1st Semester	Basic Science (BS) Applied Mathematics-1 for ME Stream	M25BMATM101

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Calculus	Algebra: Understanding of basic algebraic operations, equations, and inequalities. Geometry: Basic knowledge of geometric shapes, areas, volumes, and trigonometric functions.
2	Series Expansion and Multivariable Calculus	Single-Variable Calculus: Mastery of differentiation and integration in one dimension. Basic Series Knowledge: Familiarity with sequences and series, convergence, and divergence.
3	Ordinary Differential Equations (ODEs) of First Order	Calculus: Proficiency in differentiation and integration. Basic Algebra: Ability to manipulate algebraic equations. Basic Differential Equations Concepts: Familiarity with simple separable and linear equations.
4	Basic Concepts of Linear algebra	Linear Algebra: Proficiency in determinant expansion, matrix operations, and eigenvalues/eigenvectors. Numerical Methods: Basic understanding of numerical approximation techniques and stability.

2. Syllabus

Applied Mathematics-1 for ME Stream SEMESTER – I			
Course Code	**M25BMATM101**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**48:0:32:0:30 = 110 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**04**	Exam Hours	**03**

Course Objectives:

1. Familiarize the importance of Integral calculus for Mechanical engineering.
2. Appreciate the importance of Calculus and Matrix theory in Engineering.
3. Analyze Mechanical engineering problems by applying Ordinary Differential Equations
4. Gain the knowledge of Calculus and Matrix theory concepts to implement them in their core domain.
5. Improve their mathematical thinking and acquire skills required for sustained lifelong learning

Module -1

Matrices and System of Linear equations: Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-elimination method, approximate solution by Gauss-Seidel method. Eigenvalues and eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector

Applications: Balancing chemical equations

Module -2

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 and Volume by double integral Problems.

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

Applications: Area(polar curves), Volume by triple integral, Mass of a plane laminar region

Module -3

Multivariable Calculus: Partial differentiation, total derivative - differentiation of composite functions, Jacobian, Taylor's and Maclaurin's series expansion for two variables (statement only) – problems.

Applications: Errors and approximations, Maxima and minima for a function of two variables.

Module -4

Ordinary Differential Equations of Higher Order: Linear and Bernoulli's differential equations. Exact and

reducible to exact differential equations - Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ & $\frac{1}{M}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$ Non-linear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations. Problems. **Applications:** Orthogonal trajectories, Newton's Law of Cooling
Module -5
Higher Order Differential Equations: Higher-order linear ODEs with constant coefficients - Inverse differential operator, method of Variation of parameters, Cauchy's and Legendre's homogeneous differential equations -Problems. **Applications:** Free Oscillation of a Spring and Solving Problems Involving Spherical Symmetry
List of Laboratory experiments (2 hours/week per batch) 1. Program to compute area, surface area, volume and center of gravity 2. Evaluation of improper integrals 3. Finding partial derivatives and Jacobian 4. Applications to Maxima and Minima of two variables 5. Solution of first-order ordinary differential equation and plotting the solution curves 6. Solutions of Second-order ordinary differential equations with initial/ boundary conditions 7. Solution of differential equation of oscillations of spring with various load 8. Numerical solution of system of linear equations, test for consistency and graphical representation 9. Solution of system of linear equations using Gauss-Seidel iteration 10. Compute eigenvalues and eigenvectors and find the largest and smallest eigenvalue by Rayleigh power method. **Suggested software**: Mathematica/MatLab/Python/Scilab
TEXTBOOKS: 1. B.S. Grewal: "Higher EngineeringMathematics",Khannapublishers,45th Ed.2025 2. E.Kreyszig:"Advanced Engineering Mathematics", John Wiley & Sons, 10thEd.(Reprint),2018.

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of the concepts.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
5	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

Components		Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component. The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BMATM101.1	Apply the knowledge of calculus to solve problems related to integral calculus.
M25BMATM101.2	Analyze the concept of partial differentiation to computer at of change of multivariate Functions
M25BMATM101.3	Analyze the solution of linear and nonlinear ordinary differential equations and higher order differential equations related to Engineering applications
M25BMATM101.4	Make use of matrix theory for solving the system of linear equations and compute eigen values and eigen vectors.
M25BMATM101.5	Solving complex Engineering Problems using PYTHON

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BMATM101.1	3	-	-	-	-	-	-	-	-	-	-
M25BMATM101.2	-	3	-	-	-	-	-	-	-	-	-
M25BMATM101.3	-	3	-	-	-	-	-	-	-	-	-
M25BMATM101.4	3	-	-	-	-	-	-	-	-	-	-
M25BMATM101.5	-	-	-	-	3	-	-	-	-	-	-
M25BMATM101	**3**	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 2:** Zero Hunger	Higher-order ODEs can be used to model the growth and distribution of crops in agricultural systems. Crop growth models often involve complex relationships between soil moisture, temperature, fertilizer levels, and plant growth rates. These models can be higher-order due to the interactions between different variables and their rate of change over time.
2	**SDG 3:** Good Health and Well-Being	In public health, integral calculus is crucial for understanding the total number of people affected by an epidemic over time. Given a model for the rate of change in the number of infected individuals (such as the SIR model), we can integrate the rate of infection to find the total number of infections over a given period.
3	**SDG 7**: Affordable and Clean Energy	In energy distribution systems, especially those integrating renewable energy sources (e.g., solar, wind), there are often oscillations or instability in the power grid due to fluctuations in energy supply and demand. These systems can be modelled using second-order or higher-order linear ODEs.
4	**SDG 11:** Sustainable Cities and Communities	Linear algebra is used extensively in urban planning, especially when designing transportation networks, road systems, and building structures. Optimization algorithms are used to ensure that urban areas are both efficient and sustainable, using graph theory and matrix analysis to model connectivity and flow.

1st /2nd Semester	Basic Science Course (BS) Applied Physics for ME Stream	M25BPHYM102/202

1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Classical Mechanics and waves	Understanding of simple harmonic motion (SHM) oscillations, DHM and FHM around an equilibrium position, such as a mass-spring system or a pendulum. Understanding of different kinds of sound waves in different fluids.
2.	Material Science	Understanding the mechanical properties such as strength, toughness, hardness, ductility, and brittleness. Fundamental knowledge of how materials deform under various loads.
3.	Thermoelectric.	Familiarity with the concepts of temperature, heat, and thermal energy and knowledge of semiconductor behavior, energy bands, and charge carriers.
4.	Thermodynamics and Heat transfer.	Understanding the principles of heat transfer and temperature control at very low temperatures. Understanding the properties and behaviors of gases and liquids at low temperatures
5.	Mathematics	Knowledge of calculus, Linear algebra and trigonometry.

2. Syllabus

Applied Physics for ME stream **Semester-I/II**			
Course Code	**M25BPHYM102/202**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L: T: P:TW:SL)	**32:32:0: 20:0 = 84 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. Understand the fundamentals of oscillations, elasticity, and material behavior in engineering systems.
2. Explore shock waves and high-speed flow dynamics relevant to aerospace and mechanical applications.
3. Learn LASER principles and their practical applications in industry and medicine.
4. Study thermoelectric effects and cryogenic techniques for low-temperature applications.
5. Examine the properties and engineering uses of smart materials like piezo-electrics and shape memory alloys**.**

Module -I: Oscillations and Shock waves

Oscillations: Simple Harmonic motion (SHM), Differential equation for SHM (No derivation), Sprigs: Stiffness Factor and its Physical Significance, Series and Parallel combination of springs (Derivation), Types of Springs and their applications. Theory of Damped oscillations (Qualitative), Types of Damping (Graphical Approach). Engineering applications of Damped oscillations, Theory of Forced oscillations (Qualitative), Resonance, Sharpness of resonance. Numerical Problems.

Shock waves: Mach number and Mach Angle, Mach Regimes, Definition and Characteristics of Shock waves, Construction and working of Reddy Shock tube, Applications of Shock Waves, Numerical problems.

Module 2: Elasticity

Stress-Strain Curve, Stress hardening and softening. Elastic Moduli, Poisson's ratio, Relation between E, G and μ (with derivation), mention relation between K, E and μ, limiting values of Poisson's ratio. Beams, bending moment and derivation of expression, Cantilever and I section girder and their Engineering Applications, Elastic materials (qualitative). Failures of engineering materials - Ductile fracture, Brittle fracture, Stress concentration, Fatigue and factors affecting fatigue (only qualitative explanation), Numerical problems.

