change to polar
coordinates describe divergence and flux in vector field; classify method of solutions
of PDE’s, Numerical differentiation and integrations.

CO3: Apply the Mathematical properties to evaluate triple integral and improper integral to
interpret the irrotational and solenoidal vector field, find the solutions to problem
arises in engineering field.

CO4: Analyze multiple integrals, vector differentiations and integration, the Mathematical model by
partial differential equations, Numerical solution to algebraic and transcendental, ordinary
differential equations and familiarize with modern mathematical tools namely
SCILAB/PYTHON/MATLAB

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

REFERENCE BOOKS


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

List of Laboratory experiments (2 hours/week per batch/ batch strength 15)
10 lab sessions +1 repetition class +1 Lab Assessment

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<td>Solution of ODE of first order and first degree by Taylor’s</td>
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<td>Solution of ODE of first order and first degree by Runge-Kutta</td>
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CO2  2  2
CO3  2  2
CO4  1  3
CO5  1  3

Strength of correlation: Low-1, Medium-2, High-3
Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Mathematics
Scheme and Syllabus - 2022-2023

Course Title: Mathematics-II for Electrical & Electronics Engineering Stream
Course Code: 22MAU201D
Category: Mathematics-II for Computer Science and Engineering Stream

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

UNIT-I
Vector Calculus
Introduction to Vector Calculus in EC & EE engineering applications.
Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields.
Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green’s theorem and Stoke’s theorem.
Self-Study: Volume integral and Gauss divergence theorem.
Applications: Conservation of laws, Electrostatics, Analysis of streamlines and electric potentials.
(RBT Levels: L1, L2 and L3)

UNIT-II
Vector Space and Linear Transformations
Importance of Vector Space and Linear Transformations in the field of EC & EE engineering applications.
Vector spaces: Definition and examples, subspace, linear span, Linearly independent and dependent sets, Basis and dimension.
Self-study: Angles and Projections. Rotation, reflection, contraction and expansion.
Applications: Image processing, AI & ML, Graphs and networks, computer graphics.
(RBT Levels: L1, L2 and L3)

UNIT-III
Laplace Transform
Importance of Laplace Transform for EC & EE engineering applications.
Existence and Uniqueness of Laplace transform (LT), transform of elementary functions, region of convergence, Properties-Linearity, Scaling, t-shift property, s-domain shift, differentiation in the domain.
division by $t$, differentiation and integration in the time domain, LT of special functions periodic functions (square wave, saw-tooth wave, triangular wave, full & half wave rectifier), Heaviside Unit step function, Unit impulse function.

**Inverse Laplace Transforms:**
Definition, properties, evaluation using different methods, convolution theorem (without proof) and applications to solve ordinary differential equations.

**Self-Study:** Verification of convolution theorem.

**Applications:** Signals and systems, Control systems, LR, CR & LCR circuits.

(RBT Levels: L1, L2 and L3)

---

### UNIT-IV

**8 Hours**

**Numerical methods - 1**

Importance of numerical methods for discrete data in the field of EC & EE engineering applications.

Solution of algebraic and transcendental equations: Regula-Falsi method and Newton-Raphson method (only formulae).

Finite differences, Interpolation using Newton’s forward and backward difference formulae, Newton’s divided difference formula and Lagrange’s interpolation formula (All formulae without proof).

**Numerical integration:** Weddle’s rule, Simpson’s $(1/3)_{rd}$ and $(3/8)_{th}$ rules (without proof).

**Self-Study:** Bisection method, Lagrange’s inverse Interpolation, Trapezoidal rule.

**Applications:** Estimating the approximate roots, extremum values, Area, volume and surface area.

(RBT Levels: L1, L2 and L3)

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### UNIT-V

**8 Hours**

**Numerical methods - 2**

Introduction to various numerical techniques for handling EC & EE applications.

**Numerical Solution of Ordinary Differential Equations (ODEs):**
solution of first order and first degree – Taylor’s series method, Modified Euler’s method, Runge-Kutta method of fourth order and Milne’s predictor corrector formula (No derivations of formulae).

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

**Applications:** Estimating the approximate solutions of ODE for electric circuits.

(RBT Levels: L1, L2 and L3)

---

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

**CO1:** Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.

**CO2:** Demonstrate the idea of linear dependence and independence of sets in the vector space and linear transformation.

**CO3:** To understand the concept of Laplace transform and to solve initial value problems.

**CO4:** Apply the knowledge of numerical methods in solving physical and engineering phenomena.

**CO5:** Get familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB /PYTHON/ SCILAB.
Textbooks


REFERENCE BOOKS:

ONLINE RESOURCES:
- http://nptel.ac.in/courses.php?disciplineID=111
- http://www.class-central.com/subject/math(MOOCs)
- http://academicearth.org/
- VTU e-Shikshana Program
- VTU EDUSAT Program

List of Laboratory experiments (2 hours/week per batch/ batch strength 15)10 lab sessions +1 repetition class +1 Lab Assessment

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8. Computation of area under the curve using Trapezoidal, Simpson’s (1/3)rd and (3/8)th rule

9. Solution of ODE of first order and first degree by Taylor’s series and modified Euler’s method

10. Solution of ODE of first order and first degree by Runge-Kutta 4th order and Milne’s predictor-corrector method

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**Strength of correlation:** Low-1, Medium-2, High-3
## Course Title
Applied Physics

## Course Code
22PHU102A

## Category
Applied Science Course (ASC) (IC)

### Scheme and Credits

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</table>

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

## COURSE OBJECTIVE:
To introduce the Engineering students to the Elasticity, Vibrations, Laser and fiber optics, Acoustics of auditorium & Natural hazards and Safety 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

#### 8 hours


**Pre-requisites:** Basics of Elasticity

**Self-learning:** Types of Beams

### UNIT II

#### 8 hours


**Pre-requisites:** Simple Harmonic motion

**Self-learning:** Applications of damping in Engineering

### UNIT III

#### 8 hours


**Pre-requisite:** Properties of light

**Self-learning:** Propagation Mechanism &TIR in optical fiber

### UNIT IV

#### 8 hours

**Acoustics of Auditorium:**
Introduction to acoustics, Types of Acoustics, reverberation and reverberation time, absorption power and absorption coefficient, Requisites for acoustics in auditorium, Sabine’s formula (derivation), measurement of absorption coefficient, factors affecting the acoustics and remedial measures, Noise and its Measurements, Sound Insulation and its measurements, Numerical problems.

**Pre-requisites:** Basics of Sound Waves

**Self-learning:** Applications of Acoustics
UNIT V 8 hours
Natural hazards and Safety:
Introduction, Earthquake, (general characteristics, Physics of earthquake, Richter scale of measurement and earthquake resistant measures), Tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineering structures to withstand tsunami), Landslide (causes such as excess rainfall, geological structure, human excavation etc, types of landslide, adverse effects, engineering solution for landslides). Forest Fires and detection using remote sensing. Fire hazards and fire protection, fire-proofing materials, fire safety regulations and firefighting equipment - Prevention and safety measures. Numerical problems. Pre-requisite: Oscillations Self-learning: Richter scale.

Pre-requisite: Oscillations

Self-learning: Richter scale

Experimental Components:
Any Ten Experiments have to be completed from the list of experiments
1. Series & Parallel LCR Circuits
2. Determination of Fermi energy of a copper.
3. Wavelength of LASER using Grating
4. Numerical Aperture using optical fiber
5. Rigidity Modulus (n) by Torsional Pendulum
6. Moment of Inertia of an Irregular body (I) by Torsional pendulum
7. Y by Single Cantilever
8. Newton’s Rings
9. Bar Pendulum
10. Determination of Planck’s constant using LED’s
11. GNU Step Interactive Simulation
12. Study of motion using Spread sheets
13. Application of Statistic using Spread Sheets
14. PHET Interactive Simulations

TEACHING and LEARNING PROCESS: Chalk and Talk, Power Point presentation, Animations and videos and experimental learning in Laboratory.

Course outcome (Course Skill Set)
At the end of the course the student will be able to:

| CO1 | Elucidate the concepts in elasticity and vibrations |
| CO2 | Discuss the principles of photonic devices and their application relevant to Civil engineering |
| CO3 | Summarize concepts of acoustics in buildings and explain the concepts in radiation and photometry |
| CO4 | Describe the various natural hazards and safety precautions |
| CO5 | Practice working in groups to conduct experiments in physics and perform precise and honest measurements. |
**Text Books**

7. *An Introduction to Disaster Management, Natural Disaster & Man-Made Hazards*, S. Vaidyanathan,
8. IKON Books P

**Reference Books**


**Web links and Video Lectures (e-Resources):**

1. Simple Harmonic motion: https://www.youtube.com/watch?v=k2FvSzWeVxQ
3. Stress curves: https://www.youtube.com/watch?v=f08Y39UiC-o
4. Oscillations and waves: https://openstax.org › books › college-physics-2e
5. Earthquakes: www.asc-india.org
8. Acoustics:https://www.youtube.com/watch?v=fHBpMDFyO8

**Activity Based Learning (Suggested Activities in Class)/ Practical Based Learning:**

- http://nptel.ac.in
- https://swayam.gov.in
- https://virtuallabs.merlot.org/vl_physics.html
- https://phet.colorado.edu
- https://www.myphysicslab.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: 3
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:**
1. Questions from Experiments shall be included in the SEE question paper
2. Questions from Self-study component will not be asked for CIE and SEE.

### COs and POs Mapping

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Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped
Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus - 2022 -2023

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<td>CIE Marks: 50</td>
<td>SEE Marks: 50</td>
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COURSE OBJECTIVE: To introduce the Engineering students to the basics of Lasers and Optical fibers, Modern Physics, Quantum Mechanics, Electrical and Dielectric properties and Superconductivity, 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
Pre-requisite: Properties of light Self-learning: Propagation Mechanism &TIR in optical fiber

UNIT II
Pre-requisite: Blackbody radiations Self-learning: Planck law of radiation, Photoelectric effect

UNIT III
Pre-requisite: Wave-Particle dualism Self-learning: The Davisson–Germen experiment
UNIT IV
8 hours


Pre-requisite: Review of Classical free electron theory(CFET)
Self-learning: Electrical conductivity based on CFET

UNIT V
8 hours
Superconductivity
Introduction to Super Conductors, Temperature dependence of resistivity in superconducting materials, Effect of magnetic field on superconductors: Meissner’s Effect, Type-I and Type-II superconductors, Temperature dependence of critical field, BCS theory (Qualitative), High temperature superconductors, Josephson Junction, , Applications of super conductors: Super conducting magnets, Maglev vehicles, SQUIDs and Quantum computing. Numerical problems.

Pre-requisites: Basics of Electrical conductivity
Self-learning: Resistivity and Mobility

Experimental Components:
Any Ten Experiments have to be completed from the list of experiments
1. Series & Parallel LCR Circuits
2. Determination of Fermi energy of a copper.
3. Wavelength of LASER using Grating
4. Numerical Aperture using optical fiber
5. Charging and Discharging of a Capacitor
6. Determination of Planck’s constant using LED’s
7. Energy Gap of the given Semiconductor
8. Transistor Characteristics
9. Characteristics of Zener Diode
10. Radius of curvature of Plano convex lens using Newton’s rings
11. GNU Step Interactive Simulations
12. Study of motion using Spread sheets
13. Application of Statistic using Spread Sheets
14. PHET Interactive Simulations

TEACHING and LEARNING PROCESS: Chalk and Talk, Power Point presentation, Animations and videos

Course Outcomes
On completion of the course the student should be able to
CO1: Describe the principles of LASERS and Optical fibers and their relevant applications.
CO2: Discuss the basic principles of Modern Physics and Quantum Mechanics
CO3: Understand the properties of Electrical, Dielectric materials.
CO4: Summarize the essential properties of Superconductors and Applications
CO5: Practice working in groups to conduct experiments in Physics and perform precise and honest measurements.
TEXT BOOKS
1. Prof. S. P. Basavaraju, Engineering Physics, Subhas Stores, Bangalore.
4. Introduction to Superconductivity, Michael Tinkham, Mc Graw Hill, INC, II Edition

REFERENCE BOOKS
2. A Marikani, Engineering Physics, PHI Learning Private Limited, Delhi - 2013
3. V. Rajendran , Engineering Physics, Tata McGraw Hill Company Ltd., New Delhi -2012

ONLINE RESOURCES
1. LASER: https://www.youtube.com/watch?v=WgzynezPiyc
2. Superconductivity: https://www.youtube.com/watch?v=MT5X15ppn48
3. Optical Fiber: https://www.youtube.com/watch?v=N_kA8EpCUqo
4. Quantum Mechanics: https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s
5. NPTEL Superconductivity: https://archive.nptel.ac.in/courses/115/103/115103108/
6. NPTEL Quantum Computing: https://archive.nptel.ac.in/courses/115/101/115101092
7. Virtual LAB: https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham
8. Virtual LAB: https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1
9. Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning
   - http://nptel.ac.in https://swayam.gov.in
   - https://virtuallabs.merlot.org/vl_physics.html
   - https://phet.colorado.edu https://www.myphysicslab.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 : 3
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: 1. Questions from Experiments shall be included in the SEE question paper
2. Questions from Self-study component shall not be asked for CIE and SEE.

CO-PO Mapping:

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Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped
COURSE OBJECTIVE: To introduce the Engineering students to the Elasticity, Vibrations, Laser and fiber optics, Nanomaterials and Characterization techniques 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
8 hours


Pre-requisites: Basics of Elasticity
Self-learning: Types of Beams

UNIT II
8 hours


Pre-requisites: Simple Harmonic motion
Self-learning: Applications of damping in Engineering

UNIT III
8 hours


Application of optical fibers: Point to point communication with block diagram. Advantages and limitations of fiber optic communication over conventional communication system. Numerical problems.

Pre-requisite: Properties of light
Self-learning: Propagation Mechanism & TIR in optical fiber

UNIT IV
8 hours

nanomaterials: mechanical, electrical, magnetic and optical properties. Mention the applications of nanomaterials. Numerical problems.

**Pre-requisites:** Crystal structure  
**Self-learning:** Carbon Nanotubes

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**UNIT V**  
**8 hours**

**Material Characterization Techniques:**
Microscopic techniques: Principle of electron microscope, Scanning Electron Microscopy (SEM) and applications, Transmission Electron Microscope (TEM) and applications. Atomic Force Microscopy (AFM) and applications.

Spectroscopy Techniques: UV-Visible spectroscopy and applications, Fourier Transform Infra-Red spectroscopy (FTIR) and applications, X-ray photoelectron spectroscopy (XPS) and applications.

**Pre-requisites:** Fundamentals of optical microscopy  
**Self-learning:** Difference between SEM & TEM

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**Experimental Components:**
Any Ten Experiments have to be completed from the list of experiments

1. Series & Parallel LCR Circuits
2. Determination of Fermi energy of a copper.
3. Wavelength of LASER using Grating
4. Numerical Aperture using optical fiber
5. Determination of Rigidity modulus of the Material of the wire using Torsional Pendulum.
6. Moment of Inertia by Torsional pendulum
7. Determination of Young’s modulus of the material of the given bar Single Cantilever
9. Bar Pendulum
10. Determination of Planck’s constant using LED’s
11. Study of motion using spread Sheets
13. PHET Interactive Simulations

---

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

---

**Course outcome (Course Skill Set)**
At the end of the course the student will be able to:

| CO1 | Elucidate the concepts Elasticity and Vibrations. |
| CO2 | Discuss the fundamentals of Lasers and optical fibers. |
| CO3 | Explain the basics of nanomaterials and their properties. |
| CO4 | Analyze the material characterization techniques. |
| CO5 | Practice working in groups to conduct experiments in physics and perform precise and honest measurements. |

---

**Suggested Learning Resources:**

**Text Books**


Web links and Video Lectures (e-Resources):
1. Simple Harmonic motion: https://www.youtube.com/watch?v=k2FvSzWeVxQ
3. Stress curves: https://www.youtube.com/watch?v=f08Y39UjC-o
4. Fracture in materials: https://www.youtube.com/watch?v=x47nky4MbK8
5. Virtual lab:https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham
6. Material characterization: https://onlinecourses.nptel.ac.in/noc20_mm14/preview


Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning
1. http://nptel.ac.in https://swayam.gov.in

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 : 3
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: 1. Questions from Experiments shall be included in the SEE question paper
   2. Questions from Self-study component will not be asked for CIE and SEE.