Module 3: LASER and its Application

LASER: Characteristic properties of a LASER beam, Interaction of Radiation with Matter, Einstein's A and B Coefficients and Expression for Energy Density (Derivation), Laser Action, Population Inversion, Metastable State, Requisites of a laser system, Helium- Neon laser, Carbon- di oxide laser, Nd-YAG laser

(construction and working), Applications: Welding, cutting and drilling. Numerical.
Module 4: Thermo electric materials and Cryogenic gases
Thermo emf and thermo current, Seeback effect, Peltier effect, Seeback and Peltier coefficients, figure of merit (Mention Expression), laws of thermoelectricity. Expression for thermo-emf in terms of T_1 and T_2, Thermo couples. Thermophiles. Numerical Problems. Production of low temperature - Joule Thomson effect (Derivation with 3 cases), Porous plug experiment with theory, Liquefaction of Oxygen by cascade process, Liquefaction of Helium and Nitrogen. Numerical Problems.
Module 5: Physical properties of Smart materials
Shape Memory Alloys: Structural and Physical properties, NiTi (nitinol), Piezoelectric Materials: Structural and Physical properties, (deformation to produce electric filed), Lead Zirconate Titanate (PZT), Magneto-Rheological Fluids, Applications. Principle, construction and working of (i) X-ray Diffractometer (XRD) (ii) Scanning electron microscope (SEM).
Text Books: **1.** M.N. Avadhanulu, P G. Kshirsagar and T V S Arun Murthy, A Textbook of Engineering Physics, Eleventh edition, S Chand and Company Ltd. New Delhi-110055. **2.** M S Vijaya, Piezoelectric materials and devices, CRC Press, Taylor & Francis Group, LLC
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) 1. Sadhu Singh, "Theory of Elasticity", Khanna Publishers, 1997 2. Wole Soboyejo, Mechanical Properties of Engineered Materials, 1st edition CRC Press, 2002 3. D.S. Mathur, Heat and Thermodynamics, I-Edition, S. Chand & Company Ltd., New-Delhi, 1991 4. Bahman Zohuri , Physics of Cryogenics, Elsevier, 2018 5. Mitra P.K, Characterization of Materials-. Prentice Hall India Learning Private Limited.

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of Verilog concepts.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
5	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
6	Laboratory Learning	Utilize the facilities available in the laboratories to understand the behavior of the materials by performing few experiments.

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Basic science Course (BS)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment - Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component.

The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks.

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BPHYM102/202.1	Explain the principles and properties of oscillations, elasticity, LASERs, thermoelectricity, and smart materials, highlighting their industrial relevance.
M25BPHYM102/202.2	Apply the principles of oscillatory systems, shock waves, elasticity, laser parameters, and thermoelectric effects in engineering contexts.
M25BPHYM102/202.3	Analyze the behavior of advanced materials like shape memory alloys, piezoelectric, and magneto strictive materials in engineering applications.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BPHYM102/202.1	3	-	-	-	-	-	-	-	-	-	-
M25BPHYM102/202.2	3	-	-	-	-	-	-	-	-	-	-
M25BPHYM102/202.3	-	2	-	-	-	-	-	-	-	-	-
M25BPHYM102/202	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	SDG 4: Quality Education	Integrating these topics equips students with skills for sustainable engineering solutions.
2	SDG 7: Affordable and Clean Energy	Thermoelectric and piezoelectric materials contribute to renewable energy and efficient systems.
3	SDG 9: Industry, Innovation, Infrastructure	All modules foster innovation in materials, manufacturing, and infrastructure resilience.
4	SDG 13: Climate Action	Thermoelectric and smart materials help reduce emissions and improve energy efficiency

1st/2nd Semester	Engineering Science Course (ES) ELEMENTS OF MECHANICAL ENGINEERING	M25BEME103 /203

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic understanding of engineering disciplines	Familiarity with different engineering fields and their societal Impact.
2	Workshop skills	Prior experience in a workshop setting would be beneficial.
3	Familiarity with basic mathematical functions	Enhances understanding of calculations related to mechanical Concepts (e.g., gear ratios, forces).
4	Analytical thinking skills	Ability to break down problems, identify key elements, and solve them logically.
5	Visualization skills	Ability to interpret diagrams, schematics, and 3D models relevant to mechanical systems.

2. Syllabus

ELEMENTS OF MECHANICAL ENGINEERING SEMESTER – I/II			
Course Code	**M25BEME103/203**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**32:32:0:20:0= 84 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives: The Students will be able to,

1. U**nderstand** the fundamental role of mechanical engineering in various industries and identify emerging technologies in sectors like energy, manufacturing, and transportation.
2. **Comprehend** the basic principles and applications of steam, power generation systems, and internal combustion engines including simple numerical analysis.
3. **Illustrate** the working principles and operations of conventional and advanced machine tools, including CNC systems.
4. **Analyze** modern advancements in mechanical engineering such as electric and hybrid vehicles, and basic robotics including their components and industrial applications.

Module -1

Introduction to Mechanical Engineering (Overview only):
Role of Mechanical Engineering in Industries and Society- Emerging Trends and Technologies in different sectors such as Energy, Manufacturing, Automotive, Aerospace, and Marine sectors.

Steam Formation and Application:
Steam formation, Types of steam, Steam properties and applications of steam (simple numerical problems).

Energy Sources and Power Plants:
Basic working principles of Hydel power plant, Thermal power plant, nuclear power plant, Solar power plant (Solar Pond), Tidal power plant and Wind power plant.

Module -2

Machine Tool Operations:
Lathe: Principle of working of a center lathe, Lathe operations: Turning, Facing, Knurling, Thread cutting, Taper turning by swiveling the compound rest.
Drilling Machine: Working of simple drilling machine, Drilling operations: Drilling, Boring, Reaming, and Tapping.
Milling Machine: Working and types of milling machine, Milling operations: Plane milling, End milling and Slot milling. (No sketches of machine tools, sketches to be used only for explaining the operations).
Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC.

Module -3

Introduction to IC Engines: Components and working principles, 4-Stroke Petrol and Diesel engines, Application of IC Engines, performance of IC engines (Simple numerical).
Introduction to Refrigeration and Air Conditioning: Principle of refrigeration, Refrigerants and their

desirable properties. Working principle of VCR refrigeration system, working principle of room air conditioner & Applications of air Conditioners.
Module -4
Mechanical Power Transmission: Gear Drives: Types - spur, helical, bevel, worm and rack and pinion, velocity ratio, simple and compound gear trains (simple numerical problems) **Joining Processes:** Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding, (types of flames), TIG welding.
Module -5
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 Robotics:** Joints & links, Robot anatomy, Applications of Robots in material handling, processing and assembly and inspection.
TEXTBOOKS: 1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2018 2. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media promoters and Publishers Pvt. Ltd., 2013. **REFERENCE BOOKS:** 1. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Fourth Edition. 2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 5th Ed., 2018. 3. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1 **VIDEO LINKS:** 1. https://youtu.be/mCd89QE3t8c?si=mHuVn-BWeVHWvSs6 2. https://youtu.be/H6guqGSzcNc?si=Ra7nfv_6bGqvxFaD

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lectures & Presentations	Deliver core concepts and foundational knowledge. - Utilize multimedia (images, diagrams, and animations, videos) to enhance understanding.
2	Interactive Discussions & Q&A	Encourage active participation and clarification of doubts. Facilitate critical thinking and analysis of concepts through student-led discussions
3	Hands-on Activities	Provide laboratory or simulation-based activities to demonstrate real-world applications of mechanics or machine tools.
4	Case Studies	Present real-world engineering challenges and have students analyze potential solutions.
5	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
6	Project-Based Learning	Encourage research and design thinking through project-based learning activities

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Engineering Science Course(ES)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BEME103.1	**Interpret** the role of Mechanical Engineering in various industries and its impact on society, including emerging trends; **apply** the principles of heat transfer and steam properties to solve basic problems related to steam formation and power generation; and **explain** various energy resources along with the working principles of different power plants.
M25BEME103.2	**Analyze** the working principles and functionalities of various machine tools. Explain the advantages and applications of CNC and 3D printing in modern manufacturing systems.
M25BEME103.3	**Evaluate** the performance of Internal Combustion (IC) engines through basic numerical calculations. Compare and contrast 4-stroke Petrol and Diesel engines. Appraise the principles of refrigeration and air conditioning, including refrigerants and their properties.
M25BEME103.4	**Apply** knowledge of joining process advantages and limitations to select the most suitable method for specific materials and applications and **Analyze** gear types for power transmission.
M25BEME103.5	**Analyze** electric and hybrid vehicles with mobility challenges and **illustrate** robot anatomy and applications.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BEME103.1	3	-	-	-	-	-	-	-	-	-	-
M25BEME103.2	3	-	-	-	-	-	-	-	-	-	-
M25BEME103.3	-	3	-	-	-	-	-	-	-	-	-
M25BEME103.4	3	-	-	-	-	-	-	-	-	-	-
M25BEME103.5	3	-	-	-	-	-	-	-	-	-	-
M25BEME103	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 7**: Affordable and Clean Energy	Focus on clean and renewable energy sources (solar, wind, tidal, hydel) to promote sustainable power generation and reduce environmental impact aligning with SDG 7
2	**SDG 9**: Industry, Innovation and Infrastructure,	Advanced manufacturing processes like CNC and 3D printing promote innovation and precision, strengthen industrial capabilities, and support the development of sustainable and resilient infrastructure, contributing to SDG 9
3	**SDG 12**: Responsible Consumption and Production	Contributes to SDG 12 by promoting technologies such as electric vehicles, robotics, and mechatronics that help use resources wisely, reduce waste, and support cleaner, smarter production systems.