COs and POs Mapping

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Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped
Course Title: Applied Physics
Course Code: 22PHU102D (ECE/EIE/ET/EEE)
Category: Applied Science Course (ASC) (IC)

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</table>

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

COURSE OBJECTIVE: To introduce the Engineering students to the basics of Lasers and Optical fibers, Modern Physics, Quantum Mechanics, Electrical properties of semiconductors and Superconductivity, 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
Pre-requisite: Properties of light
Self-learning: Causes for Attenuation

UNIT II
Pre-requisite: Blackbody radiations
Self-learning: Planck law of radiation, Photoelectric effect

UNIT III
Numerical problems.
Pre-requisite: Wave-Particle dualism
Self-learning: The Davisson–Germer experiment

UNIT IV
8 hours
### Electrical properties of Semiconductors  

<table>
<thead>
<tr>
<th>Pre-requisite:</th>
<th>Basics of Semiconductors</th>
<th>Self-learning:</th>
<th>Semiconductor devices</th>
</tr>
</thead>
</table>

### UNIT V  
**Superconductivity**
Introduction to Super Conductors, Temperature dependence of resistivity in superconducting materials, Effect of magnetic field on superconductors: Meissner’s Effect, Type-I and Type-II superconductors, Temperature dependence of critical field, BCS theory (Qualitative), High temperature superconductors, Josephson Junction, Applications of Superconductors: Superconducting magnets, Maglev vehicles, SQUIDs and Quantum computing. Numerical problems.

<table>
<thead>
<tr>
<th>Pre-requisites:</th>
<th>Basics of Electrical conductivity, dielectrics</th>
<th>Self-learning:</th>
<th>Resistivity and Mobility</th>
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</table>

### Experimental Components:
**Any Ten Experiments have to be completed from the list of experiments**
1. Series & Parallel LCR Circuits
2. Determination of Fermi energy of a copper.
3. Wavelength of LASER using Grating
4. Numerical Aperture using optical fiber
5. Charging and Discharging of a Capacitor
6. Energy Gap of the given Semiconductor
7. Planck’s constant using LEDs.
8. Transistor Characteristics
9. Zener Diode Characteristics
10. Radius of curvature of Plano convex lens using Newton’s rings
11. GNU Step Interactive Simulations
12. Study of Electrical quantities using spreadsheet

### TEACHING and LEARNING PROCESS: Chalk and Talk, power point presentation, animations, videos and experimental learning in Laboratory.

**CO1:** Describe the principles of LASERS and Optical fibers and their relevant applications.

**CO2:** Discuss the basic principles of Modern Physics and Quantum Mechanics

**CO3:** Understand the properties of semiconductors.

**CO4:** Summarize the essential properties of Superconductors and Applications

**CO5:** Practice working in groups to conduct experiments in Physics and perform precise and honest Measurements.

### Suggested Learning Resources:

Web links and Video Lectures (e-Resources):
1. Laser: https://Laser: https://nptel.ac.in/courses/115/102115102124/
2. Quantum mechanics: https://nptel.ac.in/courses/115/104/115104096/
3. Physics: http://hyperphysics.phy-astr.gsu.edu/hbase/hframe.html
4. Numerical Aperture of fiber: https://bop-iitk.vlabs.ac.in/exp/numerical-aperture-measurement
5. NPTEL Superconductivity: https://archive.nptel.ac.in/courses/115/103/115103108/

Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning
1. http://nptel.ac.in
2. https://swayam.gov.in
3. https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham
6. https://phet.colorado.edu
7. https://www.myphysicslab.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 : 3
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: 1. Questions from Experiments shall be included in the SEE question paper  
2. Questions from Self-study component will not be asked for CIE and SEE.

CO-PO Mapping:

<table>
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<th>COs</th>
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</table>
Course Title: APPLIED CHEMISTRY
Course Code: 22CHU102A ME/AE/IEM
Category: Applied Science Course (ASC) (IC)

Course Objectives: To interconnect the acquaintance of Chemistry involved in Basics of Electrochemical cells, Corrosion and its control; renewable sources of energy; Polymers for Electronic materials; memory and display systems; sensors in instrumental analytical methods and water treatment; e-waste management; Nanomaterials and its application.

Syllabus content

UNIT I: Electrode Systems and Corrosion Science 8 hours
Electrodes and Cells - Introduction- Classification of electrochemical cells and concentration cells, numerical on concentration cells.; Reference electrodes - Calomel electrode; Ion-selective electrodes - Glass electrode. Determination of pH using glass electrode.
Corrosion - Definition, Electrochemical theory of corrosion, Types of corrosion - differential metal, differential aeration and stress corrosion; Factors affecting the rate of corrosion; Corrosion Penetration Rate (CPR) , numerical. Corrosion control: Inorganic coatings – anodizing and phosphating. Cathodic protection – Sacrificial anode, Impressed current method. Metal finishing - Introduction, technological importance; Electroplating – Chromium Plating; Electroless plating - Electroless plating of copper on PCB.
Self-study: Galvanic series and its importance, Electroplating of Gold.

UNIT II: Energy conversion and Storage 8 hours
Chemical fuels - Introduction, Calorific value - definition, gross and net calorific values; Determination of calorific value of a solid / liquid fuel using Bomb calorimeter and numerical on calorific value; Petroleum cracking - fluidized bed catalytic cracking; Knocking- Mechanism of Knocking in IC engine; Octane number and Cetane number; Reformation of petrol.
Electrochemical Energy Systems: Introduction to batteries, Classification of batteries - primary and secondary batteries; Battery characteristics; construction, working and applications of Lithium ion batteries.
Self-study: Fuel cells and Zinc-Air, Na-Ion batteries.

UNIT III: Macromolecules for Engineering application 8 hours
Polymers - Polymerization – Classification- addition and condensation polymerization with examples: Techniques of polymerization- bulk, solution, emulsion and suspension polymerization. Free radical mechanism taking ethylene as an example, Introduction to Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (Tg) –significance and factors affecting Tg, compounding of resins into plastics. Synthesis and applications- PMMA, Polyurethane, phenol-formaldehyde resin. Elastomers: Introduction, vulcanization of rubber. Synthesis and applications of neoprene and butyl rubber; adhesives: synthesis of...

**Self-study:** Polycarbonates, Recycling of PET.

**Unit – IV : Materials for Engineering Applications**

**Alloys:** Introduction, classification, composition, properties and applications of stainless steel, solders, brass, alnico and shape memory alloys.

**Ceramics:** Introduction, classification based on chemical composition, properties and applications of perovskites.

**Lubricants:** Introduction, classification, properties and applications of lubricants.

**Nanomaterials** - Introduction, size dependent properties (Surface area, Electrical, Optical, Catalytic and Thermal properties). Synthesis of nanomaterials: top-down and bottom-up approaches; Synthesis by sol-gel ($\text{ZrO}_2$), chemical vapor deposition methods (CNTs). Graphene by Hummer’s method – properties and applications.

**Self-Study:** Abrasives

**Unit – V : Phase Rule, Water Treatment and Analytical Techniques**

**Phase Rule** – Gibbs phase rule; Concept of Phase component, degrees of freedom with examples; Numericals. Application of Phase rule to i) one component system - water system; ii) two component system - Pb-Ag system,

**Water treatment** - Introduction, hardness of water, types, determination of hardness by EDTA method, disadvantages of hard water, removal of hardness by ion exchange method, Desalination of water – Electrodialysis. BOD and COD - introduction and their significance in waste water treatment, experimental determination of COD of waste water - numerical on hardness & COD.

**Analytical Techniques** - Principle, Instrumentation and applications of Colorimetry (Copper), Potentiometry (FAS estimation), Conductometry (Acid Mixtures).

**Self-Study:** Solid waste management.

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**TEACHING AND LEARNING PROCESS**

Chalk and talk method, power point presentation, Videos, Animations.

Practical topic: Demonstration and Virtual Lab along with Performing experiments

**Course outcomes:** On completion of the course, the student will have the ability to:

| CO1 | Understand and explain the principles of chemistry involved in water treatment, corrosion, energy sources, polymers, Green chemistry and instrumental methods of analysis. | PO1 | 3 |
| CO2 | Apply the acquired knowledge to solve the Engineering Chemistry problems. | PO1 & PO2 | 3, 3 |
| CO3 | Examine the Engineering Chemistry problems and draw meaningful interpretations. | PO1, PO3 & PO4 | 3, 3, 2 |
| CO4 | Instrument solutions through concepts of Engineering Chemistry in the field of Energy and Environment. | PO1, PO3 & PO7 | 3, 2, 3 |
| CO5 | Engage in self-study and make an effective oral presentation on contribution of Engineering Chemistry to society. | PO1, PO6, PO9 & PO12 | 3, 1, 3, 3 |
MAPPING of COs with POs for Applied Chemistry

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

REFERENCE:
1. Principles of Physical Chemistry B.R.Puri, L.R.Sharma & M.S.Pathania,
2. S.Nagin Chand & Co.
3. Text Book of Polymer Science by F.W.Billmeyer, John Wiley & Sons
6. Engineering Chemistry by Dr Renu bapna, Macmilan publisher India limited
8. Nano Metal Oxides For Environmental Remediation. United Publications Dr. Jahagirdar A.A and Dr. Nagaswarupa H P.

NPTEL/SWAYAM/MOOCs
1. http://nptel.ac.in/
2. https://swayam.gov.in/

Practical Module

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<th>Sl. No.</th>
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<td><strong>A – Compulsory Experiments:</strong></td>
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<tr>
<td>1</td>
<td>Potentiometric estimation of Iron using std. K₂Cr₂O₇ (Electrochemical sensor).</td>
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<td>Determination of pKa of a weak acid using glass electrode (pH sensor)</td>
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<td>Conductometric estimation of mixture of strong and weak acid (conductometric sensors)</td>
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<td>4</td>
<td>Estimation of copper in CuSO₄ by colorimetry (optical sensor).</td>
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<td>Determination of viscosity coefficient of a given liquid using Ostwald’s viscometer.</td>
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</table>
8. Estimation of percentage of copper in brass (analysis of alloy).

**B – Demonstration (offline/virtual)**

1. Determination of rate of corrosion of mild steel by weight loss method.
2. Synthesis of oxide nanoparticles.

**C – Open Ended Experiments:**

1. Design an experiment to Identify the presence of proteins in given sample.
2. Determination of glucose by electrochemical sensors.

**References Books:**

**VIRTUAL LAB LINK DETAILS:**
- [https://www.labster.com/chemistry-virtual-labs/](https://www.labster.com/chemistry-virtual-labs/)
- [https://youtu.be/OwZbw6Mhrqc](https://youtu.be/OwZbw6Mhrqc)
- [https://youtu.be/UOLOsKZxi6Y](https://youtu.be/UOLOsKZxi6Y)
Course Title: Applied Chemistry
Course Code: 22CHU102B (ECE/EIE/ET/EEE)
Category: Applied Science Course (ASC) (IC)

Scheme and Credits

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

Course Objectives: To interconnect the acquaintance of Chemistry involved in Basics of Electrochemical cells, Corrosion and its control; renewable sources of energy; Polymers for Electronic materials; memory and display systems; sensors in instrumental analytical methods and water treatment; e-waste management; Nanomaterials and its application.

Unit I: Electrode Systems and Corrosion Science

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**Self-study: Polycarbonates, Recycling of PET.**

**Unit – IV : Nano Technology, Sensors and e-waste management** 8 hours

**Nano Technology:** Introduction, size dependent properties of nanomaterials (Surface area, Catalytic, Conducting), preparation of nanomaterials by sol-gel (TiO₂), chemical vapour deposition (CVD) method (CNTs and GO by Hummer’s Method).

**Sensors:** Introduction, Construction, working and applications of Conductometric sensors (Estimation of Acid Mixtures), Electrochemical sensors (Potentiometric estimation of FAS), Optical sensors (Colorimetric estimation of copper), Gas sensors.

**E-waste Management:** Introduction, sources, types, effects of e-waste on environment and human health, methods of disposal, advantages of recycling. Extraction of copper from e-waste.

**Self-study: Micro-electromechanical system (MEMS), Nanoelectromechanical systems (NEMS).**

**Unit – V : Electronic Materials and Display System** 8 hours

**Conductors, Semiconductors and Insulators:** Introduction, Band theory and examples.

**Semiconductors:** production of electronic grade silicon, Refining- Float Zone method and Czochralski process.


**Display Systems:** Liquid crystals (LC’s) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD’s). Jablonski Diagram. Photoactive and electroactive materials, Light emitting electrochemical cells. Nanomaterials(QLED’s) and organic materials (OLED’s) used in optoelectronic devices.

**Self-study: Properties and functions of Silicon (Si), Germanium (Ge), Copper (Cu), Aluminum (Al), and Brominated flame retardants in computers.**

<table>
<thead>
<tr>
<th>TEACHING AND LEARNING PROCESS</th>
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PO1, PO6, PO9 & PO12 3, 1, 3, 3

**MAPPING of COs with POs for Applied Chemistry**

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

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**B – Demonstration (offline/virtual)**

1. Determination of rate of corrosion of mild steel by weight loss method.
2. Synthesis of oxide nanoparticles.

**C – Open Ended Experiments:**

1. Design an experiment to identify the presence of proteins in a given sample.
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CIE Marks: 50 SEE Marks: 50 Total Max. marks=100 Duration of SEE: 03 Hours

Course Objectives:

To interconnect the acquaintance of Chemistry involved in Basics of Electrochemical cells, Corrosion and its control; renewable sources of energy; Polymers for Electronic materials; memory and display systems; sensors in instrumental analytical methods and water treatment; e-waste management; Nanomaterials and its application.

Unit I: Electrode Systems and Corrosion Science 8 hours


Unit – II: Energy conversion and Storage 8 hours

Chemical fuels - Introduction, Calorific value - definition, gross and net calorific values; Determination of calorific value of a solid / liquid fuel using Bomb calorimeter and numerical on calorific value; Petroleum cracking - fluidized bed catalytic cracking; Knocking- Mechanism of Knocking in IC engine; Octane number and Cetane number; Reformation of petrol.


Electrochemical Energy Systems: Introduction to batteries, Classification of batteries - primary and secondary batteries; Battery characteristics; construction, working and applications of Lithium ion batteries. Self-study: Fuel cells and Zinc-Air, Na-Ion batteries.

Unit – III: Macromolecules for Engineering application 8 hours

Polymers - Polymerization – Classification- addition and condensation polymerization with examples: Techniques of polymerization- bulk, solution, emulsion and suspension polymerization. Free radical mechanism taking ethylene as an example, Introduction to Molecular weight - number average and weight

**Self-study:** Polycarbonates, Recycling of PET.

**Unit – IV : Structural Materials**

**Metals and Alloys:** Introduction, Properties and application of Iron and its alloys(any two), Aluminium(any two) and its alloys. **Cement:** Introduction, composition, properties, classification, manufacturing process of cement, process of setting and hardening of cement, additives for cement. **Geo polymer concrete:** Introduction, synthesis, constituents, properties and applications. **Refractories:** Introduction, classification based on chemical composition, properties and application of refractory materials. **Glass:** Introduction, Composition, Types, Preparation of Soda-lime glass, properties and applications of glass.