1st/2nd Semester	Engineering Science Course (ESC) Introduction to Civil Engineering	M25BESK104A/204A

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic Science and Mathematics	Knowledge of basic physics (mechanics, forces) and mathematics (algebra, geometry).
2	Environmental Awareness	Basic knowledge of pollution, sanitation, and sustainable issues
3	Engineering Drawing and Visualization	Knowledge of sketches, visualization of shapes, sections and projections of buildings.
4	Logical Reasoning and Spatial Ability	Skill to understand space, balance, and visualize structures and forces.

2. Syllabus

Introduction to Civil Engineering SEMESTER – I/II			
Course Code	**M25BESK104A/204A**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/Sem(L: T: P:TW:SL)	**32:32:0: 0:20 = 84 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. Explore Civil Engineering scope, materials, and building components aligned with Sustainable Development Goals.
2. Apply fundamental concepts of force systems, equilibrium, and free-body diagrams in basic structural analysis.
3. Calculate and locate centroid of simple and built-up sections for structural applications.
4. Calculate moment of inertia of simple and built-up sections for structural applications

Module 1

Introduction: Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering.
Basic Materials of Construction: Bricks, Cement & mortars, Plain, Reinforced Cement Concrete.
General components of the building and Introduction to sustainable development goals.

Module 2

Analysis of concurrent force systems: Concept of idealization, system of forces, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrent force systems, free body diagram, equations of equilibrium, equilibrium of concurrent coplanar force systems

Module 3

Analysis of non-concurrent force systems: Resultant of non-concurrent coplanar force systems, moment of forces, couple, Varignon's theorem, equilibrium of non-concurrent coplanar force systems

Module 4

Centroid: Methods of determining the centroid, locating the centroid of plane laminae from first principles, centroid of built-up sections. Numerical examples

Module 5

Moment of inertia: Method of determining the second moment of area of plane sections from first principles, parallel axis and perpendicular axis theorem, radius of gyration, moment of inertia of built-up sections, Numerical Examples.

TEXTBOOKS:

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, *Basic Civil Engineering and Engineering Mechanics*, 2015,Laxmi Publications.
2. Kolhapure B K, *Elements of Civil Engineering and Engineering Mechanics*, 2014, EBPB

REFERENCE BOOKS:

1. Beer F.P. and Johnston E. R., *Mechanics for Engineers, Statics and Dynamics*, 1987, McGraw

Hill.
2. Irving H. Shames, *Engineering Mechanics*, 2019, Prentice-Hall.
3. Hibbler R. C., *Engineering Mechanics: Principles of Statics and Dynamics*, 2017, Pearson Press.
4. Timoshenko S, Young D. H., Rao J. V., *Engineering Mechanics*, 5th Edition, 2017, Pearson Press.
5. Bhavikatti S S, *Engineering Mechanics*, 2019, New Age International 6. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication

VIDEO LINKS:

1. https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT
2. https://www.youtube.com/watch?v=3YBXteL-qY4
3. https://www.youtube.com/watch?v=atoP5_DeTPE
4. https://www.youtube.com/watch?v=ksmsp9OzAsI
5. https://www.youtube.com/watch?v=x1ef048b3CE
6. https://www.youtube.com/watch?v=l_Nck-X49qc
7. https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force
8. https://www.youtube.com/watch?v=RIBeeW1DSZg
9. https://www.youtube.com/watch?v=R8wKV0UQtlo
10. https://www.youtube.com/watch?v=0RZHHgL8m_A
11. https://www.youtube.com/watch?v=Bls5KnQOWkY

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Interactive Lectures	Use multimedia presentations, models, and physical samples to explain building materials and structural components.
2	Field Visits	Organize visits to construction sites, water treatment plants, and urban infrastructure projects.
3	Group Activities	Facilitate collaborative work on smart city models and environmental impact discussions.
4	Problem Solving Sessions	Introduce conceptual and numerical problem-solving on centroid, force systems, and moment of inertia.
5	ICT Tools and Videos	Use NPTEL lectures, animations and simulations to demonstrate real-time force analysis and building science.
6	Seminars and Presentations	Assign students short presentations on infrastructure, smart cities, and sustainable practices.

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Tem Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks.

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

Cos	Description
M25BESK104A/204A.1	Apply knowledge of Civil Engineering disciplines, materials, structural elements, and infrastructure for sustainable development practices.
M25BESK104A/204A.2	Analyze the resultant and equilibrium of force systems on the rigid bodies.
M25BESK104A/204A.3	Determine and locate the centroid of plane and built-up sections.
M25BESK104A/204A.4	Determine the moment of inertia of plane and built-up sections.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BESK104A.1	3	-	2	-	-	2	3	-	-	-	2
M25BESK104A.2	3	3	2	2	2	-	-	-	-	-	2
M25BESK104A.3	3	3	2	2	-	-	-	-	-	-	2
M25BESK104A.4	3	3	2	2	-	-	-	-	-	-	2
M25BESK104	**3**	**3**	**2**	**2**	**2**	**2**	**3**	-	-	-	**2**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 9**: Industry, Innovation and Infrastructure	Students explore fundamental infrastructure design concepts promoting innovation and resilient development.
2	**SDG 11**: Sustainable Cities and Communities	Incorporates clean city, smart city, and solid waste management topics to improve urban livability.
3	**SDG 13**: Climate Action	Introduces environment-friendly practices in construction and energy-efficient buildings.

1st/2nd Semester	Engineering Science Course (ES) INTRODUCTION TO ELECTRICAL ENGINEERING	M25BESK104B/204B

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic Concepts in physics	Understanding of electric charge, voltage, current, resistance, and power. These concepts form the foundation of electrical engineering.
2	Circuit Elements	Familiarity with fundamental concepts of discrete components such as resistors, capacitors and inductors
3	Mathematics	Proficiency in algebra for solving few mathematical expressions using voltage divider rule, integration and differential equations to calculate the desired voltage, frequency of operation
4	Previous Coursework	Gain a basic understanding of electromagnetic theory, including concepts like magnetic fields, electromagnetic induction, and the relationship between electricity and magnetism.
5	Component symbols	Familiarity with electrical components and their symbols, along with safety precautions, lays a strong groundwork for further learning.

2. Syllabus

INTRODUCTION TO ELECTRICAL ENGINEERING SEMESTER – I/II			
Course Code	**M25BESK104B/204B**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem(L:T: P:TW:SL)	**32:32:0:20:20 = 104Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

- To explain the laws used in the analysis of DC and AC circuits.
- To explain the behavior of circuit elements in single-phase circuits.
- To explain the construction and operation of transformers, DC generators, DC motors and Induction motors. • To introduce concepts of circuit protecting devices and earthing.
- To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.

Module -1: Electrical Energy Sources & DC circuits

Introduction: Sources of Electrical Energy- Hydro, Thermal, Solar, Wind, Single line diagram approach. Brief introduction to the electrical generation using Thermal, Solar, Hydro, Wind (Block diagram approach).

DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel and series – parallel circuits excited by independent voltage sources. Power and energy, Illustrative examples

Module -2: Single phase and Three phase AC circuit

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

Three Phase Circuits:

Generation of Three phase AC quantity, advantages and limitations; star and delta connection, relationship between line and phase quantities.

Module -3: DC Machines

DC Generator: Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple numerical.

DC Motor: Principle of operation, back emf and its significance. Torque equation, types of motors,

characteristics and speed control (armature & field) of DC motors (series & shunt only). Applications of DC motors. Simple numerical.
Module -4: Transformer & Induction Motor
Transformers: Necessity of transformer, principle of operation, Types and construction of single phase transformers, EMF equation, losses, variation of losses with respect to load. Efficiency and simple numerical. **Three-phase induction Motors**: Concept of rotating magnetic field, Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance simple numerical.
Module -5: Domestic Wiring & Electrical Safety
Domestic Wiring: Requirements, Types of wiring: casing, capping. Two way and three way control of load. **Electricity Bill**: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. **Equipment Safety measures**: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. **Personal safety measures**: Electric Shock, Earthing and its types, Safety Precautions to avoid shock
TEXTBOOKS: 1. Fundamentals of Electrical Engineering & Electronics by B L Theraja, S. Chand and Company Pvt. Ltd. Reprint edition, 2013 2. Basic Electrical Engineering D. C. Kulshreshtha McGraw-Hill Education 1st edition, 2019 **REFERENCE BOOKS:** 1. Electrical Technology E Huges Pearson International Students 9th edition 2. Principles of Electrical Engineering & Electronics V K Mehta and Rohit Mehta S. Chand and Company Pvt. Ltd. **VIDEO LINKS:** 1.https://youtu.be/OC8Lbyeyh-E 2.https://youtu.be/5CHufqAF-p0

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of generation of electrical energy.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
5	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
6	Laboratory Learning	Utilize the facilities available in the laboratories to understand the behavior of the materials by performing few experiments.

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Engineering Science Course ES1/ES2

	Components	Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

A = Average of best two Test marks
B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BESK104B.1	**Understand** the concepts of hydel, thermal, solar & wind energy sources and Electric circuits.
M25BESK104B.2	**Apply** Ohm's law and Kirchhoff's laws to solve DC & AC circuits
M25BESK104B.3	**Illustrate** the construction and working principles of DC & AC Machines
M25BESK104B.4	**Describe** the types of wiring, tariff and safety measures in an electrical system.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BESK104B.1	3	3	-	-	-	-	-	-	-	-	-
M25BESK104B.2	3	3	-	-	-	-	-	-	-	-	-
M25BESK104B.3	3	3	-	-	-	-	-	-	-	-	-
M25BESK104B.4	-	-	-	-	-	3	-	-	-	-	-
M25BESK104B	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	SDG 7: Affordable and Clean Energy	Electrical engineers are crucial in designing, installing, and maintaining systems for solar, wind, hydro, and geothermal power. This involves understanding circuits, power electronics, energy conversion, and grid integration.
2	SDG 9: Industry, Innovation, and Infrastructure	Applying basic electrical engineering principles leads to the development of energy-efficient industrial processes, automation, and control systems that reduce resource consumption and waste.
3	SDG 11: Sustainable Cities and Communities	Smart Cities: The development of smart cities heavily relies on electrical engineering for smart infrastructure, energy conservation, efficient waste management, and sustainable urban living. Sustainable Transportation: Electrical engineers are vital in the design and development of electric vehicles (EVs) and their charging infrastructure, reducing reliance on fossil fuels and improving air quality in urban areas.

1st/2nd Semester	Engineering Science Course - (ESC) INTRODUCTION TO ELECTRONICS AND COMMUNICATION	M25BESK104C/204C

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic knowledge on Physics	A fundamental understanding of physics concepts such as electricity, circuits, and waves.
2	Basic knowledge on Mathematics	A fundamental understanding of mathematics such as algebra, basic calculus and logarithms functions.
3	Semiconductor Fundamentals	Basic concepts of conductors, insulators, and semiconductors. Understanding of charge carriers, p-n junctions, and diode/transistor behavior.
4	Basic Electronics	Familiarity with basic electronic components like resistors, capacitors, inductors, and semiconductors is necessary.
5	Basic circuit analysis	Proficiency in circuit theory is important. This includes understanding concepts such as voltage, current as well as basic circuit analysis techniques like Ohm's Law, is fundamental.

2. Syllabus

INTRODUCTION TO ELECTRONICS AND COMMUNICATION SEMESTER – I/II			
Course Code	**M25BESK104C/204C**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem(L:T: P:TW:SL)	**32:32:0:20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering.
2. To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems.
3. Professionalism & Learning Environment: To inculcate in first-year engineering students an ethical and professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context, and life-long learning needed for a successful professional career.

Module -1

Power Supplies –Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers.

Amplifiers – Transistors and its applications, DC Load line, Types of amplifiers, Gain, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback, Transistor Amplifier (Text 1)

Module -2

Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Multi vibrators, Single-stage as table oscillator, (Only Concepts, working, and waveforms. No mathematical derivations)

Operational amplifiers -Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits.(Text 1)

Module -3

Boolean Algebra and Logic Circuits: Number Base Conversion, Complements, Binary subtraction using 1's and 2's complement method, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Digital Logic Gates (Basic and Universal Gates).

Combinational logic: Introduction, Design procedure, Adders- Half adder and Subtractor, Full adder and Subtractor (Text 2)

Module -4
Embedded Systems – Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Microprocessor vs Microcontroller, RISC vs CISC, Harvard and Von-Neumann architecture. **Sensors and Interfacing** – Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display. (Text 3)
Module -5
Analog Communication Schemes – Modern communication system - Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM , FM, PM. Concept of Radio wave propagation (Ground, space, sky) **Digital Modulation Schemes:** Advantages of digital communication over analog communication, ASK, FSK, PSK, Multiple access techniques. (Text 4)
Text Books 1. Mike Tooley, 'Electronic Circuits, Fundamentals & Applications',4thEdition, Elsevier, 2015. DOI https://doi.org/10.4324/9781315737980. eBook ISBN9781315737980 2. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203- 0417-84. 3. K V Shibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India), Private Limited, 2016 4. S L Kakani and Priyanka Punglia, 'Communication Systems', New Age International Publisher, 2017. **Reference Book** 1. Alberto Malvino, David J. Bates 7th edition**,** McGraw Hill Education (India), Private Limited, 2017

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of electronics components.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M23BESK104C/204C.1	**Present** the comprehensive knowledge of electronic circuits encompassing power supplies, amplifiers, operational amplifiers, oscillators, boolean algebra and logic circuits.
M23BESK104C/204C.2	**Apply** the basic concepts of electronics engineering required for comprehending the operation and application of electronic circuits encompassing power supplies, amplifiers, operational amplifiers, oscillators, boolean algebra and logic circuits.
M23BESK104C/204C.3	**Apply** the knowledge of digital electronics concepts to realize the combinational logic circuits.
M23BESK104C/204C.4	**Illustrate** the role of sensor and actuator in embedded system and study the various modulation and demodulation techniques of analog and digital communication systems.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M23BESK104C/204C.1	3	-	-	-	-	-	-	-	-	2	-
M23BESK104C/204C.2	3	3	-	-	-	-	-	-	-	2	-
M23BESK104C/204C.3	3	3	-	-	-	-	-	-	-	-	-
M23BESK104C/204C.4	3	2	-	-	-	-	-	-	2	-	-
M23BESK104C/204C	**3**	**2.66**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 4**: Quality Education	Learning advanced electronics builds foundational engineering skills.
2	**SDG 9**: Industry, Innovation and Infrastructure	Embedded systems, communication technologies, amplifiers, digital logic.
3	**SDG 11**: Sustainable Cities and Communities	Sensors, automation, embedded applications in smart cities

1st/2nd Semester	Engineering Science Course -1 (ES-1) INTRODUCTION TO MECHANICAL ENGINEERING	M25BESK104D /204D

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic understanding of engineering disciplines	Familiarity with different engineering fields and their societal Impact.
2	Basic mathematical and physical science knowledge	Foundational understanding of mathematics and physics concepts such as force, energy, and material behaviour relevant to mechanical systems.
3	Analytical thinking skills	Ability to break down problems, identifies key elements, and solves them logically.
4	Visualization skills	Ability to interpret diagrams, schematics, and 3D models relevant to mechanical systems.

2. Syllabus

INTRODUCTION TO MECHANICAL ENGINEERING SEMESTER – I/II			
Course Code	**M25BESK104D/204D**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**32:32:0:20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

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.

Module -1

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.

Energy: Introduction and applications of Energy sources like Nuclear fuels, Hydel, Solar (Solar Pond), wind, and Environmental issues like Global warming and Ozone depletion.