**Self-study:** Chemistry of reinforced concrete

**Unit – V : Water Technology, Phase rule and Analytical Techniques**


**Phase Rule** – Gibbs phase rule; Concept of Phase component, degrees of freedom with examples; Numericals. Application of Phase rule to i) one component system - water system; ii) two component system - Pb-Ag system, 

**Analytical techniques:** - Principle, Instrumentation and applications of Colorimetry (Copper), Potentiometry (FAS estimation using K2Cr2O7), Conductometry (Acid Mixtures).

**Self-Study: Solid waste management.**

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**TEACHING AND LEARNING PROCESS**

Chalk and talk method, power point presentation, Videos, Animations. 

Practical topic: Demonstration and Virtual Lab along with Performing experiments

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**Unit I : Electrode Systems and Corrosion Science**  
8 hours

Electrodes and Cells – Introduction- Classification of electrochemical cells and concentration cells, numerical on concentration cells. ; Reference electrodes - Calomel electrode; Ion-selective electrodes - Glass electrode. Determination of pH using glass electrode.

Corrosion - Definition, Electrochemical theory of corrosion, Types of corrosion - differential metal, differential aeration and stress corrosion; Factors affecting the rate of corrosion; Corrosion Penetration Rate (CPR) , numerical. Corrosion control: Inorganic coatings – anodizing and phosphating. Cathodic protection – Sacrificial anode, Impressed current method. Metal finishing - Introduction, technological importance; Electroplating – Chromium Plating; Electroless plating - Electroless plating of copper on PCB.

Self-study: Galvanic series and its importance, Electroplating of Gold.

**Unit II : Energy : Sources, Conversion and Storage**  
8 hours

Chemical fuels - Introduction, Calorific value - definition, gross and net calorific values; Determination of calorific value of a solid / liquid fuel using Bomb calorimeter and numerical on calorific value; Petroleum cracking - fluidized bed catalytic cracking; Knocking- Mechanism of Knocking in IC engine; Octane number and Cetane number; Reformation of petrol.


Electrochemical Energy Systems: Introduction to batteries, Classification of batteries - primary and secondary batteries; Battery characteristics; construction, working and applications of Lithium ion batteries.

Self-study: Fuel cells and Zinc-Air, Na-Ion batteries.

**Unit III : Polymers for Engineering Applications**  
8 hours

Polymers - Polymerization – Classification- addition and condensation polymerization with examples: Techniques of polymerization- bulk, solution, emulsion and suspension polymerization. Free radical mechanism taking ethylene as an example, Introduction to Molecular weight - number average and weight average molecular weight, Polydispersion index and its significance, numerical problems; Glass transition temperature (Tg) –significance and factors affecting Tg, compounding of resins into plastics. Synthesis and applications- PMMA, Polyurethane, phenol-formaldehyde resin. Elastomers: Introduction, vulcanization of rubber. Synthesis and applications of neoprene and butyl

**Self-study: Polycarbonates, Recycling of PET.**

**Unit – IV : Materials for Memory and Display Systems** 8 hours

**Memory Devices:** Introduction, concepts of electronic memory. Classification of electronic memory materials (organic molecules, polymeric materials, organic-inorganic hybrid materials).

**Display Systems:** Liquid crystals (LC’s) - Introduction, classification, Liquid crystal behaviour and applications. Jablonski Diagram. Photoactive and electroactive materials, Light emitting electrochemical cells. Nanomaterials (QLED’s) and organic materials (OLED’s) used in optoelectronic devices.

**Self-study: Properties and functions of Silicon (Si), Germanium (Ge) and Brominated flame retardants in computers.**

**Unit – V : Sensors, Water treatment and E-waste management** 8 hours

**Sensors:** Introduction, Construction, working and applications of conductometric sensors, Electrochemical sensors, Optical sensors.

**Water treatment** - Introduction, hardness of water, types, determination of hardness by EDTA method, disadvantages of hard water, removal of hardness by ion exchange method, Desalination of water – Electrodialysis. BOD and COD - introduction and their significance in waste water treatment, experimental determination of COD of waste water - numerical on hardness & COD.

**E-Waste:** Introduction, sources of e-waste, Composition, Characteristics, and Need of e-waste management. Toxic materials used in manufacturing electronic and electrical products; Recycling and Recovery: Different approaches of recycling (separation, thermal treatments, hydrometallurgical extraction, pyrometallurgical methods, direct recycling). Recycling of Li-ion batteries. Extraction of copper from E-waste.

**Self-study: Properties and functions of Silicon (Si), Germanium (Ge), Copper (Cu), Aluminum (Al), and Brominated flame retardants in computers.**

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<tr>
<td>3</td>
<td>Synthesis of polyaniline and its conductivity measurement.</td>
</tr>
</tbody>
</table>

**C – Open Ended Experiments:**

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Design an experiment to Identify the presence of proteins in given sample.</td>
</tr>
<tr>
<td>2</td>
<td>Determination of glucose by electrochemical sensors.</td>
</tr>
</tbody>
</table>

**References Books:**


**VIRTUAL LAB LINK DETAILS:**

- [https://www.labster.com/chemistry-virtual-labs/](https://www.labster.com/chemistry-virtual-labs/)
- [https://youtu.be/OwZbw6Mhrqc](https://youtu.be/OwZbw6Mhrqc)
- [https://youtu.be/ULoLsKZxi6Y](https://youtu.be/ULoLsKZxi6Y)
Course Title: Engineering Mechanics
Course Code: 22CVT103
Category: (ESC - Engineering Science Courses)

<table>
<thead>
<tr>
<th>Scheme &amp; Credits</th>
<th>No. of Hours per week</th>
<th>Total Teaching hours</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
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</tr>
</tbody>
</table>

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

Course Learning Objective: To develop the ability to analyze the problems involving forces, moments with their applications, Relative motions of the surfaces, Study the stability of the shapes with understanding the concepts of centroid and moment of inertia. Understand and analyse the bodies under the displacement like kinematics and kinetics and their applications.

UNIT – I
Resultant of coplanar force system:
Basic dimensions and units, Idealizations, 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, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads, 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:
Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity, Numerical examples on linear motion
Projectiles: Introduction, numerical examples on projectiles.

Teaching & Learning Process:
Chalk and talk, Power point presentations, Animations and Videos and experimental learning in Laboratory.

Course Outcomes: The students will be able to

CO1 Understand the concept of Engineering Mechanics, force system and Compute the resultant of various force system, examine the types of loads acting on rigid bodies and compute the induced forces in various member of the structure and trusses.

CO2 Analyse the problems to obtain reactive forces in various member of the structure and the behaviour of bodies in contact with different surfaces.

CO3 Locate and compute the centroid and moment of inertia of various planes and built-up sections.

CO4 Explain the basics of dynamics and analyse the bodies in motion at various conditions.

Text Books:


Question paper pattern:
• The question paper will have ten full questions carrying equal marks.
• Each full question will be for 20 marks.
• There will be two full questions (with a maximum of three sub - questions) from each unit.
• Each full question will have sub - question covering all the topics under a unit.
• The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

<table>
<thead>
<tr>
<th>CO/PO</th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
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</thead>
<tbody>
<tr>
<td>CO1</td>
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<td>✓</td>
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<tr>
<td>CO2</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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</tr>
<tr>
<td>CO3</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
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<td></td>
<td></td>
<td>✓</td>
</tr>
<tr>
<td>CO4</td>
<td>✓</td>
<td>✓</td>
<td>✓</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✓</td>
</tr>
</tbody>
</table>
COURSE OBJECTIVE:
1. Describe the basic laws of electrical engineering and energy billing.
2. Explain the working of basic electrical parameters under sinusoidal excitation.
3. Make use of three phase system of power supply
4. Predict the values of electrical parameters and quantities.
5. Explain electric, wiring schemes and equipment and personal safety measures

UNIT I 8 hours

UNIT II 8 hours
Phasor representation of alternating quantities. Concept of lead, lag and in phase of two sinusoidal quantities.

UNIT III 8 hours

UNIT IV 8 hours
Measuring instruments: Construction and working principle of Wheatstone’s bridge, Kelvin’s double bridge, Megger. AC bridges- Maxwell’s and Desauty’s, concepts of current transformer and potential transformer. (Only balance equations and Excluding Vector diagram approach). Applications of CTs and PTs. Numericals. Text book 1 & Reference book 4

UNIT V 8 hours
Electric Wiring: Types, advantages and disadvantages. Color code and gauges of wires used for lighting and heating (power) circuits. One, two and three point control of load. Service mains- overhead and underground. Fuse, fuse materials and properties.
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 ac circuits.
CO3: Apply three-phase system in power generation and utilization
CO4: Determine the values of electrical parameters and quantities.
CO5: Explain the concept of electricity billing, equipment, and personal safety measures.

TEXT BOOKS

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

REFERENCE BOOKS


ONLINE RESOURCES

1. 40
2. https://www.youtube.com/watch?v=IZA_bJiGiJc&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. The students have to answer five full questions, selecting one full question from each module.

MAPPING of COs with POs and PSOs

<table>
<thead>
<tr>
<th></th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</th>
<th>PO10</th>
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<th>PSO2</th>
<th>PSO3</th>
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<tr>
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<td>3</td>
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</tr>
</tbody>
</table>

Strength of correlation: Low-1, Medium-2, High-3
Dr. Ambedkar Institute of Technology, Bengaluru-56
Department of Electronics and Communication Engineering
Scheme and Syllabus - 2022-2023

Course Title: Basic Electronics
Course Code: 22ECT103/203 (ECE AND ALLIED BRANCHES)
Category: Engineering Science Course (ESC)

<table>
<thead>
<tr>
<th>Scheme and Credits</th>
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<th>Total teaching hours</th>
<th>Credits</th>
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<tbody>
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<tr>
<td>CIE Marks: 50</td>
<td>SEE Marks: 50</td>
<td>Total Max. marks=100</td>
<td>Duration of SEE: 03 Hours</td>
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</tr>
</tbody>
</table>

COURSE OBJECTIVES: Students will be taught

1. Operation of Semiconductor diode, Zener diode and Special purpose diodes and their applications.
2. Biasing circuits for transistor (BJT) as an amplifier.
4. Logic circuits and their optimization.
5. Principle of basic communication system.

UNIT-I 8 hours
Semiconductor Diodes: Introduction, PN Junction diode, Characteristics and Parameters - Forward and Reverse Characteristics, Diode Parameters, Diode Approximations, Ideal Diodes and Practical Diodes, Piecewise Linear Characteristics, DC Equivalent Circuits, DC Load Line analysis-DC load line- Q-Point, Calculating Load Resistance and Supply Voltage (Text 1)
Zener Diodes: Junction Breakdown, Circuit Symbol and Package, Characteristics and Parameters, Equivalent Circuit, Zener Diode Voltage Regulators, Regulator Circuit with No Load, Loaded Regulator, Regulator Performance (Text 1)

UNIT-II 8 hours
Common Base, Common-Emitter and Common Collector Characteristics- Circuit, Input and output characteristics, Current Gain Characteristics. (Text 1)
Field Effect Transistor: Junction Field Effect Transistor - n-channel and p-channel FET, JFET Characteristics-Depletion regions, Drain Characteristics, Transfer Characteristics, MOSFETs-Enhancement and Depletion MOSFETs (Text 1)

UNIT-III 8 hours
Amplifiers: Single-Stage CE Amplifier-Specification, Selection of IC, RC, and RE, Bias Resistors, Bypass Capacitor, Coupling Capacitors. (Text 1)
Signal Generators: BJT Phase Shift Oscillator, BJT Colpitts Oscillator, BJT Hartley Oscillator. (Text 1)
Operational Amplifiers: Introduction, The Operational Amplifier, Block Diagram Representation of Typical Op-Amp, Schematic Symbol. (Text 2)
UNIT-IV
Boolean Algebra and Logic Circuits:
Binary Systems – Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 3)
Combinational logic: Introduction, Design procedure, Adders, Subtractors (Text 3)

UNIT-V
Synchronous Sequential Logic: Introduction, Flip-flops, Registers, Counters and Memory Unit-Introduction, Registers, Shift registers, Ripple Counters, Synchronous counters. (Text 4)
Communications: Introduction to communication, Communications, Communication System, Modulation-Description, Need for modulation, Amplitude Modulation – Amplitude Modulation theory, Representation of AM, Frequency Modulation - Theory of Frequency and Phase Modulation, Description of systems. (Text 5)

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

CO1: Explain the basic knowledge on construction, operation and characteristics of semiconductor Devices.
CO2: Apply the acquired knowledge to construct small scale circuits consisting of semiconductor Devices
CO3: Construct basic digital circuit by making use of basic gates and their functions.
CO4: Explain the conceptual blocks of basic communication system and representation of different types of modulation.
CO5: Illustrate the concepts of various sequential logic circuits and their working principles.

TEXT BOOKS

REFERENCE BOOK

ONLINE RESOURCES

MODERN TOOLS:
1. PSPICE

MAPPING of COs with POs:

<table>
<thead>
<tr>
<th></th>
<th>PO1</th>
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<th>PO10</th>
<th>PO11</th>
<th>PO12</th>
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Strength of correlation: Low-1, Medium-2, High-3

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Dr. Ambedkar Institute of Technology, Bengaluru-56  
Department of Computer Science & Engineering  
Scheme and Syllabus - 2022 -2023

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Principles of Programming using C</th>
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<tbody>
<tr>
<td>Course Code</td>
<td>22CSU103/203</td>
</tr>
<tr>
<td>Category and Type</td>
<td>Engineering Science Course (ES), Integrated</td>
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</table>

<table>
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<th>Total teaching hours</th>
<th>Credits</th>
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</tr>
<tr>
<td></td>
<td>02</td>
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<td>02</td>
</tr>
</tbody>
</table>

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

COURSE OBJECTIVES:
1. Elucidate the basic architecture and functionalities of Computers.
2. Apply programming constructs of C language to solve 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.

UNIT I  
Art of programming through Algorithms 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

UNIT II  
Managing Input and output operations: Reading a character, writing a character, formatted Input, formatted output  
Decision Making and Branching: if statement, if…else statement, nesting of if…else statements, Else if Ladder, switch statement, Goto statement  
Decision Making and looping: While statement, do statement, for statement, Jumps in loops

UNIT III  
Arrays: Introduction, one-dimensional Arrays, declaration of one-dimensional Arrays, Initialization of one-dimensional Arrays, Two dimensional Arrays, Initialization of two-dimensional Arrays, Multi-dimensional Arrays  
Character Arrays and strings: Introduction, Declaring and Initializing string variables, Reading string from the terminal, writing strings to screen, comparison of Two strings, string handling functions

UNIT IV  
User Defined Functions: Introduction, Need for User defined functions, Multi-function program, Elements of User Defined Functions, Definition of functions, Return values and their types, Function call, function declaration, Category of Functions, Recursion, Passing Arrays to Functions, Passing strings to Functions, the scope, Visibility and lifetime of Variables  
Pointers: Introduction, Understanding pointers, Accessing the address of variable, Declaring pointer variable, Initialization of pointer variables, Accessing a variable through its pointer, Pointers and Arrays

UNIT V  
Structures and Unions: Introduction, definition of structure, declaring structure variables, accessing structure members, structure initialization, Copying and comparing structure variables, Arrays of structures, Arrays within a structures, Arrays within structures, Unions  
File Management in C: Introduction, Defining and opening a File, Closing a File, Input/output Operations on Files

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### Programming Assignments

<table>
<thead>
<tr>
<th>Practice Programs</th>
</tr>
</thead>
<tbody>
<tr>
<td>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)).</td>
</tr>
<tr>
<td>2. To print the ASCII value of the given input.</td>
</tr>
<tr>
<td>3. To find largest of three numbers.</td>
</tr>
<tr>
<td>4. To perform simple calculator using switch case statement.</td>
</tr>
<tr>
<td>5. To find factorial of a number.</td>
</tr>
<tr>
<td>6. To print even and odd numbers using looping Construct.</td>
</tr>
<tr>
<td>7. To find sum of N natural Numbers</td>
</tr>
<tr>
<td>8. Write a C Program to search for the given key element with the help of Linear search Technique.</td>
</tr>
<tr>
<td>9. Develop a C program to implement selection sort technique.</td>
</tr>
<tr>
<td>10. Develop a C program to swap two numbers using pointers (Call by Reference).</td>
</tr>
</tbody>
</table>

### 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. |
|   | b | Write a C program using function to sort the given array elements using bubble sort technique. |
| 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 |
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>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=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>
</tbody>
</table>

Write a menu driven C Program to compute Trace and Norm of a matrix Using Functions.