Module -2

Machine Tool Operations: Working Principle of lathe, **Lathe operations:** Turning, Facing, Knurling.
Working principles of Drilling Machine, **Drilling operations:** Drilling, Boring, and Reaming.
Working principles of Milling Machine, **Milling operations:** Plane milling, End Milling and Slot milling.
(No sketches of machine tools, sketches to be used only for explaining the operations).

Automation in industry: Definition, types – Fixed, programmable and flexible automation, basic elements with block diagrams, advantages.

Module -3

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.

Module -4

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.
Module -5
Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Classification based on robotics configuration: polar cylindrical, Cartesian coordinate and spherical. Application, Advantages and disadvantages. **Introduction to Advanced Manufacturing Systems**: Introduction, components of CNC, advantages and applications of CNC, 3D printing.
TEXTBOOKS: 1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2018 2. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media promoters and Publishers Pvt. Ltd., 2013. **REFERENCE BOOKS:** 1. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Fourth Edition. 2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 5th Ed., 2018. 3. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1 **VIDEO LINKS:** 1. https://youtu.be/mCd89QE3t8c?si=mHuVn-BWeVHWvSs6 2. https://youtu.be/H6guqGSzcNc?si=Ra7nfv_6bGqvxFaD

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lectures & Presentations	Deliver core concepts and foundational knowledge. - Utilize multimedia (images, diagrams, and animations, videos) to enhance understanding.
2	Interactive Discussions & Q&A	Encourage active participation and clarification of doubts. Facilitate critical thinking and analysis of concepts through student-led discussions
3	Hands-on Activities	Provide laboratory or simulation-based activities to demonstrate real-world applications of mechanics or machine tools.
4	Case Studies	Present real-world engineering challenges and have students analyze potential solutions.
5	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
6	Project-Based Learning	Encourage research and design thinking through project-based learning activities

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Professional Course (ES-1)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component.
The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BESK104D/204D.1	**Interpret** the role of mechanical engineering in various industrial sectors**;** **Illustrate** the working principles and applications of energy sources and environmental impact, including issues such as global warming and ozone depletion.
M25BESK104D/204D.2	**Analyze** the working principles and functionalities of various machine tools. **Classify** industrial automation systems into fixed, programmable, and flexible types based on control strategy and adaptability.
M25BESK104D/204D.3	**Evaluate** the construction and working of Internal Combustion (IC) engines with respect to energy conversion processes; and **analyse** the working principles and challenges of electric and hybrid vehicles in future mobility.
M25BESK104D/204D.4	**Utilize** material properties to select appropriate engineering materials for mechanical applications, and **Interpret** the working principles and applications of metal joining processes such as welding, brazing, and soldering.
M25BESK104D/204D.5	**Analyze** the integration of mechanical, electrical, electronic, and computing subsystems in mechatronic systems, and **Illustrate** the configurations and applications of robotic systems and advanced manufacturing technologies such as CNC and 3D printing.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BESK104D/204D.1	3	-	-	-	-	-	-	-	-	-	-
M25BESK104D/204D.2	3	-	-	-	-	-	-	-	-	-	-
M25BESK104D/204D.3	-	3	-	-	-	-	-	-	-	-	-
M25BESK104D/204D.4	3	-	-	-	-	-	-	-	-	-	-
M25BESK104D/204D.5	3	-	-	-	-	-	-	-	-	-	-
M25BESK104D/204D	**3**	**3**	-	-	-	-	-	-	-	-	-

8. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 7**: Affordable and Clean Energy	The introduction and applications of renewable energy sources (solar, wind) and emerging technologies like electric and hybrid vehicles promote clean, sustainable, and affordable energy solutions, reducing dependence on fossil fuels and mitigating environmental issues.
2	**SDG 9**: Industry, Innovation and Infrastructure,	CNC, 3D printing, robotics, and automation drive innovation, enhancing productivity, precision, and sustainability in industries.
3	**SDG 12**: Responsible Consumption and Production	Efficient manufacturing, advanced materials, and responsible practices help minimize waste, promote recycling, and support sustainable consumption.

1st/ 2nd Semester	Engineering Science Course (ESC) Introduction to C Programming	M25BESK104E/204E

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	**Basic computer Skills**	Understanding how to use a computer, Functionality of Computer and perform basic Programming.
2	**Logical Thinking**	Ability to think logically and analytically, which is crucial for understanding algorithms and problem-solving in programming.
3	**Understanding of Algorithms**	Understanding the logic behind different algorithms (e.g., sorting, searching) can improve the efficiency of the code and its role in solving problems efficiently.
4	**Basic Modular Arithmetic**	Basic Number Theory: Understanding of integers, Datatypes. Algebra: Proficiency in algebraic manipulations and understanding of congruence relations.
5	**Problem-Solving Skills**	Ability to break down complex problems into smaller, manageable parts and develop step-by-step solutions

2. Syllabus

Introduction to C Programming **SEMESTER – I/II**			
Course Code	**M25BESK104E/204E**	CIE Marks	**50**
Number of Lecture Hours/Week (L:T: P: S:TW:SL)	**32:32:0:0:20:0=84Hrs**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. Understand basic programming concepts.
2. Provide knowledge for problem solving through programming.
3. Illustrate solutions to the given problem using C

Module -1

Introduction: Introduction to computers, Algorithms, flowcharts, pseudo codes, structure of a C program, writing the first C program, keywords, identifiers, basic data types, variables, constants, input / output statements, operators and expressions, type conversion and typecasting. Compilers, Compiling and executing C programs.

Module -2

Branching Statements: Conditional Branching

Control Statements: if, if-else, if-else-if, switch case.

Looping Statements: for, while, do-while statements, nested loops, break and continue statements.

Module -3

Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, operations on arrays – searching for a value in an array (Linear search, Binary search) and sorting the elements in an array (Bubblesort, Selection sort), two dimensional arrays and operations**.**

Module -4

Functions: Introduction, declaration/prototype, definition, function call, return statement, passing parameters to functions, storage classes, recursion. Strings: Introduction–reading and writing strings, string operations, miscellaneous string and character functions.

Preprocessor Directives: Introduction, Types of Preprocessor Directives, #define, #include, #undef.

Module -5

Structures: Introduction to structures, nested structures, arrays of structures, structures and functions.

File Processing: Introduction to Files, Using Files in C, Reading Data from Files(fscanf(), fgets(),fgetc()) , and Writing data to Files(fprintf(), fputs(),fputc()).

Textbooks:

1.Reema Thareja, Computer Fundamentals and Programming in C, 2nd edition, Oxford University Press, 2016.

Reference Books:

1. Brian Kernighan and Dennis Ritchie, The C Programming Language, 2nd edition, Prentice Hall, 2012.
2.Yashavant P. Kanetkar, Let Us C, 16th edition, BPB Publications, 2017.

VIDEO LINK:

https://onlinecourses.nptel.ac.in/noc22_cs40/preview

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of Programming concepts.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Higher Order Thinking (HOTS) Questions:	Pose HOTS questions to stimulate critical thinking related to each competency.
5	Problem-Based Learning (PBL)	Implement PBL to enhance analytical skills and practical application of competencies
6	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
7	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

Components		Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	2	50%	25
2	Assignments/Quiz/Activity (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Assignments/Quiz/Activity marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component. The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

Cos	Description
M25BESK104E/204E.1	Understanding the basic concepts of programming in C
M25BESK104E/204E.2	Apply concepts of procedure-oriented programming to solve a given problem
M25BESK104E/204E.3	Analyze the given code segment for syntactic and logical errors
M25BESK104E/204E.4	Design and develop modularized solution for given requirements

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BESK104E/204E.1	3	-	-	-	-	-	-	-	-	-	-
M25BESK104E/204E.2	3	-	-	-	-	-	-	-	-	-	-
M25BESK104E/204E.3	-	3	-	-	-	-	-	-	-	-	-
M25BESK104E/204E.4	-	-	3	-	-	-	-	-	-	-	-
M25BESK104E/204E	**3**	**3**	**3**	-	-	-	-	-	-	-	-

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 4**: Quality Education	The course builds critical computational and analytical thinking skills, empowering students with lifelong learning tools in computer science. Promotes technical education and employability
2	**SDG 8**: Decent Work and Economic Growth	By equipping students with key programming and problem-solving skills, the course enhances career opportunities in IT and software sectors, contributing to economic growth.
3	**SDG 9**: Industry, Innovation and Infrastructure	Programming using C form the backbone of modern technology and software infrastructure. The course fosters innovation and prepares students for building efficient, scalable digital systems

1st/2nd Semester	Programming Language Course(PL) INTRODUCTION TO WEB	M25BPLK105A/205A

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic Programming Concepts:	Understanding core programming concepts like variables, loops, and conditional statements will make learning JavaScript and other languages easier.
2	Web Servers and Hosting:	Having a basic understanding of how websites are hosted and served on the internet is beneficial.
3	Problem-Solving and Logical Thinking	Ability to analyze problems and apply logical steps to solve them and Familiarity with algorithmic thinking.
4	Understanding of Markup Language	Basic understanding of what HTML and CSS
5	Developer Tools	Familiarize yourself with browser developer tools, which are essential for debugging and testing web pages.

2. Syllabus

INTRODUCTION TO WEB SEMESTER – I/II			
Course Code	**M25BPLK105A/205A**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**32:32:0:20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1.To use the syntax and semantics of HTML and XHTML
2.To develop different parts of a web page
3.To understand how CSS can enhance the design of a webpage.
4.To create and apply CSS styling to a webpage
5.To get familiarity with the JavaScript language and understand Document Object Model handling of Java Script

Module -1

HTML: Understanding elements, physical style elements, DIV and SPAN elements, exploring hyperlink and URLs, Table elements, Images in web page, input element, button, multi choice, submitting forms

Textbook1: Ch. 2.1, 3.1,3.2,4.1,5.1.1, 5.1.2,6.1,7.1.1, 8.1.1,8.1.2, 8.1.10, 7.2 **8 Hours**

Module -2

CSS: Syntax of CSS, CSS selectors, CSS in HTML doc, Color property, image property, size property, background property, font family, font size property, font style property, font variant property, font weight property, font property, CSS to text, box model, template layout model, display of an element using CSS, positioning an element, floating element.

Textbook 1:8.1.2, 18.1.3, 18.1.4, 19.1.1, 19.1.2, 19.1.8, 19.1.11,20.1.1, 20.1.2, 20.1.5-20.1.8, 20.3, 21.1,21.3,22.1-22.3,25.1 **8 Hours**

Module -3

Table Elements, Formatting a Data Table: Borders, Alignment, and Padding, CSS Structural Pseudoclass Selectors, thead and tbody Elements, Cell Spanning, Web Accessibility, CSS display Property with Table Values, a 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 .

Textbook 2 : 5.2 to 5.8, 6.2, 6.3, 6.6., 6.7, 6.9, 6.10, 6.12, 7.2 to 7.4 **8 Hours**

Module -4

XML: Working with basics of XML, XML namespaces, XML schema:simple type, data types, DOM parser, XSLT processor, JAXP, XPath language, XLink language, XPointer languag, XML encoding.

Textbook1: 28.1-28.7, 29.1,29.2.1,29.2.3, 30.1,30.3,30.4, 32.1-32.3,29.4,29.5 **8 Hours**

Module -5

Introduction to JavaScript: Functions, DOM, Forms, and Event Handlers History of JavaScript, Hello World Web Page, Buttons, Functions, Variables, Identifiers, Assignment Statements and Objects, Document Object Model, Client-Side Versus Server-Side, form Element, Controls, Text Control, accessing a Form's Control Values, reset and focus Methods **TextBook2: 8.2 to 8,13, 8.15, 8.16** **8 Hours**
TEXTBOOKS: **1.** Dreamtech Press India Pvt. Ltd HTML 5 Black Book, Covers CSS 3, JavaScript, XML, XHTML, AJAX, PHP and jQuery, Second Edition,2019 **2.** John Dean, Jones & Bartlett Learning, WEB PROGRAMMING with HTML5, CSS and JavaScript, First Edition,2018 **REFERENCE BOOKS:** 1. S Rattan, Strength of Materials, Second Edition, McGraw Hill, 2011. 2. Ferdinand Beer and Russell Johnston, Mechanics of materials, Tata McGraw Hill, 2003. **VIDEO LINKS:** 1.https://onlinecourses.swayam2.ac.in/aic20_sp11/preview

3.Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Learning Objectives	Understand the basic concepts of the internet and the World Wide Web. Differentiate between websites, web pages, web servers, and web browsers. Introduce HTML, CSS, and basic client-server architecture. Understand how data travels on the internet using protocols like HTTP/HTTPS and Develop a simple static web page.
2	Learning Resources	Basic Web Technology or Web Development books. **Online Tutorials**: W3Schools, MDN Web Docs. **Software Tools**: Text Editor (VS Code, Notepad++), Browsers (Chrome, Firefox).**Hardware Requirements**: Computer Lab with internet access
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world Competencies.
5	Outcomes	Create and host a basic webpage. Demonstrate understanding of web browser and server interaction.

4.Assessment Details (both CIE and SEE)

CIE Split up for Professional Elective Course (PE)

Components		Number	Weightage	Max. Marks
(i)	Internal Assessment Tests (A)	3	50%	25
(ii)	Term Work (B)	2	50%	25
Total				50

Final CIE Marks = (A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component. The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs Course Outcomes (COs)

COs	Description
M25BPLK105A/205A.1	Apply the knowledge of fundamental concepts of HTML, XHTML, CSS and JavaScript
M25BPLK105A/205A.2	Identify complex engineering problems and providing suitable solutions using HTML5 and JavaScript
M25BPLK105A/205A.3	Analyze various attributes, values and types of CSS to design Web components.
M25BPLK105A/205A.4	Investigate the core constructs and event handling mechanisms of JavaScript and CSS for Providing valid solutions.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BPLK105A/205A.1	3	-	-	-	-	-	-	-	-	-	-
M25BPLK105A/205A.2	-	3	-	-	-	-	-	-	-	-	-
M25BPLK105A/205A.3	-	-	3		-	-	-	-	-	-	-
M25BPLK105A/205A.4	-	-	-	3	-	-	-	-	-	-	-
M25BPLK105A/205A	**3**	**3**	**3**	**3**	-	-	-	-	-	-	-

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 4**: Quality Education	Provides learners with essential digital and technical skills such as HTML, CSS, JavaScript—empowering them in a technology-driven world.
2	**SDG 9**: Industry, Innovation, and Infrastructure	Equips students to build digital platforms that can support modern services, innovation, and IT infrastructure development
3	**SDG 10**: Reduced Inequalities,	Web technologies allow marginalized groups to access opportunities and information, bridging digital and social gaps

1st/2nd Semester	Programming Language Courses - I(PLC) Introduction to Python Programming	M25BPLCK105B/205B

1. Prerequisites (Minimum 4 Pre-requisites)

Sl. No.	Proficiency	Pre-requisites
1	Basic Computer Skills	Understanding how to use files, folders, and applications. Familiarity with installing and using software
2	Logical Thinking and Problem Solving	Ability to break problems into steps. Familiarity with if/then logic or flowcharts is a bonus.
3	Basic Math Skills	Comfort with simple arithmetic (addition, subtraction, multiplication, division).Basic understanding of variables and equations
4	Typing Skills	Not required, but being comfortable with a keyboard will improve your coding speed and reduce frustration.

2. Syllabus

Introduction to Python Programming **SEMESTER – I/II**			
Course Code	**M25BPLCK105B/205B**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/ sem (L:T: P:TW:SL)	**32:0:32:16:20 = 100 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. Learn the syntax and semantics of the Python programming language.
2. Illustrate the process of structuring the data using lists, tuples .
3. Appraise the need for working with various documents like Excel, PDF, Word and Others.
4. Demonstrate the use of built-in functions to navigate the file system.
5. Implement the Object Oriented Programming concepts in Python.

Module -1

Python Basics: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program, Flow control: Boolean Values, Comparison Operators, Boolean Operators, Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules, Ending a Program Early with sys.exit(), Functions: def Statements with Parameters, Return Values and return Statements, The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number **Textbook 1: Chapters 1 – 3**

Module -2

Lists: The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References**, Dictionaries and Structuring Data:** The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things, **Textbook 1: Chapters 4 – 5**

Module -3

Manipulating Strings: Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup **Reading and Writing Files:** Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module, Saving Variables with the print.format() Function **Textbook 1: Chapters 6 , 8**

Module -4

Organizing Files: The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module, Project: Backing Up a Folder into a ZIP File, **Debugging:** Raising Exceptions, Getting the Traceback as a String, Assertions, Logging**. Textbook 1: Chapters 9-10**.