Develop a program to concatenate two strings and determine the length of the concatenated string without using string-built in function.

Three people denoted by P1, P2, P3 intend to buy some rolls, buns, cakes and bread. Each of them needs these commodities in differing amounts and can buy them in two shops S1, S2. Which shop is the best for every person P1, P2, P3 to pay as little as possible? The individual prices and desired quantities of the commodities are given in the following tables:

<table>
<thead>
<tr>
<th>Demanded quantity of foodstuffs</th>
<th>Prices in shops S1 and S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td></td>
</tr>
<tr>
<td>roll</td>
<td>S1</td>
</tr>
<tr>
<td>P2</td>
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</tr>
<tr>
<td>P3</td>
<td>1</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>roll</th>
<th>S1</th>
<th>S2</th>
</tr>
</thead>
<tbody>
<tr>
<td>1,50</td>
<td>1.50</td>
<td>1.00</td>
</tr>
<tr>
<td>2,00</td>
<td>2.00</td>
<td>2.50</td>
</tr>
<tr>
<td>5,00</td>
<td>5.00</td>
<td>4.50</td>
</tr>
<tr>
<td>10,00</td>
<td>10.00</td>
<td>15.00</td>
</tr>
</tbody>
</table>

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=AXB)

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.

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: Understand the concept of** algorithms and flowchart, **apply** logical skills to design and develop algorithms/Flow charts to solve real-world problems.

**CO2: Acquire** the knowledge of programming constructs of C language and **Apply** the same to solve the real world problems.

**CO3: Explore** user-defined data structures like arrays in implementing solutions to example problems like searching, sorting etc.

**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

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

REFERENCE BOOKS

ONLINE RESOURCES
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.

MAPPING of COs with POs

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<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 Mechanical Engineering  
Scheme and Syllabus - CBCS – 2022 -2023

Course Title | Computer Aided Engineering Drawing  
Course Code | 22MED103/203  
Category | Mechanical  

<table>
<thead>
<tr>
<th>Scheme and Credits</th>
<th>No. of Hours/Week</th>
<th>Total contact hours</th>
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<td>Duration of SEE: 03 Hours</td>
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* One additional hour may be considered for laboratory.

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:
Significance of Engineering drawing, Lettering, BIS Conventions of Engineering Drawing, Free hand sketching of engineering drawing, Introduction to Scales and its types. (Not for SEE)
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. (Not for SEE)

Orthographic Projections of Points, Lines and Plane surfaces:
Introduction to Orthographic projections, Orthographic projections of points in all the four quadrants. Orthographic projections of lines placed in first quadrant only; Inclined to HP, to VP and to both the planes. Orthographic projections of plane surfaces (triangle, square, rectangle, pentagon, hexagon and circular
laminae) placed in first quadrant only; resting on HP and on VP, inclined to HP, to VP and to both HP and VP.

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

UNIT II
Orthographic Projection of Solids:
Orthographic projection of right regular solids (Cube, Tetrahedron, Prism, Cylinder, Cone and Pyramid)
Different positions of solid – axis parallel to VP and inclined to HP, axis parallel to HP and inclined to VP, and axis parallel to Profile Plane and inclined to HP or VP. Left profile view to be drawn on RPP only.

Projections of Frustum of cone, pyramid & truncated sphere (Not for SEE)

UNIT III
Isometric Projections:
Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids. Frustum of solids not to be given.

UNIT IV
Development of Lateral Surfaces of Solids:
Development of lateral surfaces of frustum and truncated right regular prisms, cylinders, pyramids, and cones resting with base on HP only (Axis perpendicular to HP and parallel to VP). The section plane perpendicular to VP, inclined to HP and passing through only vertical surfaces of the solid to be considered.

Problems on applications of development of lateral surfaces like funnels, trays, transition pieces connecting circular duct and rectangular duct (Not for SEE)

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

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 INTERNAL ASSESSMENT (IA)</th>
<th>DETAILS</th>
<th>MAX. MARKS</th>
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<td><strong>Manual Sketching (25)</strong></td>
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<td><strong>TOTAL IA MARKS</strong></td>
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* Continuous Internal Evaluation (CIE) is based on the average of two tests conducted during the mid-semester and end-semester.

<table>
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<tr>
<th>QUESTION PAPER PATTERN FOR SEMESTER END EXAMINATION (SEE)</th>
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<td>Max. Marks</td>
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</table>

NOTE:
1. Two Full Questions to be set from each Unit with internal choice.
2. Each Full question shall cover all the topics of the Unit.
3. Unit 1 and Unit 2 to have both manual sketching and computer solution/print out.
4. Unit 3 and Unit 4 to have only manual sketching.
5. Model question paper may be referred for distribution of topics in each Full Question.

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<tr>
<th>Scheme of Evaluation for Semester End Examination (SEE)</th>
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**MAPPING OF COs WITH POs**

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**Strength of correlation:** Strongly related-3, Moderately related-2, Weakly related-1, Not related-0
Course Title: Elements of Mechanical Engineering
Course Code: 22MET203
Category: Mechanical

<table>
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<tr>
<td>Duration of SEE: 03 Hours</td>
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</table>

COURSE OBJECTIVE:

1. Knowledge on importance of sources of energy, steam and its properties, power generating systems.
2. Overview on automobile engine’s performance, hybrid and electrical vehicles and refrigeration and air conditioning.
3. To have basic insights on cooling of the products using refrigeration and air conditioning.
4. Understanding of composite materials and fabricating methods with an emphasis on importance of power transmission.
5. Complete idea on principles of basic manufacturing processes and advanced manufacturing process.

UNIT-I  ENERGY AND ENERGY SYSTEMS  10 hours
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.
Power generating systems: Introduction, construction and working of: Steam turbines – Impulse and reaction turbine, Gas turbines – Open and closed cycle,
Harnessing of renewable energy sources: Wind energy, Geothermal energy, Tidal energy, Ocean thermal energy, Bio-mass and their applications
Power absorbing systems: Introduction, classification to pumps and compressors.

UNIT-II  MACHINE TOOL OPERATIONS  10 hours
Computer numerical controlled machines: Introduction, types and operations performed and application on CNC.

Part programming using G Codes and M codes.

Robotics: Introduction, classification based on robot’s configuration, polar, cylindrical, Cartesian coordinate and spherical, application, advantages and disadvantages.

UNIT-III INTERNAL COMBUSTION ENGINES AND REFRIGERATION  
10 hours

Internal combustion engines: Introduction, classification, parts and terminology of I C engines, construction and working principles of 4-stroke petrol & diesel engines, simple numerical problems on four stroke engines.

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.

UNIT-IV MECHANICAL POWER TRANSMISSION AND JOINING PROCESS  
10 hours

Mechanical Power Transmission: Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, simple and compound gear trains (simple numerical problems)

Belt Drives: Introduction, Types of belt drives (Flat and V-Belt Drive), length of the belt and tensions ratio (simple numerical problems)


UNIT-V FUTURE MOBILITY TECHNOLOGY AND MECHATRONICS  
10 hours

Insight into future mobility technology: Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of Electric Vehicles (EVs) and Hybrid vehicles.

Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Joints & links, Robot anatomy, Applications of Robots in material handling, processing and assembly and inspection.

Suggested Learning Resources:

Test Books

Reference Books

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

CO1: Explain fundamentals of steam and non-conventional energy sources.

CO2: Describe different conventional and advanced machining processes.

CO3: Understand IC engines its parameters, propulsive devices, refrigeration and air-conditioning.
CO4: Explain different belt and gear drives, gear trains, joining of materials.
CO5: Know the principle, application and aspects of future mobility and fundamentals of robotics.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

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Semester End Examination (SEE):

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<tr>
<td>Q. No.</td>
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<td>UNIT</td>
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</table>

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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<tr>
<th>MAPPING OF COs WITH POs</th>
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<tbody>
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<td>COs/POs</td>
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</table>

**Strength of correlation:** Strongly related-3, Moderately related-2, Weakly related-1, Not related-0

**Level 3-** Highly Mapped, **Level 2-Moderately Mapped,** **Level 1-Low Mapped, Level 0- Not Mapped**

74
Course Title: Introduction to Civil Engineering

Course Code: 22EST104A / 22EST204A

Category: Engineering Science Courses - I (ESC - I)

Scheme & Credits:

<table>
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<th>No. of Hours per week</th>
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<th>Credits</th>
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</table>

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

Course Learning Objective: To learn the scope of various field of Civil Engineering, the concepts of sustainable infrastructure. Understand the concepts of force systems to analyze the problems involving with their applications. Study the stability of the shapes with understanding the concepts of centroid and moment of inertia.

UNIT – I
Civil Engineering Disciplines and Building Science

Introduction to Civil Engineering:

Basic Materials of Construction:
Bricks, Cement & mortars, Plain, Reinforced & Pre-stressed Concrete, Structural steel, Construction Chemicals.

Structural elements of a building:
Foundation, plinth, lintel, chejja, Masonry wall, column, beam, slab and staircase.

UNIT – II
Societal and Global Impact of Infrastructure

Infrastructure:
Introduction to sustainable development goals, Smart city concept, clean city concept, Safe city concept

Environment:
Water Supply and Sanitary systems, urban air pollution management, Solid waste management, identification of Landfill sites, urban flood control

Built-environment:
Energy efficient buildings, recycling, Temperature and Sound control in buildings, Security systems; Smart buildings.

UNIT – III
Analysis of force systems:
Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrent and non-concurrent coplanar force systems, moment of forces, couple, Varignon’s theorem, free body diagram, equations of Equilibrium, Equilibrium of Concurrent and Non Concurrent force systems. Numerical examples.

UNIT – IV
Support Reactions:
Types of Beams, Loads and Supports, Numerical Examples.

Friction:
Introduction, laws of Coulomb friction, equilibrium of blocks on horizontal plane, equilibrium of blocks on inclined plane, ladder friction, Numerical examples.

UNIT – V
Centroid:
Importance of centroid and centre of gravity, methods of determining the centroid, locating the centroid of plane laminae from first principles, centroid of built-up sections, Numerical examples.

Moment of inertia:
Importance of Moment of Inertia, method of determining the second moment of area (moment of inertia) of plane sections from first principles, parallel axis theorem and perpendicular axis theorem, section modulus, radius of gyration, moment of inertia of built-up Sections.

Teaching & Learning Process:
Chalk and talk, Power point presentations, Animations and Videos and experimental learning in Laboratory.

Course Outcomes: The students will be able to

<table>
<thead>
<tr>
<th>CO</th>
<th>Description</th>
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<tbody>
<tr>
<td>CO1</td>
<td>Understand the various fields of Civil Engineering, infrastructure requirement for sustainable development.</td>
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<tr>
<td>CO2</td>
<td>Examine the types of force system and compute their resultant at various conditions.</td>
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<tr>
<td>CO3</td>
<td>Analyse the problems to obtain support reactions, the behaviour of bodies in contact with different surfaces.</td>
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<tr>
<td>CO4</td>
<td>Locate the centroid of plane and built-up sections and Compute the moment of inertia of plane and built-up sections.</td>
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</table>

Text Books:


Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of three sub-questions) from each unit.
- Each full question will have sub-question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

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<tr>
<th>CO/PO</th>
<th>PO1</th>
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Course Title: INTRODUCTION TO ELECTRICAL ENGINEERING

Course Code: 22EST104B/204B

Category: Engineering Science Core (ESC)

<table>
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Total Max. marks = 100
Duration of SEE: 03 Hours

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

8 hours


Electromagnetism: 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. (Simple Numerical).

UNIT II

8 hours

AC Fundamentals: Generation of sinusoidal voltage, average and RMS value, form factor, and peak factor. (Numerical).


UNIT III

8 hours

Three Phase AC 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 (Numerical).

Transformers: Necessity of transformer, the principle of operation, Types, and construction of single-phase transformers, EMF equation, losses, efficiency. (Numerical).

UNIT IV

8 hours

DC Machines: Generator-Principle of operation, constructional details, induced EMF, types of generators, Motor- Principle of operation, back EMF, torque equations, types of motors, characteristics (shunt and series only) and applications. (Simple Numerical)

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. (Numerical).

UNIT V

8 hours

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.


Text book 1,2 & Reference books
**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 of 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](http://www.nptel.ac.in)
2. [https://www.youtube.com/watch?v=IZA_bJiGiJc&list=PL_mruqjnuVd8LP2z0c4yBwKAGEiEW_Si9&index=1](https://www.youtube.com/watch?v=IZA_bJiGiJc&list=PL_mruqjnuVd8LP2z0c4yBwKAGEiEW_Si9&index=1)
3. [https://www.youtube.com/watch?v=3TR_DS_7z2w&list=PLbRMhDVUMngfdEXVcdf_ijj2Eub-UHs_y](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)
(iv) 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 Electronics and Communication Engineering  
Scheme and Syllabus - 2022 -2023

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Introduction to Electronics Engineering</th>
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<tbody>
<tr>
<td>Course Code</td>
<td>22EST104C/204C</td>
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<td>Category</td>
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<td>COURSE OBJECTIVES:</td>
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<td>1. To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication</td>
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<tr>
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<td>Engineering.</td>
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<td>2. To equip students with a basic foundation in electronic engineering required for comprehending the</td>
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<td>operation and application of electronic circuits, logic design, embedded systems, and communication</td>
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<td>systems.</td>
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<td>3. Professionalism &amp; Learning Environment: To inculcate in first-year engineering students an ethical and</td>
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<td>professional attitude by providing an academic environment inclusive of effective communication,</td>
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<td>teamwork, ability to relate engineering issues to a broader social context, and life-long learning needed</td>
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<td>for a successful professional career.</td>
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<td>UNIT I</td>
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<td>Power Supplies</td>
<td>Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators,</td>
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<td>Output resistance and voltage regulation, Voltage multipliers.. Numerical</td>
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<td>Amplifiers</td>
<td>CE amplifier with and without feedback, Multi-stage amplifier; BJT as a switch: Cut-off and saturation</td>
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<td>modes. (Text 1)</td>
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<td>UNIT II</td>
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<td>Oscillators</td>
<td>Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge</td>
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<td>oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators (Only Concepts,</td>
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<td>working, and waveforms. No mathematical derivations) Numerical</td>
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<td>Operational amplifiers</td>
<td>Ideal op-amp; characteristics of ideal and practical op-amp; Practical op-amp circuits: Inverting and</td>
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<td>non-inverting amplifiers, voltage follower, summer, subtractor, integrator, differentiator. (Text 1)</td>
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<td>UNIT III</td>
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<tr>
<td>Binary Systems</td>
<td>Binary numbers, Number Base Conversion, octal &amp; HexaDecimal Numbers, Complements.</td>
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<td>Boolean Algebra and Logic Circuit</td>
<td>Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra,</td>
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<td>Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 2: 1.2,</td>
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<td>1.3, 1.4, 1.5, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7)</td>
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<td>Combinational logic</td>
<td>Introduction, Design procedure, Adders- Half adder, Full adder (Text 2: 4.1, 4.2, 4.3)</td>
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<tr>
<td>Embedded Systems</td>
<td>Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major</td>
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<td>application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System,</td>
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<td>Microprocessor vs Microcontroller, RISC vs CISC (Text 2)</td>
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<tr>
<td>Sensors and Interfacing</td>
<td>Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display. (Text 3)</td>
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<td>UNIT V</td>
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<td>Analog Communication Schemes</td>
<td>Modern communication system scheme, Information source, and input transducer, Transmitter, Channel or</td>
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<td>Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of</td>
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<td>modulation (only concepts) – AM, FM, Concept of Radio wave propagation (Ground, space, sky).</td>
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<tr>
<td>Digital Modulation Schemes</td>
<td>Advantages of digital communication over analog communication, ASK, FSK, PSK, Radio signal transmission</td>
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<td>Multiple access techniques. (Text 4)</td>
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</tbody>
</table>
**COURSE OUTCOMES:** On completion of the course, student should be able to:

**CO1:** Understand/analyse/design the diode based and transistor based circuits like Power supplies, Amplifiers.

**CO2:** Analyse and design transistor based Oscillators and Operational amplifiers.

**CO3:** Apply the digital electronics knowledge to build arithmetic blocks for digital systems.

**CO4:** Understand the basics of microprocessor, microcontroller, RISC, CISC and Sensors based circuits.

**CO5:** Understand the operation and applications of modern 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 Title: INTRODUCTION TO MECHANICAL ENGINEERING  
Course Code: 22EST104D/204D  
Category: Mechanical  

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

COURSE OBJECTIVE:
1. To develop basic Knowledge on Mechanical Engineering, Fundamentals and Energy Sources.
2. Understand the concept of different types of Machine tool operations and Modern Manufacturing Processes like CNC, 3D printing.
3. To know the concept of IC engines and Future Mobility vehicles.
4. To give exposure in the field of Engineering Materials and Manufacturing Processes Technology and its applications.
5. To acquire a basic understanding role of Mechanical Engineering in the Robotics and Automation in industry.