Module -5

Classes and objects: Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying **Classes and functions:** Time, Pure functions, Modifiers, Prototyping versus planning **Classes and methods:** Object-oriented features, Printing objects, Another example, A more complicated example, The __init__ method, The __str__ method, Operator overloading, Type-based dispatch, Polymorphism **Textbook 2: Chapters 15 – 17**
Text Books 1. Al Sweigart, "Automate the Boring Stuff with Python",1stEdition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at https://automatetheboringstuff.com/) (Chapters 1 to 18, except 12) for lambda functions use this link: https://www.learnbyexample.org/python-lambda-function/ 2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at http://greenteapress.com/thinkpython2/thinkpython2.pdf (Chapters 13, 15, 16, 17, 18) (Download pdf/html files from the above link)

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Hands-on Coding	Python is best learned by doing. Provide plenty of opportunities for students to write code, debug, and experiment with Python programs. Use coding exercises, projects, and challenges to reinforce learning
2	Interactive Learning	Use interactive Python environments like Jupyter Notebooks, REPL (ReadEval-Print Loop), or IDEs (Integrated Development Environments) such as PyCharm or Visual Studio Code. These tools allow students to see immediate results and interactively explore concepts.
3	Real-world Examples	Relate Python concepts to real-world applications and examples that resonate with students' interests or future career paths. For example, show how Python is used in data analysis, web development, or artificial intelligence.
4	Peer Learning and Collaboration	Encourage students to work together on coding projects or problem-solving tasks. Peer learning can enhance understanding as students explain concepts to each other and learn from different approaches.
5	Project-Based Learning	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
6	Incremental Complexity	Start with simple Python concepts and gradually increase the complexity of topics as students gain proficiency. This approach helps build a strong foundation and prevents overwhelming students with advanced topics too soon.
7	Laboratory Learning	Utilize the facilities available in the laboratories to understand the behavior of the materials by performing few experiments.

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

Components		Number	Weightage	Max. Marks
1	Internal Assessment - Tests (A)	3	50%	25
2	Laboratory	1	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Assignments/Quiz/Activity marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component. The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20 marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have a mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BPLCK105B/205B.1	Apply the fundamentals of Python programming to solve complex problems.
M25BPLCK105B/205B.2	Analyse different data structures, concepts of string manipulation used in python programming
M25BPLCK105B/205B.3	Interpret the concepts of object oriented programming using Python
M25BPLCK105B/205B.4	Develop Solutions to the real world problems using python and justify through formal reasoning with complete experimental documentation.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BPLCK105B/205B.1	3	-	-	-	-	-	-	-	-	-	-
M25BPLCK105B/205B.2	-	3	-	-	-	-	-	-	-	-	-
M25BPLCK105B/205B.3	-	-	2	-	-	-	-	-	-	-	-
M25BPLCK105B/205B.4	-	-	-	3	2	-	-	-	-	-	-
M25BPLCK105B/205B	**3**	**3**	**2**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**

6. Mapping to Sustainable Development Goals (SDG):

Note: Minimum 3 SDG's to be mapped with each course

Sl. No.	SDG	Justification
1	**SDG 4:** Quality Education	Python is free, beginner-friendly, and widely used in digital education platforms and coding literacy campaigns.
2	**SDG 8:** Decent Work and Economic Growth	Python helps in workforce analytics, automation, and developing digital skills that boost employability.
3	**SDG 9:** Industry, Innovation, and Infrastructure	Python drives innovations in AI, IoT, and automation in industries, enhancing infrastructure management.

1st/2nd Semester	Professional Course (PC) Basics of Java	M25BPLK105C/205C

1. Prerequisites (Minimum 4 Pre-requisites)

Sl. No.	Proficiency	Pre-requisites
1	**Understanding of Programming Fundamentals**	Understanding the basic programming knowledge that helps to know Variables and Data Types, Control Structures (if, else, loops),Functions or Methods and Basic Syntax of any programming language (like C, Python, etc.)
2	**Knowledge of OOP Concepts**	Ability to use code or text editors (e.g., Notepad++, Sublime Text, VS Code)
3	**Problem-Solving and Logical Thinking**	Ability to analyze problems and apply logical steps to solve them and Familiarity with algorithmic thinking.
4	**Object-Oriented Programming (OOP) language**	Understanding OOP is essential for learning Java, as Java is **fully object-oriented**
5	**IDE and Java Installation**	Ensuring JDK (Java Development Kit) is installed. An IDE (like Eclipse, IntelliJ IDEA, or NetBeans) or a simple code editor (like VS Code) is ready.

2. Syllabus

Basics of Java **SEMESTER – I/II**			
Course Code	**M25BPLK105C/205C**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**32:32:0:16:20 = 100 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. Apply basic concepts of java to solve real time problems.
2. Apply the object-oriented concepts of java and exception handling concepts to implement java programs.
3. Analyze I/O and String handling concept to develop an application program.
4. Analyze and develop computer programs to solve real world problems in Java.

Module -1

An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays.

Module -2

Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses, Control Statements: Java‟s Selection Statements, Iteration Statements, Jump Statements.

Module -3

Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited, Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Using Abstract Classes, Using final with Inheritance.

Module -4

Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, 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 Exceptions.
Module -5
Enumerations, Type Wrappers, I/O, Applets, and Other Topics: I/O Basics, Reading Console Input, Writing Console Output, The Print Writer Class, Reading and Writing Files, Applet Fundamentals, The transient and volatile Modifiers, Using instance of, Invoking Overloaded Constructors Through this( ), **String Handling**: The String Constructors, String Length, Special String Operations, Character Extraction, String Comparison, Searching Strings, Modifying a String, Data Conversion Using value Of( ), Changing the Case of Characters Within a String ,String Buffer, String Builder.
TEXTBOOKS: 1. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007. (Chapters 2, 3, 4, 5, 6,7, 8, 9,10, 12,13,15) Edition **REFERENCE BOOKS:** 1.Cay S Horstmann, "Core Java - Vol. 1 Fundamentals", Pearson Education, 10th Edition, 2016. 2.Raoul-Gabriel Urma, Mario Fusco, Alan Mycroft, "Java 8 in Action", Dreamtech Press/Manning Press, 1st Edition, 2014.. **VIDEO LINKS:** 1. https://onlinecourses.nptel.ac.in/noc22_cs47/preview

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Understand Java Fundamentals	Learn about the history, features, and uses of Java. Understand how Java works (JVM, JRE, JDK).
2	Set Up Java Development Environment	Install and configure Java Development Kit (JDK).Use IDEs like Eclipse, IntelliJ, or simple editors like VS C
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment - Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component. The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20 marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have a mix of topics under that module if necessary.

3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BPLK105C/205C.1	Apply basic concepts of java to solve real time problems.
M25BPLK105C/205C.2	Apply the object-oriented concepts of java and exception handling concepts to implement java programs.
M25BPLK105C/205C.3	Analyze I/O and String handling concepts to develop an application program.
M25BPLK105C/205C.4	Analyze and develop computer programs to solve real world problems in Java.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BPLK105C/205C.1	3	-	-	-	-	-	-	-	-	-	-
M25BPLK105C/205C.2	-	3	-	-	-	-	-	-	-	-	-
M25BPLK105C/205C.3	-	-	3		-	-	-	-	-	-	-
M25BPLK105C/205C.4	-	-	-	3	-	-	-	-	-	-	-
M25BPLK105C/205C	**3**	**3**	3	3	-	-	-	-	-	-	-

6. Mapping to Sustainable Development Goals (SDG):

Note: Minimum 3 SDG's to be mapped with each course

Sl. No.	SDG	Justification
1	**SDG 4**: Quality Education	Promotes digital literacy and computational thinking, providing foundational programming skills accessible to all learners.
2	**SDG 9**: Industry, Innovation and Infrastructure	Innovation by enabling learners to develop applications and solutions using Java, contributing to the digital economy.
3	**SDG 10**: Reduced Inequalities	Offers opportunities for students from diverse backgrounds to access high-demand skills, bridging the digital divide

1st/2nd Semester	Programming Language Courses Introduction to C++ Programming	M25BPLK105D/205D

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic Computer Skills	Familiarity with different Operating Systems and basic knowledge of command-line usage is very necessary.
2	Problem-Solving Skills	Knowledge of Algorithmic thinking and Logical thinking is needed.
3	Basics of C Programming	A fundamental understanding of C is essential for object-oriented programming. This includes syntax, data types, variables, control structures, functions, and pointers
4	Mathematics	Proficiency in Mathematics requires the roots of the quadratic equation, Trigonometric Functions etc.