UNIT-I  Role of Mechanical Engineering in Industries and Energy  8 hours
Introduction: Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

UNIT-II  Machine Tool Operations  8 hours
Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D printing.

UNIT-III  Internal Combustion Engines and Future Mobility  8 hours
Introduction to IC Engines: Components and Working Principles, 4-Strokes Petrol and Diesel Engines, Application of IC Engines.
Insight into Future Mobility: Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of EVs and Hybrid vehicles.

UNIT-IV  ENGINEERING MATERIALS AND JOINING PROCESS  8 hours
Engineering Materials: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, glass, graphite, diamond and polymer. Shape Memory Alloys.
Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.
UNIT-V MECHATRONICS, ROBOTICS AND IOT 8 hours


Introduction to IOT: Definition and Characteristics, Physical design, protocols, Logical design of IoT, Functional blocks, and communication models.

Suggested Learning Resources:

Test Books

Reference Books:

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

CO1: Explain the concepts of Role of Mechanical Engineering and Energy sources.
CO2: Describe the Machine Tool Operations and advanced Manufacturing process.
CO4: Discuss the Properties of Common Engineering Materials and various Metal Joining Processes.
CO5: Explain the Concepts of Mechatronics, Robotics and Automation in IoT.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

<table>
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<tr>
<th>Test 1</th>
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Semester End Examination (SEE):

**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.

**MAPPING OF COs WITH POs**

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**Strength of correlation:** Strongly related-3, Moderately related-2, Weakly related-1, Not related-0

**Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0-Not Mapped**
**Course Title**: Introduction to C programming  
**Course Code**: 22ESU104E/204E  
**Category and Type**: PLC and Integrated  

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<tr>
<td>SEE Marks: 50</td>
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**Total Max. marks=100**  
**Duration of SEE: 03 Hours**

**COURSE OBJECTIVES:**
1. Elucidate the basic architecture and functionalities of Computers.  
2. Apply programming constructs of C language to solve 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.

**UNIT I**  
8 hours  
**Introduction to C**: Introduction to computers, input and output devices, designing efficient programs.  
Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing Programs, variables, constants, Input/output statements in C, Operators in C.

**UNIT II**  
8 hours  
**Decision control and Looping statements**: Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.

**UNIT III**  
8 hours  
**Arrays and Strings**: Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Two dimensional arrays, operations on two-dimensional arrays, Applications of arrays case study with sorting techniques.  
Introduction to strings: Reading strings, writing strings, summary of functions used to read and write characters, operations on strings.

**UNIT IV**  
10 hours  
**Functions**: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, Introduction to Recursive functions.

**UNIT V**  
8 hours  
**Pointers**: Understanding the Computer's Memory, Introduction to Pointers, Declaring Pointer Variables  
**Structures, Unions**: Introduction to structures, Unions  
**Storage classes**: auto, extern, static, register.

**Programming Assignments**

<table>
<thead>
<tr>
<th>Practice Programs</th>
</tr>
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</table>
| 1. To calculate simple interest (SI) for a given principal (P), time (T), and rate of interest (R) (SI = P*T*R/100).  
2. To print the ASCII value of the given input.  
3. To find the largest of three numbers.  
4. To perform a simple calculator using switch case statements.  
5. To find the factorial of a number. |
6. To print even and odd numbers using looping Construct.

7. To find 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 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.

   b Write a C program using function to sort the given array elements using bubble sort technique.

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

   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 a given yearly salary and tax percentages. Read the monthly salary of an employee as input from the user.

   Conditions to calculate tax, if yearly salary is:

<table>
<thead>
<tr>
<th>Income Range</th>
<th>Tax Charges</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;=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>
</tbody>
</table>

   b Write a menu driven C Program to compute Trace and Norm of a matrix Using Functions.
Develop a program to concatenate two strings and determine the length of the concatenated string without using string built-in function.

Three people denoted by P1, P2, P3 intend to buy some rolls, buns, cakes and bread. Each of them needs these commodities in differing amounts and can buy them in two shops S1, S2. Which shop is the best for every person P1, P2, P3 to pay as little as possible? The individual prices and desired quantities of the commodities are given in the following tables:

<table>
<thead>
<tr>
<th>Demanded</th>
<th>roll</th>
<th>bun</th>
<th>cake</th>
<th>bread</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>5</td>
<td>3</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>P2</td>
<td>3</td>
<td>6</td>
<td>2</td>
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<tr>
<td>P3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>1</td>
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<table>
<thead>
<tr>
<th>Prices in shops ( S_1 ) and ( S_2 )</th>
</tr>
</thead>
<tbody>
<tr>
<td>roll</td>
</tr>
<tr>
<td>bun</td>
</tr>
<tr>
<td>cake</td>
</tr>
<tr>
<td>bread</td>
</tr>
</tbody>
</table>

**MATRIX MULTIPLICATION**

Write a C program by considering 2 matrices \( A(\text{M} \times \text{N}) \) and \( B(\text{P} \times \text{Q}) \) 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 \( C=AXB \)

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

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

**COURSE OUTCOMES:**
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:** Acquire the knowledge of programming constructs of C language and Apply the same to solve the real world problems.

**CO3:** Explore user-defined data structures like arrays in implementing solutions to example problems like searching, sorting etc.

**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**
Reema Thareja, Computer fundamentals and programming in c, Oxford University, Second edition, 2017

**REFERENCE BOOKS**

**ONLINE RESOURCES**
MOOC courses can be adopted for more clarity in understanding the topics and varieties of problem solving methods.

### MAPPING of COs with POs

<table>
<thead>
<tr>
<th></th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
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<th>PO6</th>
<th>PO7</th>
<th>PO8</th>
<th>PO9</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 & Engineering  
Scheme and Syllabus - CBCS – 2022 -2023

<table>
<thead>
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<th>Course Title</th>
<th>Introduction to Cyber Security</th>
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<td>Category and Type</td>
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<th>Credits</th>
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<td>00</td>
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<tr>
<td>Total Max. marks=100</td>
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<td>Duration of SEE: 03 Hours</td>
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</table>

COURSE OBJECTIVES:
1. To familiarize cybercrime terminologies and perspectives
2. To understand Cyber Offenses and Botnets
3. To gain knowledge on tools and methods used in cybercrimes
4. To understand phishing and computer forensics

UNIT I
Introduction to Cybercrime:
Cybercrime: Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws, Global Perspectives

UNIT II
Cyber Offenses:

UNIT III

UNIT IV
Phishing and Identity Theft: Introduction, methods of phishing, phishing,phising techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft.

UNIT V

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

CO1: Explain the cybercrime terminologies
CO2: Describe cyber offenses and botnets
CO3: Illustrate tools and methods used on Cybercrime
CO4: Explain Phishing and Identity Theft
CO5: Justify the need of Computer Forensics
TEXT BOOKS

MAPPING of COs with POs

<table>
<thead>
<tr>
<th></th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
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<th>PO6</th>
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Strength of correlation: Low-1, Medium-2, High-3
Dr Ambedkar Institute of Technology, Bengaluru-56  
Department of Electronics and Communication Engineering  
Scheme and Syllabus - 2022-2023

<table>
<thead>
<tr>
<th>Course Title</th>
<th>Introduction to Internet of Things (IoT)</th>
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<tbody>
<tr>
<td>Course Code</td>
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<tr>
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<td>Theory - Emerging Technology Course (ETC)</td>
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<td>No. of Hours/Week</td>
<td>Credits</td>
</tr>
<tr>
<td>L</td>
<td>T</td>
</tr>
<tr>
<td>CIE Marks: 50</td>
<td>SEE Marks: 50</td>
</tr>
</tbody>
</table>

COURSE OBJECTIVES:
1. Understand about the fundamentals of IoT and its building blocks along with their characteristics.
2. Gain the knowledge of various sensors and actuators for IoT application.
3. Understand the IoT protocols for processing and communication.
4. Gain insights about current trends of associated IoT technologies and IoT Analytics.
5. Insight into the recent application domains of IoT in everyday life.

UNIT I  
08 hours  
**Basics of Networking:** Introduction, Network Types, Layered network models, Addressing.  
**Emergence of IoT:** Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components, Addressing strategies in IoT.  
**Textbook 1:** Chapter 1-1.1 to 1.4 Chapter 4 – 4.1 to 4.5

UNIT II  
08 hours  
**IoT Sensing and Actuation:** Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics.  
**Textbook 1:** Chapter 5–5.1 to 5.9

UNIT III  
08 hours  
**IoT Processing Topologies and Types:** Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading.  
**IoT Connectivity technologies:** IEEE 802.15.4, ZigBee, RFID, NFC, LoRa, Wi-Fi, Bluetooth.  
**Textbook 1:** Chapter 6–6.1 to 6.5, Chapter 7–7.2,7.3,7.7, 7.8, 7.13, 7.15,7.16

UNIT IV  
08 hours  
**Textbook 1:** Chapter 10–0.1 to 10.6;

UNIT V  
08 hours  
**Textbook 1:** Chapter 12-12.1-12.2, 13– 13.1, 14- 14.1-14.2, 17- 17.1
Note:
1. Unit 1, 2, 3, 4, and Unit 5 will have the internal choice.
2. Two assignments are evaluated for 5 marks: Assignment 1 – From Unit 1 and 2, Assignment 2 from units 3, 4 and 5

Course Outcomes:

CO1. Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.
CO2. Classify various sensing devices and actuator types.
CO3. Illustrate architecture of IoT applications and communication.
CO4. Explain associated IoT Technologies.
CO5. Demonstrate the processing in IoT.

<table>
<thead>
<tr>
<th>COs</th>
<th>Mapping with Pos</th>
</tr>
</thead>
<tbody>
<tr>
<td>CO1</td>
<td>PO1, PO2, PO12</td>
</tr>
<tr>
<td>CO2</td>
<td>PO1, PO2, PO3, PO4, PO12</td>
</tr>
<tr>
<td>CO3</td>
<td>PO1, PO2, PO3, PO6, PO12</td>
</tr>
<tr>
<td>CO4</td>
<td>PO1, PO2, PO3, PO4, PO12</td>
</tr>
<tr>
<td>CO5</td>
<td>PO1, PO2, PO3, PO4, PO6, PO7, PO8, PO9, PO10, PO12</td>
</tr>
</tbody>
</table>

Text Books.

Reference Text Books.

Web Links.
1. https://nptel.ac.in/noc/courses/noc19/SEM1/noc19-cs31/
COURSE OBJECTIVE:
1. To get exposure on solar radiation and its environmental impact to power.
2. To know about the types of solar collectors, their configurations and their applications.
3. To learn about the wind energy and its economic aspects.
4. To know biomass and biogas energy production, types of biomass gasifiers and its benefits.
5. To discuss tidal and ocean thermal energy resources, conversion and power generation.

UNIT I
8 hours
Text Book 1,2,3 and Reference Book 1

UNIT II
8 hours
Text Book 1,2,3 and Reference Book 1

UNIT III
8 hours
Solar Thermal Energy Collectors: Types of Solar Collectors, and applications.
Wind Energy: Sources and potentials, horizontal and vertical axis windmills, performance characteristics, Wind Turbine- Site Selection.
Text Book 1,2,3 and Reference Book 1

UNIT IV
8 hours
Text Book 1,2,3 and Reference Book 1

UNIT V
8 hours
Text Book 1,2,3 and Reference Book 1

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

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

CO1: Discuss the causes of energy scarcity and its solution, energy resources and availability of renewable energy.
CO2: Analyze the implication of renewable energy.
**CO3:** Summarize the economic aspects in Renewable Energy.

**CO4:** Discuss various generation schemes of Renewable energy.

**CO5:** Identify various applications of various Renewable Energy.

**TEXT BOOKS**


**REFERENCE BOOKS**


**ONLINE RESOURCES**

1. [www.mnre.org](http://www.mnre.org)
2. [www.renewableenergyworld.com](http://www.renewableenergyworld.com)
3. [www.powergridindia.com](http://www.powergridindia.com)
4. [www.saurenergy.com](http://www.saurenergy.com)
5. [https:nptel.ac.in](https:nptel.ac.in)

**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. The students have to answer five full questions, selecting one full question from each module.

**MAPPING of COs with POs and PSOs**

<table>
<thead>
<tr>
<th>CO</th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
<th>PO4</th>
<th>PO5</th>
<th>PO6</th>
<th>PO7</th>
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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 - 2022 -2023

<table>
<thead>
<tr>
<th>Course Title</th>
<th>BASICS OF WASTE MANAGEMENT</th>
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<td>Course Code</td>
<td>22ETT1054 / 22ETT2054</td>
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Course Learning Objective: To understand the various aspects of solid waste management practiced in industries, Methods of collection, transport and storage, Methods of treatments such as volume reduction, densification, Method of by product recovery.

UNIT – I  
INTRODUCTION TO SOLID WASTE MANAGEMENT:
Classification of solid wastes (source and type based), solid waste management (SWM), elements of SWM, ESSWM (environmentally sound solid waste management) and EST (environmentally sound technologies), factors affecting SWM, Indian scenario, progress in MSW (municipal solid waste) management in India.

UNIT – II  
WASTE GENERATION ASPECTS:
Waste stream assessment (WSA), waste generation and composition, waste characteristics (physical and chemical), health and environmental effects (public health and environmental), comparative assessment of waste generation and composition of developing and developed nations, a case study results from an Indian city, handouts on solid waste compositions.

UNIT – III  
COLLECTION, STORAGE AND TRANSPORT OF WASTES:
Waste Collection, Storage and Transport: Collection components, storage-containers/collection vehicles, collection operation, transfer station, waste collection system design, record keeping, control, inventory and monitoring, implementing collection and transfer system.

UNIT – IV  
WASTE PROCESSING TECHNIQUES & SOURCE REDUCTION, PRODUCT RECOVERY & RECYCLING:
Purpose of processing, mechanical volume and size reduction, component separation, drying and dewatering. Source Reduction, Product Recovery and Recycling: basics, purpose, implementation monitoring and evaluation of source reduction, significance of recycling, planning of a recycling programme, recycling programme elements, commonly recycled materials and processes, a case study.

UNIT – V  
WASTE DISPOSAL:
Key issues in waste disposal, disposal options and selection criteria, sanitary landfill, landfill gas emission, leachate formation, environmental effects of landfill, landfill operation issues. Leachate and landfill gas management –landfill closure and post closure care. Types and methods of composting.
**Teaching & Learning Process:**
Chalk and talk, Power point presentations, Animations and Videos and experimental learning in Laboratory.

**Course Outcomes:** The students will be able to

<table>
<thead>
<tr>
<th>CO</th>
<th>Description</th>
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<tr>
<td>CO1</td>
<td>Apply the basics of solid waste management towards sustainable development.</td>
</tr>
<tr>
<td>CO2</td>
<td>Apply technologies to process and dispose the waste.</td>
</tr>
<tr>
<td>CO3</td>
<td>Design working models to convert waste to energy.</td>
</tr>
<tr>
<td>CO4</td>
<td>Identify, classify and manage the hazardous waste.</td>
</tr>
</tbody>
</table>

**Text Books:**


**Question paper pattern:**

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of three sub-questions) from each unit.
- Each full question will have sub-question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

**CO-PO Mapping**

<table>
<thead>
<tr>
<th>CO/PO</th>
<th>PO1</th>
<th>PO2</th>
<th>PO3</th>
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Dr Ambedkar Institute of Technology, Bengaluru-56  
Department of Civil Engineering  
Scheme and Syllabus - 2022 -2023

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

Course Learning Objective: Understand the Concept and Objectives of cost effective techniques of construction and green building. Understand the Problems due to Global Warming.

UNIT – I

Introduction to the concept of cost effective construction:

UNIT – II

Environment friendly and cost effective Building Technologies:
Different substitute for wall construction Flemish Bond - Rat Trap Bond – Arches – Panels - Cavity Wall - Ferro Cement and Ferro Concrete constructions – different pre cast members using these materials - Wall and Roof Panels – Beams – columns - Door and Window frames - Water tanks - Septic Tanks - Alternate roofing systems - Filler Slab - Composite Beam and Panel Roof -Pre-engineered and ready to use building elements - wood products - steel and plastic - Contributions of agencies - Costford - Nirmithi Kendra – Habitat.

UNIT – III

Global Warming and Green buildings:

UNIT – IV

Utility of Solar Energy in Buildings:

Green Composites for Buildings:

UNIT – V

Green Building rating Systems:
Teaching & Learning Process:
Chalk and talk, Power point presentations, Animations and Videos and experimental learning in Laboratory.

Course Outcomes: The students will be able to

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<tr>
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<td>Select different building materials for construction.</td>
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<tr>
<td>CO2</td>
<td>Apply effective environmental friendly building technology.</td>
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<tr>
<td>CO3</td>
<td>Analyse global warming due to different materials in construction.</td>
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<tr>
<td>CO4</td>
<td>Analyse buildings for green rating, to use alternate source of energy and the effective use water.</td>
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Text Books:

<table>
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<tr>
<th>No</th>
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<th>Title</th>
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<tbody>
<tr>
<td>1</td>
<td>HarharAlayer G</td>
<td>Green Building Fundamentals, Notion Press.</td>
</tr>
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Question paper pattern:

- The question paper will have ten full questions carrying equal marks.
- Each full question will be for 20 marks.
- There will be two full questions (with a maximum of three sub-questions) from each unit.
- Each full question will have sub-question covering all the topics under a unit.
- The students will have to answer five full questions, selecting one full question from each unit.

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</table>
COURSE OBJECTIVES:

1. To Acquire Knowledge of smart materials and devices used in smart systems
2. To know Degree of smartness of various materials
3. To Acquire knowledge of commonly used piezoelectric, piezopolymer and piezo ceramic smart materials
4. To Acquire knowledge of Shape memory materials, Electro/Magneto Rheological materials

UNIT-I
INTRODUCTION

UNIT-II
PIEZOELECTRIC MATERIALS
Piezoelectric effect, Piezoelectric materials; Piezoceramic, Piezopolymer, Application of Piezoelectric materials.

SMART STRUCTURES - Types of smart Structures, potential feasibility of smart structures, key elements of smart structures, applications of smart structures.

UNIT-III
SENSORS AND ACTUATORS
Piezoelectric materials as sensors and actuators, Principles of electromagnetic, acoustics, chemical and mechanical sensing and actuation, Types of sensors and their applications.

UNIT-IV
SHAPE MEMORY MATERIALS
Shape memory alloys (SMAs), Shape memory effect, super elasticity, Phase Transformation. Martensitic transformation, Shape memory based Actuators, SME testing of SMA wires, vibration control through SMA, Testing of super elasticity, Applications of SMAs.

UNIT-V
ELECTRO/MAGNETO RHEOLOGICAL MATERIALS and MEMs
Electro/Magneto Rheological materials, mechanisms and properties, Fluid Composition and behavior, applications in clutches, brakes, dampers.
MEMS: Mechanical properties of MEMS materials, scaling of mechanical systems, fundamentals of theory, the intrinsic characteristics of MEMS, miniaturization.
COURSE OUTCOMES: On completion of the course, student should be able to;

CO1: Express and Define Materials used in Sensors and Actuators considering degree of smartness.
CO2: Define commonly used smart materials.
CO3: Analyse and demonstrate piezoelectric effect in Piezoelectric, Piezopolymer and Piezoceramic smart materials.
CO4: Analyse the effect and Phase Transformation in shape memory materials
CO5: Define the mechanism and properties of Electro/Magneto Rheological materials

Suggested Learning Resources:

Test Books:
2 Introduction to Shape Memory Alloys P. K. Kumar and D. C. Lagoudas

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

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Semester End Examination (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.
<table>
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**Strength of correlation:**
- Strongly related: 3
- Moderately related: 2
- Weakly related: 1
- Not related: 0

**Level 3-** Highly Mapped,
**Level 2-Moderately Mapped,**
**Level 1-Low Mapped,**
**Level 0-Not Mapped**
Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Physics
Scheme and Syllabus - 2022 -2023

<table>
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<td>CIE Marks: 50</td>
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Course objectives
To provide a comprehensive overview of synthesis and characterization of nanoparticles, nanocomposites and hierarchical materials with nanoscale features.

- To provide the engineering students with necessary background for understanding various nanomaterials characterization techniques
- To develop an understanding of the basis of the choice of material for device applications
- To give an insight into complete systems where nanotechnology can be used to improve our everyday life.


UNIT IV Nanotechnology in Energy storage and conversion:

UNIT V Applications of Nanotechnology:
Nanotech Applications and Recent Breakthroughs: Introduction, Significant Impact of Nanotechnology and Nanomaterial, Medicine and Healthcare Applications, Biological and Biochemical Applications (Nano biotechnology), Electronic Applications (Nano electronics), Computing Applications (Nano computers), Optical Applications (Nano photonics), Agriculture and Food Applications,
Course outcome
At the end of the course the student will be able to:

CO1: Demonstrate the types, synthesis and properties of nanoparticles.
CO2: Explain working of basic instruments used in characterization of nanoparticles.
CO3: Understand the properties of carbon based nanomaterials CNT
CO4: Discuss the importance of Nanotechnology in Energy storage and conversion and applications of nanomaterials in Engineering field.

Text Books:

Reference Books:
1. Introduction to Nanotechnology, C. P. Poole and F. J. Owens, Wiley, 2003
2. Understanding Nanotechnology, Scientific American 2002
5. Recent reviews on Li-ion batteries, solar cells and fuel cells

Web links and Video Lectures (e-Resources):https://nptel.ac.in/courses/118104008
2. https://archive.nptel.ac.in/courses/113/106/113106099/
3. https://nptel.ac.in/courses/112107283
4. https://onlinecourses.nptel.ac.in/noc22_me131/preview Practical Based learning (Any 5 experiments x 2 hours = 10 practical hours)
5. Preparation of silver nanoparticles and characterization of particle size by optical spectroscopy
6. Preparation of ZnO nanoparticles by combustion technique
7. Preparation of Al2O3 nanoparticles by precipitation method
8. Preparation of Silica nanoparticles by sol-gel method
9. Preparation of metal oxide nanoparticles by hydrothermal method
10. Determination of thermal conductivity of nanofluids using a thermal analyser
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: 3

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

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Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0-Not Mapped
Dr Ambedkar Institute of Technology, Bengaluru-56  
Department of Civil Engineering  
Scheme and Syllabus - 2022 -2023

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Total Max. Marks: 100  
Duration of SEE: 03 hours

Course Learning Objective: To understand the concept of sustainability engineering, principles and framework with Life Cycle Assessment tool, Integration of sustainability with design.

UNIT – I  
Sustainable Development and Role of Engineers:  
Introduction, Why and What is Sustainable Development, The SDFs, Paris Agreement and Role of Engineering, Sustainable Development and the Engineering Profession, Key attributes of the Graduate Engineering

Sustainable Engineering Concepts:  
Key concepts – Factor 4 and Factor 10: Goals of sustainability, System Thinking, Life Cycle Thinking and Circular Economy.

UNIT – II  
Sustainable Engineering and Concepts, Principles and Frame Work:  
Green Economy and Low Carbon Economy, Eco Efficiency, Triple bottom Line, Guiding principles of sustainable engineering, Frameworks for sustainable Engineering.

Tools for sustainability Assessment:  
Environmental Management System, Environmental Auditing, Cleaner Production Assessment, Environmental Impact Assessment, Strategic Environmental.

UNIT – III  
Fundamentals of Life Cycle Assessment:  
Why and What is LCA, LCA Goal and Scope, Life cycle inventory, Life Cycle Impact Assessment, Interpretation and presentation of Results, Iterative Nature of LCA, Methodological Choices, LCI Databases and LCA Softwares, Strength and Limitations of LCA.

UNIT – IV  
Environmental Life Cycle Costing, Social Life Cycle Assessment, and Life Cycle Sustainability Assessment:  

Introduction to Environmental Economics:  
UNIT – V
Integrating Sustainability in Engineering Design:

Teaching & Learning Process:
Chalk and talk, Power point presentations, Animations and Videos and experimental learning in Laboratory.

Course Outcomes: The students will be able to
CO1 Elucidate the basics of sustainable development and its role in engineering
CO3 Apply the Principle, and methodology of Life Cycle Assessment Tools.
CO4 Understand the integration methods of sustainability in Engineering Design.

Text Books:
1 Introduction to Sustainability for Engineers, Toolseeram Ramjeawon, CRC Press, 1st Edn., 2020
4 Engineering for Sustainable development: Delivery a sustainable development goals, UNESCO, International Centre for Engineering Education, France, 1stEdn., 2021

Question paper pattern:
• The question paper will have ten full questions carrying equal marks.
• Each full question will be for 20 marks.
• There will be two full questions (with a maximum of three sub - questions) from each unit.
• Each full question will have sub - question covering all the topics under a unit.
• The students will have to answer five full questions, selecting one full question from each unit.

CO-PO Mapping

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Dr Ambedkar Institute of Technology, Bengaluru-56  
Department of Electronics and Communication Engineering  
Scheme and Syllabus - CBCS – 2022 -2023

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<td>Duration of SEE: 03 Hours</td>
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COURSE OBJECTIVE:
1. Understand the basic concepts of embedded Systems.
2. Get exposure to typical embedded system concepts.
3. Familiarize the characteristics and quality attributes of Embedded Systems.
4. Understand the design and development concepts of a basic embedded system.
5. Get exposure to present trends of embedded system industry.

UNIT I
TEXT 1

UNIT II
TEXT 1

UNIT III
Characteristics and Quality Attributes of Embedded Systems: Characteristics of an Embedded system, Quality attributes of Embedded Systems.
Hardware Software Co-Design and Program Modelling:
TEXT 1

UNIT IV
Embedded Firmware Design and Development: Embedded Firmware Design Approaches, Embedded Firmware Development Languages, Integration of Hardware and Firmware, A typical embedded system development environment (Figure illustration), The Integrated Development Environment (IDE).
TEXT 1

UNIT V
Design Case Studies: Digital camera, Embedded systems in automobile, Smart Card Reader, Automated Meter Reading System.
TEXT 1
COURSE OUTCOMES: On completion of the course, student should be able to:

CO1. Explain the basic concepts of embedded system.
CO2. Analyse different elements of a typical embedded system.
CO3. Explain characteristics, quality enhancing factors and importance of EDA tools related to embedded systems.
CO4. Apply embedded firmware design approaches, embedded firmware development languages concepts in designing simple embedded systems.
CO5. Evaluate the current trends of embedded industry and analyze domain specific examples of embedded systems through case studies.

TEXT BOOKS

REFERENCE BOOKS

ONLINE RESOURCES
1. https://onlinecourses.nptel.ac.in

MAPPING of COs with POs

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Strength of correlation: Low-1, Medium-2, High-3
Course Title: Introduction to Web Programming
Course Code: 22PLU105A/205A
Category: Integrated

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

Course Objectives:
1. Understand the Markup Languages for the web pages.
2. Describes how HTML elements are to be displayed.
3. Design an interactive and dynamic web pages.

UNIT-I
Traditional HTML and XHTML:
8 Hours
First Look at HTML and XHTML, Hello HTML and XHTML World, HTML and XHTML: Version History, HTML and XHTML DTDs: The Specifications Up Close, (X) HTML Document Structure, Browsers and (X)HTML, The Rules of (X)HTML, Major Themes of (X)HTML, The Future of Markup—Two Paths?
TextBook1: Chapter 1

UNIT-II
HTML5:
8 Hours
Hello HTML5, Loose Syntax Returns, XHTML5, and HTML5: Embracing the Reality of Web Markup, Presentational Markup Removed and Redefined, HTML5 Document Structure Changes, Adding Semantics, HTML5’s Open Media Effort, Client-Side Graphics with <canvas>, HTML5 Form Changes, Emerging Elements and Attributes to Support Web Applications.
TextBook1: Chapter 2

UNIT-III
Cascading Style Sheets (CSS)
8 Hours
Introduction, CSS Overview, CSS Rules, Example with Type Selectors and the Universal Selector, CSS Syntax and Style, Class Selectors, ID Selectors, span and div Elements, Cascading, style Attribute, style Container, External CSS Files, CSS Properties, Color Properties, RGB Values for Color, Opacity Values for Color, HSL and HSLA Values for Color, Font Properties, line-height Property, Text Properties, Border Properties, Element Box, padding Property, margin Property, Case Study: Description of a Small City’s Core Area.
TextBook2: Chapter 3

UNIT-IV
Tables and CSS, Links and Images
8 Hours
Table Elements, Formatting a Data Table: Borders, Alignment, and Padding, CSS Structural Pseudo Class Selectors, thead and tbody Elements, Cell Spanning, Web Accessibility, CSS display Property with Table Values, an Element, Relative URLs, Navigation Within a Web Page, CSS for Links, Bitmap Image Formats: GIF, JPEG, PNG, img Element, Responsive Images, Positioning Images, Shortcut Icon, iframe Element.
TextBook2: 5.2 to 5.8, 6.2, 6.3, 6.6., 6.7, 6.9, 6.10, 6.12, 7.2 to 7.4
Introduction to JavaScript: Functions, DOM, Forms, and Event Handlers:

TextBook2: 8.2 to 8.13, 8.15, 8.16

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

| CO2. | Demonstrate the use of CSS to Enhance the appearance of a webpage. |
| CO3. | Design, understand and analyze interactive, dynamic web pages. |

Programming Assignments:

1. Create an XHTML page using tags to accomplish the following:
   (i) A paragraph containing text “All that glitters is not gold”. Bold face and italicize this text
   (ii) Create equation: \( x = \frac{1}{3} (y_1^2 + z_1^2) \)
   (iii) Put a background image to a page and demonstrate all attributes of background image
   (iv) Create unordered list of 5 fruits and ordered list of 3 flowers

2. Create following table using XHTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary

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<tr>
<th>Department</th>
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3. Use HTML5 for performing following tasks:
   (i) Draw a square using HTML5 SVG, fill the square with green color and make 6px brown stroke width
   (ii) Write the following mathematical expression by using HTML5 MathML. \( d = x^2 - y^2 \)
   (iii) Redirecting current page to another page after 5 seconds using HTML5 meta tag

4. Demonstrate the following HTML5 Semantic tags- `<article>`, `<aside>`, `<details>`, `<figcaption>`, `<figure>`, `<footer>`, `<header>`, `<main>`, `<mark>`, `<section>` for a webpage that gives information about travel experience.

5. Create a class called income, and make it a background color of #0ff.
Create a class called expenses, and make it a background color of #f0f.
Create a class called profit, and make it a background color of #f00.
Throughout the document, any text that mentions income, expenses, or profit, attach the appropriate class to that piece of text. Further create following line of text in the same document:

The current price is 50₹ and new price is 40₹.

6. Change the tag li to have the following properties:
   - A display status of inline
   - A medium, double-lined, black border
   - No list style type

Add the following properties to the style for li:
   - Margin of 5px
   - Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px to the left

Also demonstrate list style type with user defined image logos.

7. Create following web page using HTML and CSS with tabular layout

8. Create following calculator interface with HTML and CSS

9. Write a Java Script program that on clicking a button, displays scrolling text which moves from left to right with a small delay

10. Create a webpage containing 3 overlapping images using HTML, CSS and JS. Further when the mouse is over any image, it should be on the top and fully displayed.

Text Books


2. WEB PROGRAMMING with HTML5, CSS and JavaScript, John Dean, Jones &Bartlett Learning, First Edition
Web links and Video Lectures (e-Resources):
https://onlinecourses.swayam2.ac.in/aic20_sp11/preview

MAPPING of COs with POs

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

Faculty Incharge
1. Asha K N
2. Harish Kumar H C
Course Title: INTRODUCTION TO PYTHON PROGRAMMING
Course Code: 22PLU105B/205B
Category: Programming Language Courses – 1 (PLC-1)

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

COURSE OBJECTIVES
Describe the core syntax and semantics of Python programming language.

1. Discover the need for working with the strings and functions.
2. Illustrate the process of structuring the data using lists, dictionaries, tuples and sets.
3. Indicate the use of built-in functions to navigate the file system.
4. Infer the Object-oriented Programming concepts in Python.

UNIT-I
Introduction: What Is a Program? Programming Languages, Software Development, History of Python Programming Language, Features of Python, Execution of a Python Program, Identifiers, Keywords, Statements and Expressions, Variables, Operators, Precedence and Associativity, Data Types, Indentation, Comments, Reading Input, Print Output, Type Conversions, the type () Function and Is Operator

Control Flow Statements: The if, if...else, if...elif...else, Nested if Statement, while Loop, the for Loop, the continue and break Statements
Textbook 1: Chapters 1,2,3

UNIT-II
Functions: Built-In Functions, Commonly Used Modules, Function Definition and Calling the Function, The return Statement and void Function, Scope and Lifetime of Variables, Default Parameters
Strings: Creating and Storing Strings, Basic String Operations, Accessing Characters in String by Index Number, String Slicing and Joining, String Methods
Textbook 1: Chapters 4,5

UNIT-III
List: Creating Lists, Basic List Operations, Indexing and Slicing in Lists, Built-In Functions Used on Lists, List Methods, Populating Lists with Items, Traversing of Lists, The del Statement
Dictionaries: Creating Dictionary, Accessing and Modifying key: value Pairs in Dictionaries, Built-In Functions Used on Dictionaries, Dictionary Methods, The del Statement
Textbook 1: Chapter 6, 7

UNIT-IV
Tuples and Sets: Creating Tuples, Basic Tuple Operations, Indexing and Slicing in Tuples, Built-In Functions Used on Tuples, Tuple Methods, using zip () Function, Sets, Set Methods, Traversing of Sets

8 Hours

112
**Files:** Types of Files, Creating and Reading Text Data, File Methods to Read and Write Data, Textbook 1: Chapter 8,9

**UNIT-V**  
8 Hours

**Exception Handling:** Catching Exceptions Using try and except Statement, Syntax Errors, Exceptions, Exception Handling Using try…except…finally

**Object-Oriented Programming:** Features of OOPS, Classes and Objects, Creating Classes in Python, Creating Objects in Python, The Constructor Method, Classes with Multiple Objects, Class Attributes versus Data Attributes, Encapsulation, inheritance, polymorphism.

**Textbook 2: Chapter 13,14**

**Programming Exercises:**

1. a. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
   b. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.
2. a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
   b. Develop a function to calculate factorial of a number.
3. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
4. Develop python program to demonstrate the linear search applied on the array where if the element is present or not with suitable message.
5. Develop a python program that has dictionary of names of students and list of list of marks in three subjects. Create another dictionary from this dictionary that has names of the students and their total marks. Display the topper based on his or her score.
6. a) Develop a program to count the numbers of characters in the given string and store them in a dictionary data structure
   b) Develop a program to use split and join methods in the given string and trace a birthday with a dictionary data structure
7. Develop a python program to identify number of vowels, consonants, special characters and digits in a given file.
8. Develop a program that inputs a text file. The program should print all of the unique words in the file in alphabetical order.
9. Develop a function named DivExp which takes TWO parameters a, b and returns a value c (c=a/b). Write suitable assertion for a>0 in function DivExp and raise an exception for when b=0. Develop a suitable program which reads two values from the console and calls a function DivExp.
10. Develop python program to simulate banking operation using class and objects

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

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

**CO1:** Interpret the fundamental Python syntax and semantics and be fluent in the use of Python control flow statements.
**CO2:** Express proficiency in the handling of strings and functions.
CO3: Determine the methods to create and manipulate Python programs by utilizing the data structures like lists, dictionaries, tuples and sets.

CO4: Identify the commonly used operations involving file systems and Exception handling to develop efficient and error free codes.

CO5: Articulate the Object-Oriented Programming concepts such as encapsulation, inheritance and polymorphism as used in Python.

TEXT BOOKS

REFERENCE BOOKS

ONLINE RESOURCES
1. https://www.learnbyexample.org/python-lambda-function/
2. https://www.youtube.com/watch?v=daefaLgNkw0
5. https://pythontutor.com/visualize.html#mode=edit

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Strength of correlation: Low-1, Medium-2, High-3
COURSE OBJECTIVES:
- Learn fundamental features of object oriented language and JAVA
- Set up Java JDK environment to create, debug and run simple Java programs.
- Study the concepts of creation of Threads ,Inheritance concepts and to learn GUI Based programs Using Applets.
- Study the concepts of importing of packages and exception handling mechanism.

UNIT I

UNIT II

UNIT III

UNIT IV
Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java”s Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exception...
### UNIT V

**Packages and Interfaces:** Packages, Access Protection, Importing Packages, Interfaces.

**Inheritance:** Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.

**Program Exercises:**

1. Write a JAVA program that prints all real solutions to the quadratic equation \( ax^2 + bx + c = 0 \). Read in \( a \), \( b \), \( c \) and use the quadratic formula.

2. Write a JAVA program for multiplication of two arrays.

3. Demonstrate the following operations and sign extension with Java programs:
   
   (i) \( << \)  (ii) \( >> \)  (iii) \( >>> \)

4. Write a JAVA program for passing parameters to Applet.

5. Create a JAVA class called Student with the following details as variables within it. USN NAME BRANCH PHONE PERCENTAGE Write a JAVA program to create \( n \) Student objects and print the USN, Name, Branch, Phone, and percentage of these objects with suitable headings.

6. Write a JAVA program demonstrating Method overloading and Constructor overloading.

7. Design a super class called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a JAVA program to read and display at least 3 staff objects of all three categories.

8. Write a JAVA program to create MultipleThreads and perform following task using above functions:
   
   i) isAlive ()  ii) join()  iii) setPriority  iv) getpriority  v) setName().

9. Create two packages P1 and P2. In package P1, create class A, class B inherited from A, class C. In package P2, create class D inherited from class A in package P1 and class E. Demonstrate working of access modifiers (private, public, protected, default) in all these classes using JAVA.

10. Write a JAVA program to read two integers \( a \) and \( b \). Compute \( a/b \) and print, when \( b \) is not zero. Raise an exception when \( b \) is equal to zero. Also demonstrate working of ArrayIndexOutOfBoundsException.

### TEACHING LEARNING PROCESS:

Chalk and Talk, power point presentation, animations, videos, Hands on problem solving.
COURSE OUTCOMES:
At the end of the course the student will be able to:

CO1: Design Classes and establish relationship among Classes for various applications from problem definition.

CO2: Analyze and implement reliable object-oriented applications using Java features.

CO3: Demonstrate Java concepts to implement window based program and GUI Programms.

CO4: Write Java programs to implement Multithreads and handle Exceptions in Program.

TEXT BOOKS:


REFERENCE BOOKS:


SELF STUDY REFERENCES/WEBLINKS:

1. https://www.youtube.com/watch?v=mQj34vUhtps&list=PLfn3cNtmZdPOe3R_wO_h540QNFMKCQ0ho&index=44&t=0s
2. https://www.youtube.com/watch?v=FY3g4gGPhio&list=PLfn3cNtmZdPOe3R_wO_h540QNFMKCQ0ho&index=44

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

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Strength of correlation: Low-1, Medium- 2, High-3
**Course Title**: Introduction to C++ Programming  
**Course Code**: 22PLU105D/22PLU205D  
**Category**: Integrated  

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

**Course objectives**

- Understanding about object oriented programming and Gain knowledge about the capability to store information together in an object.
- Understand the capability of a class to rely upon another class and functions.
- Understand about constructors which are special type of functions.
- Create and process data in files using file I/O functions
- Use the generic programming features of C++ including Exception handling

**Teaching-Learning Process**

These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes and make Teaching –Learning more effective

1. Chalk and talk
2. Online demonstration
3. Hands on problem solving

**UNIT-I**  
8 Hours  
**Introduction to Object Oriented Programming**: Computer programming background- Need for C++, Concepts of Object-oriented Programming, Classes and Objects, Methods and Messages, Abstraction and Encapsulation, Inheritance, Abstract Classes, Polymorphism.  
**C++ overview**: Identifiers and Constants, Keywords, Data Types, Pointers, Reference Variables.  
**Functions in C++**: Function prototyping – Call by reference – Return by reference – Inline functions- Default arguments – Function overloading.

**UNIT-II**  
8 Hours  
**Classes and Objects**: Class Specification, Defining member functions, Static members, Friend functions, Passing objects as arguments, Returning objects, Arrays of objects, Constructors, Destructors.  
**Operator overloading**: Rules, Defining operator overloading, Overloading unary operators, Overloading binary operators and Overloading binary << and >> using friend functions.

**UNIT-III**  
8 Hours  
**Inheritance**: Defining derived class, single inheritance, Multilevel Inheritance, Multiple Inheritance, Hierarchical Inheritance, Hybrid Inheritance, Virtual base classes.

**UNIT-IV**  
8 Hours  
**Virtual functions**: Virtual functions, Need for virtual function, Calling a Virtual function through a base class reference.  
**I/O Streams**: C++ Class Hierarchy- File Stream-Text File Handling- Binary File Handling during file operations.

**UNIT-V**  
8 Hours  
**Exception Handling**: Introduction to Exception – Basics of Exception handling, Exception handling mechanism – Try, Throw and Catch, Re-throwing an Exception, Specifying Exception.
Course outcome (Course Skill Set)
At the end of the course the student will be able to:

CO1: Understand and design the solution to a problem using object oriented programming concepts.

CO2: Illustrate the concept of constructors, destructors and operator overloading.

CO3: Achieve code reusability and extensibility by means of Inheritance and Polymorphism

CO4: Implement the features of C++ including exceptions and file handling for providing programming solutions to complex problems.

Programming Assignments:
1. Write a C++ program to sort the elements in ascending and descending order.
2. Write a C++ program to find the sum of all the natural numbers from 1 to n.
3. Write a C++ program to swap 2 values by writing a function that uses call by reference technique.
4. Write a C++ program to demonstrate function overloading for the following prototypes.
   i) add(int a, int b)
   ii) add(double a, double b)
5. Design and implement a class STUDENT with attributes like: roll number, name, three test marks. Implement member functions
   i) to read student data like name and test marks,
   ii) to compute average marks (considering best two out of three test marks)
   iii) to display the student information.
   Declare an array of STUDENT objects in the main function.
6. Write a program to find mean of two numbers belonging to two different classes using friend function.
7. Create a class called DATE. Accept two valid dates in the form dd/mm/yyyy. Implement the following by overloading - and << operators.
   i) no_of_days = d1 – d2; where d1 and d2 are DATE objects, d1 >=d2
8. Create a class named Shape with a function that prints "This is a shape". Create another class named Polygon inheriting the Shape class with the same function that prints "Polygon is a shape". Create two other classes named Rectangle and Triangle having the same function which prints "Rectangle is a polygon" and "Triangle is a polygon" respectively. Again, make another class named Square having the same function which prints "Square is a rectangle". Now, try calling the function by the object of each of these classes.
9. Write a C++ program to create a text file, check file created or not, if created it will write some text into the file and then read the text from the file.
10. Write a function which throws a division by zero exception and catch it in catch block.
    Write a C++ program to demonstrate usage of try, catch and throw to handle exception.

Suggested Learning Resources:
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)
Textbooks

Assessment Details (both CIE and SEE)
The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%.
The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum
passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

**Two Unit Tests each of 20 Marks (duration 01 hour)**
- First test after the completion of 30-40% of the syllabus
- Second test after completion of 80-90% of the syllabus

One Improvement test before the closing of the academic term may be conducted if necessary. However best two tests out of three shall be taken into consideration.

**Two assignments each of 10 Marks**

The teacher has to plan the assignments and get them completed by the students well before the closing of the term so that marks entry in the examination portal shall be done in time. Formative (Successive) Assessments include Assignments/Quizzes/Seminars/ Course projects/Field surveys/ Case studies/ Hands-on practice (experiments)/Group Discussions/ others. The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the COs and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods/test question paper is designed to attain the different levels of Bloom’s taxonomy as per the outcome defined for the course.

**The sum of two tests, two assignments, will be out of 60 marks and will be scaled down to 30 marks CIE for the practical component of the Integrated Course**

- On completion of every experiment/program in the laboratory, the students shall be evaluated and marks shall be awarded on the same day. The 15 marks are for conducting the experiment and preparation of the laboratory record, the other 05 marks shall be for the test conducted at the end of the semester.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments’ write-ups are added and scaled down to 15 marks.
- The laboratory test (duration 02/03 hours) at the end of the 14th/15th week of the semester /after completion of all the experiments (whichever is early) shall be conducted for 50 marks and scaled down to 05 marks.

Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for 20 marks.

**Semester End Examination (SEE):**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the subject (duration 03 hours)

- The question paper shall be set for 100 marks. The medium of the question paper shall be English/Kannada. The duration of SEE is 03 hours.

The question paper will have 10 questions. Two questions per module. Each question is set for 20 marks. The students have to answer 5 full questions, selecting one full question from each module. The student has to answer for 100 marks and marks scored out of 100 shall be proportionally reduced to 30 marks. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), should have a mix of topics under that module.

Lab SEE will be conducted based on the Lab assignments with both internal and external examiners as per prevailing practice. The exam will be conducted for 50 marks and minimum passing is 20.
marks. The marks obtained will be proportionally reduced to 20 marks (max) and will be summed with theory SEE to get the total SEE marks.

Passing in the subject: The student will pass the subject only if he obtained minimum passing marks both in theory SEE and Lab SEE. If a student fails in either theory/lab he has to clear the corresponding component only. Grading will be assigned by combining the performance in Lab and theory.

Web links and Video Lectures (e-Resources):

Web-links and Video Lectures (e-Resources):
1. Basics of C++ - https://www.youtube.com/watch?v=BCIS40yzssA
2. Functions of C++ - https://www.youtube.com/watch?v=p8ehAjZWjPw

Tutorial Link:
1. https://www.w3schools.com/cpp/cpp_intro.asp
2. https://www.edx.org/course/introduction-to-c-3

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning
Assign small tasks to Develop and demonstrate using C++

COs and P0s Mapping (Individual teacher has to fill up)

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Level 3- Highly Mapped, Level 2-Moderately Mapped, Level 1-Low Mapped, Level 0- Not Mapped
Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2022 -2023

Course Title: COMMUNICATIVE ENGLISH
Course Code: 22ENT106
Category: Humanities & Social Sciences (HS)

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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 5 hours

UNIT II 5 hours
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

UNIT IV 5 hours
Communication Skills: LSRW Skills

UNIT V 5 hours
Speaking Skills: Extempore / Public Speaking, 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: 25 marks)
SEE- Objective type (Max. marks: 50 marks)

MAPPING of COs with POs

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<th>Ss</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 Humanities & Social Sciences  
Scheme and Syllabus – OBE - CBCS – 2022 -2023

<table>
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<th>PROFESSIONAL WRITING SKILLS IN ENGLISH</th>
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<td>CIE Marks: 50</td>
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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: 25 marks)
SEE- Objective type (Max. marks: 50 marks)

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Strength of correlation: Low-1, Medium- 2, High-3
COURSE OBJECTIVE: KANNADA – SAMSKRUTHIKA KANNADA (2022-2023) (Kannada Students)

UNIT I 3 hours
UNIT II 3 hours
UNIT III 3 hours
UNIT IV 2 hours
UNIT V 2 hours

Dr Ambedkar Institute of Technology, Bengaluru-56
Department of Humanities & Social Sciences
Scheme and Syllabus – OBE - CBCS – 2022-2023

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

CO1: [Course Outcome 1]
CO2: [Course Outcome 2]
CO3: [Course Outcome 3]
CO4: [Course Outcome 4]
CO5: [Course Outcome 5]

TEXT BOOKS:

1. [Textbook 1]
2. [Textbook 2]
3. [Textbook 3]
4. [Textbook 4]

REFERENCE BOOKS

1. [Reference Book 1]
2. [Reference Book 2]
3. [Reference Book 3]
4. [Reference Book 4]

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:
CIE- Objective type (Max. marks: 25 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
## Course Title
NON KANNADA – BALAKE KANNADA (2022-2023)
(Non Kannada & Non Karnataka Students)

## Course Code
22BKT107/207

## Category
Humanities & Social Sciences (HS)

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## COURSE OBJECTIVE:

The objective of this course is to provide students with a comprehensive understanding of the Balake Kannada language and its cultural significance. The course aims to enhance students' communication skills in Kannada and foster an appreciation for the language's rich history and literature. Through a blend of traditional and modern teaching methods, students will develop an ability to read, write, and converse in Kannada, thereby bridging the gap between traditional and contemporary perspectives.

## UNIT I
2hours

- Introduction to Balake Kannada
- Basic grammar and sentence structure
- Cultural aspects and historical background

## UNIT II
2hours

- Advanced grammar and conversation
- Literary works and authors
- Cultural events and their significance

## UNIT III
2hours

- Poetic forms and styles
- Folk literature and its evolution
- Contemporary trends in Balake Kannada

## UNIT IV
2hours

- Language and identity
- Integration with other languages
- Future perspectives and challenges

## UNIT V
1hours

- Projects and presentations
- Final examination
- Cultural exchange and celebration

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**Dr Ambedkar Institute of Technology, Bengaluru-56**  
**Department of Humanities & Social Sciences**  
**Scheme and Syllabus – OBE - CBCS – 2022 -2023**
COURSE OUTCOMES:
1. Listening and Speaking - KelisikoLLuvudu mattu Maatanaduvudu (சேர்க்கிலோலவு மற்றும் மேற்கொள்ளுவுது)
2. Pronouns – SarvanaamagaLu (சர்வநாமாகு தான்)
3. Adjectives – Naama VisheshaNagaLu (நாம் விருச்சாங்காகு)
4. Verbs – KriyapadagaLu (கியாபாடாகு)
5. Adverbs – KriyavisheshaNagaLu (சூழனியறாங்காகு)

TEXT BOOKS:
1. ¥ÀoÀåzÀ ºÉ¸ÀgÀÄ : §¼ÀPÉ PÀ£ÀßqÀ PÀ£ÀßqÉÃvÀgÀ ªÀÄvÀÄÛ ºÉÆgÀ£ÁqÀÄ PÀ£ÀßqÀ «zÁåyðUÀ½UÉ
2. §ÁµÁzsÀåAiÀÄ£À «¨sÁUÀ, PÀ£ÀßqÀ «±Àé«zÁå®AiÀÄ
3. qÁ.J¯ï.wªÉÄäñÀ - ¸ÀºÁAiÀÄPÀ ¥ÁæzsÁå¥ÀPÀgÀÄ ªÀÄvÀÄÛ ªÀÄÄRå¸ÀÜgÀÄ
4. ¥ÉÆæ.«.PÉñÀªÀªÀÄÆwð - ±ÉÊPÀëtÂPÀ ¸À®ºÉUÁgÀgÀÄ

REFERENCE BOOKS
1. ¥ÀoÀåzÀ a - ஓவர்பிரித்து பாறை
2. ¥ÀoÀåzÀ a - ஓவர்பிரித்து - கூட்டாக விருச்சாங்கா மாறு கூட்டாக்கு
3. ¥ÀoÀåzÀ a - கூட்டாக விருச்சாங்கா சார்ந்து மாறு
4. ¥ÀoÀåzÀ a - கூட்டாக விருச்சாங்கா

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:
CIE- Objective type (Max. marks: 25 marks)
SEE- Objective type (Max. marks: 50 marks)

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Strength of correlation: Low-1, Medium-2, High-3
COURSE OBJECTIVES:
1. To know the fundamental political structure & codes, procedures, powers, and duties of Indian government institutions, fundamental rights, directive principles, and the duties of citizens.
2. To understand engineering ethics and their responsibilities, identify their individual roles and ethical responsibilities towards society.

UNIT I

UNIT II
Union Government: Executive – President, Prime Minister, Council of Ministers, Parliament – Lok Sabha & Rajya Sabha. Supreme Court.

UNIT III
State Government: Executive – Governor, Chief Minister, Council of Ministers, State Legislature-Legislative Assembly & Legislative Council, High Court.

UNIT IV

UNIT V

TEACHING LEARNING PROCESS:
Direct instructional method (Low/Old Technology), Flipped classrooms (High/advanced Technological tools), Blended learning (combination of both), Enquiry and evaluation based learning, Personalized learning, Problems based learning through discussion, Following the method of expeditionary learning.

COURSE OUTCOMES:
At the end of the course the student should:
CO 1: Have constitutional knowledge and legal literacy.
CO 2: Understand Engineering and Professional ethics and responsibilities of Engineers

TEXT BOOKS
2. ENGINEERING ETHICS by CHARLES E. HARIER, MICHAEL S. PRITCHARD AND MICHAEL J. ROBINS THOMPSON ASIA, 2003-08-05

REFERENCE BOOKS
2. Constitution of India by B S Raman
4. Constitution of India and Professional Ethics—K R Phaneesh
5. Introduction to the Constitution of India—Brij Kishore Sharma

SCHEME FOR EXAMINATIONS

Theory Question Paper Pattern:
CIE- Objective type (Max. marks: 25 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
Course Title: SCIENTIFIC FOUNDATION OF HEALTH & WELLNESS
Course Code: 22SFT108/208
Category: Ability Enhancement Course (AEC)

<table>
<thead>
<tr>
<th>Scheme and Credits</th>
<th>No. of Hours/Week</th>
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<td>SEE Marks: 50</td>
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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 5 hours
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 4 hours
Determinants of Health and Wellness: Lifestyle and Health, Sleep and health, Relaxation and Meditation, Physical Fitness and Stamina, Reproductive health and hygiene.

UNIT III 7 hours
Seven dimensions of Health & Wellness: Physical health, Mental health, Social Health, Spiritual health, Cultural health, Moral health, Economical health.

UNIT IV 5 hours
Healthy Eating- Diet and Nutrition: Food and Diet – Difference, Concept of DIET, Nutrition.

UNIT V 5 hours
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: 25 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 Electrical and Electronics Engineering  
Scheme and Syllabus - CBCS –2022 -2023

<table>
<thead>
<tr>
<th>Course Title</th>
<th>INNOVATION AND DESIGN THINKING</th>
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**COURSE OBJECTIVE:**
1. To explain the concept of design thinking for product and service development.
2. To explain the fundamental concept of innovation and design thinking.
3. To discuss the methods of implementing design thinking in the real world.

**UNIT I**
**PROCESS OF DESIGN**
Understanding Design thinking
Introduction to Design Thinking - Theory and practice in Design thinking – Shared model in team-based design – MVP or Prototyping.
*Text Book 1,2,3,4 and Reference Book 1,2*

**UNIT II**
**Tools for Design Thinking**
Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design.
*Text Book 1,2,3,4 and Reference Book 1,2*

**UNIT III**
**Design Thinking in IT**
*Text Book 1,2,3,4 and Reference Book 1,2*

**UNIT IV**
**DT for strategic innovations**
*Text Book 1,2,3,4 and Reference Book 1,2*

**UNIT V**
**The Design Challenge:**
*Text Book 1,2,3,4 and Reference Book 1,2*

**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 various design process procedure.
- **CO2:** Evaluate design ideas through different technique.
- **CO3:** Generate design ideas through design thinking.
- **CO4:** Identify the significance of reverse Engineering to Understand products.
- **CO5:** Predict the design challenge properly.
TEXT BOOKS


REFERENCE BOOKS


ONLINE RESOURCES

1. www.tutor2u.net/business/presentations/ productlifecycle/default.html
3. www.bizfilings.com Home Marketing Product Development
7. https://support.google.com/docs/answer/179740?hl=en

SCHEME FOR EXAMINATIONS

i. Theory Question Paper Pattern:
   CIE – Objective type (Max. marks : 25 marks)
   SEE – Objective type (Max. marks : 25 marks)

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 Placement  
Scheme and Syllabus - 2022 -2023

<table>
<thead>
<tr>
<th>Subject Code: 22CDN109</th>
<th>Mandatory Course (CGPC)</th>
<th>No of lecture hours per week: 2 Hrs</th>
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<td>CIE Marks-50</td>
<td>SEE Exam-Nil</td>
<td>Total No. of lecture hours: 26 hrs per semester</td>
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**CGPC – Career Guidance and Placement Cell**

**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.

**UNIT I**  
4 hours

**Career Planning:** Qualities of an Engineer, Engineering Graduate v/s Engineers, Avenues, Skills  
**Goal Settings:** Importance of goal, Creating SMART goals, Action plan to meet goals, Tips for effective execution of goals  
**Self-awareness and Self-confidence:** Knowing your own self, Knowing others, Working well with others, Knowing personal attitudes, Developing the right attitude for work, Being proactive & positive.

**UNIT II**  
4 hours

**Building Personality and Discipline:** Personality Building, Types of Personality, Ways of developing personality, 3 types of discipline, Advantages of being disciplined  
**Grooming, hygiene and Cleanliness:** Expectations from the industry, Building personal presence, Corporate grooming, Types and Impact of Grooming, Tips on Personal Grooming.

**UNIT III**  
6 hours

**Attitude and Behavior:** Types & Structures of Attitudes, Personal & Positive Attitudes  
**Emotional intelligence Quotient:** Types of emotional quotient, Signs of emotional intelligence, Characteristics of emotional intelligence, Ways to increase EQ

**UNIT IV**  
4 hours

**Time Management:** Importance of time, Time Management Matrix, Tips for managing time effectively, Prioritizing.  
**Stress Management:** Causes, Types & Symptoms of stress
UNIT V

Listening Skills: Hearing & Listening, Barriers to Listening, Active Listening Skills & Importance of listening

Speaking Skills: Basics of Speaking skills, 7 C’s for Better Speaking, Types of Speaking & Elements of public speaking.

Reading Skills: Dos & Don’ts of good reading, Improve your reading skills.

Writing Skills: Importance of Writing Skills, Dos & DON’T’s of Writing Skills, Ways to improve writing skills, Tips for writing skills

8 hours

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. By the end of this unit, students will have deployed 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
CGPC – Career Guidance and Placement Cell

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.

2. This unit teaches the students on how to be effective team player & contribute to the organizational growth. It also depicts the easier decision making and problem-solving techniques & enables students to think creatively there by moulding them to be future leaders

3. This unit makes the students understand about the English usage properly with the right set of course and action. This unit aims at teaching the Verbal Ability and It gives them the insight about grammar rules & concepts.

4. This unit deals with the preparation of Resume Building thereby laying path for good career start. It also teaches on behaviour & mannerism that should be maintained during the interview.

5. This unit is framed to up bring their skill of Creative thinking.

UNIT I
Presentation skills + Mock presentations: Aspects in the development of good presentation, Structuring, Effective delivery, Group facilitation, Handling questions, Visual Aids, Mock presentations
Small talk and Debate
Body language

UNIT II
Team building: Importance of Team Building, Benefits of Team Building, Key Roles in Team building, Helpful Team Behavior
Decision making and Problem Solving: Decision making styles, Types of Decision making, Steps of Decision making, Decision Making skills, Problem Solving, Steps of Problem solving
Leadership skills and motivation: Attributes of a leader, Leadership Styles, Key Characteristics

UNIT III
Common mistake in English, Classic Indianisms, Course of action, Cause and effect, Statement and assumptions, Statement and Conclusions

UNIT IV
Resume Building: Guidelines for Writing a resume, Points to keep in mind when writing a resume, Sample resume, Resume correction
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. After the completion of this unit, student will have learnt how to work in teams & be effective leader. And students will learn about the synchronization with the workmate and also gives them an opportunity to unlock their individual potentials by taking the right decisions.

3. At this unit, students would have learnt the mistakes in the usage of English vocabulary during their common talks.

4. After the completion of this unit student have learnt about pre-requisites to build effective resume that being asked during the recruitment process.

5. After the completion of this unit students will demonstrate an ability to recognise and would have deployed themselves in the active creative thinking.

REFERENCE:

01. Soft skills for Managers by Dr. T. KALYANA CHAKRAVATHI

02. Personal Development and Soft Skills by BARUN K MITRA, Oxford Higher Education

03. The Emotionally Intelligent Workplace by DANIEL GOLEMAN.

04. Communication skills and soft skills an integrated approach by E. SURESH KUMAR, P. SREEHARI, J SAVITHRI.

05. Top Talking in English (international communication skills) by CHARLES T. RAJENDRA

06. Soft skills by RAJ LAKSHMI SURYAVANSHI, Gurucool Publishing

07. Enhancing English and Employability Skills by State Board of Technical.

08. Soft skills an integrated approach to maximize personality by SANGEETHA SHARMA, GAJENDRA SINGH CHAUHAN, and Wiley Publishing.