2. Syllabus

INTRODUCTION TO C++ PROGRAMMING SEMESTER I /II			
Course Code	**M25BPLK105D/205D**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/ Sem (L:T: P:TW: SL)	**32:32:0: 20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. Understanding about object-oriented programming and gaining knowledge about the capability to store information together in an object.
2. Understand the capability of a class to rely upon another class and its functions.
3. Understand about constructors, which are a special type of function.
4. Inculcate the generic programming features of C++, including Exception handling

Module -1

Principles of Object-Oriented Programming: OOP Paradigm, Basic concepts of OOP, Applications of OOP, Beginning with C++: What is C++? Applications of C++, A simple C++ program, Structure of C++ Program. Tokens: Introduction, tokens, Keywords, Identifiers and Constants, Declaration of variables, Dynamic Initialization of variables, Reference variables, Operators, Operator precedence.

Module -2

Basic data types, User-defined data types, Storage classes, Derived data Types, Scope resolution operator, memory management operators, Type cast Operators, Expressions and their types, Operator overloading, Control Structures: if statement, if-else statement, switch statement, Loop: while, do while, for, Jump Statements: break, return, go to.

Module -3

Classes and Objects: Introduction, specifying a class, defining member functions, Nesting of member functions, Inline functions, default arguments, Function Overloading, Constructors and Destructors : Constructors, Parameterized constructors, Multiple Constructors in a class, Constructors with default arguments, Dynamic initialization of Objects, copy constructor, const object, Destructors.

Module -4

Operator Overloading: Introduction, defining operator overloading, overloading unary and binary operators, Type Conversions Inheritance: Defining Derived classes, Types of Inheritance- Single inheritance, Multilevel inheritance, Multiple inheritance, Hierarchical inheritance, Hybrid Inheritance, Abstract classes, constructors in derived class, Member classes..

Module -5

Polymorphism: Introduction, Virtual functions, virtual constructor and destructors. Exception Handling: Basics of Exception Handling, Exception Handling Mechanism, Throwing Mechanism, Catching Mechanism, Rethrowing an Exception, Specifying Exceptions, Exception in Operator overloaded functions.

TEXTBOOKS:

1. Balagurusamy E, Object Oriented Programming with C++, Tata McGraw Hill Education Pvt. Ltd., Sixth Edition 2016.

REFERENCE BOOKS:

1. Herbert Schildt, The Complete Reference C++, 4th edition, TMH, 2005
2. D.S Guru, Object- Oriented Programming with C++.

VIDEO LINKS:

1. Basics of C++ - https://www.youtube.com/watch?v=BClS40yzssA
2. Functions of C++ - https://www.youtube.com/watch?v=p8ehAjZWjPw

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Collaborative Learning	Encourage collaborative learning for improved competency application.
3	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
4	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
5	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

Components		Number	Weightage	Max. Marks
1	Internal Assessment - Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component. The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions for 100 marks. Each question is set for 20 marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have a mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BPLK105D/205D.1	Understand and apply the basic C++ programming constructs.
M25BPLK105D/205D.2	Apply the structure of classes and methods in a C++ programming environment.
M25BPLK105D/205D.3	Illustrate inheritance concepts and operator overloading with suitable C++ programs.
M25BPLK105D/205D.4	Demonstrate the concept of polymorphism and exception handling.

CO-PO-PSO Mapping

COs/POs	PO 1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BPLK105D/205D.1	3	-	-	-	-	-	-	-	-	-	-
M25BPLK105D/205D.2	3	-	-	-	-	-	-	-	-	-	-
M25BPLK105D/205D.3	3	-	-	-	-	-	-	-	-	-	-
M25BPLK105D/205D.4	3	-	-	-	-	-	-	-	-	-	-
M25BPLK105D/205D	**3**	-	-	-	-	-	-	-	-	-	-

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 4**: Quality education	C++ is used to develop educational software, simulations, and tools that can enhance learning experiences and provide access to quality education
2	**SDG 9**: Industry, Innovation and Infrastructure,	C++ is a foundational language for various industries, including game development, robotics, and high-performance computing, all of which are relevant to building resilient infrastructure and fostering innovation.
3	**SDG 13**: Climate action	C++ is used in scientific computing, including climate modelling and simulations, which are crucial for understanding and addressing climate change.

1st/2nd Semester	Engineering Science Laboratory BASIC WORKSHOP	M25EMEL106/206

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Engineering Drawing Basics	Ability to read and interpret simple technical drawings and dimensions.
2	Measurement Tools Knowledge	Familiarity with using scale, Vernier-calipers, micro-meters, etc.
3	Workshop Safety Practices	Understanding of safety rules, hazard awareness, and use of PPE (gloves, goggles, etc.).
4	Basic Hand Tools and Machines	Awareness of common workshop tools like files, hammers, drills, lathes, etc.
5	Material Knowledge	Basic idea of different materials (metals, wood, plastic) and their properties.

2. Syllabus

BASIC WORKSHOP

SEMESTER – I/II

Course Code	**M25EMEL106/206**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem(L:T: P:TW:SL)	**0:32:0:0:0 = 32 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**01**	Exam Hours	**03**

Course Objectives:

1. To identify tools, work material and measuring instruments useful for fitting, welding, carpentry and plumbing practice.
2. To handle tools and instruments and use them to prepare joints of specific shape and size.

Practice sessions:

Identification of tools and equipment's for bench work-practice, safety practice and general guidelines.

Fitting Practice:

Demonstration on use of Hand Tools: V-block, Marking Gauge, Files, Hack Saw, Drills, Taps. Minimum 2 models involving Triangular joint and Semicircular joint.

Welding Practice:

Study of electric arc welding tools & equipment's, Minimum 2 models Butt Joint, Lap Joint, T joint & L-joint.

Sheet Metal Work:

Development & Soldering of the models: Hexagon Prism, Truncated Square Pyramid, Funnel.

Plumbing practice:

PVC pipes threading by gluing and cementing

Text Books:

1. Elements of Mechanical Engineering – Hajra Choudhury& others, Media Promoters 2010.
2. The Elements of Workshop Technology - Vol I & II, S.K. Hajra Choudhury, A.K. Hajra Choudhury, Nirjhar Roy, 11th edition 2001 others, Media Promoters and Publishers, Mumbai.

Reference:

1. Workshop manual prepared by Department of Mechanical Engineering

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Explaining theory, safety norms, and demonstrates processes like fitting, welding.
2	Hands-on Practice	Students perform operations themselves under supervision (e.g., filing, sawing, welding joints)
3	Safety Drills & Mock Practice	Practice emergency procedures and correct handling of tools.

1. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

	Components	Weightage	Max. Marks
1	Fitting Model OR Sheet Metal	25%	25
2	Welding Model OR Plumbing	15%	15
3	Viva	10%	10
Total			50

Semester End Examination:

	Components	Weightage	Max. Marks
1	Fitting Model OR Sheet metal	50%	50
2	Welding OR Plumbing	30%	30
3	Viva	20%	20
Total			100

2. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25EMEL106/206.1	Understand the different tools used in fitting ,welding and sheet metal
M25EMEL106/206.2	Demonstrate and produce different types of fitting models.
M25EMEL106/206.3	Perform welding to produce different welded joints
M25EMEL106/206.4	Development of sheet metal models with an understanding of their applications

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25EMEL106/206.1	3	-	-	-	-	-	-	-	-	-	-
M25EMEL106/206.2	-	-	-	-	3	-	-	-	-	-	-
M25EMEL106/206.3	-	-	3	-	-	-	-	-	-	-	-
M25EMEL106/206.4	-	-	-	3	-	-	-	-	-	-	-
M25EMEL106/206	**3**	**-**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

2. Mapping to Sustainable Development Goals (SDG):

Note: Minimum 3 SDG's to be mapped with each course

Sl. No.	SDG	Justification
1	SDG 3 Good Health and Well-Being	Emphasizes workplace safety, safe tool handling, and accident prevention promoting health and well-being in practical work environments.
2	SDG 4 Quality Education	Provides practical, hands-on learning that develops technical skills, craftsmanship, and employability for students.
3	SDG 8 Decent Work and Economic Growth	Equips students with industry-relevant skills for manufacturing, fabrication, and production, leading to better job prospects**.**
4	SDG 9 Industry, Innovation, and Infrastructure	Builds a foundation for students to contribute to industrial sectors, promote innovation in manufacturing, and maintain infrastructure.

1st /2nd Semester	Basic Science Course (BS) Applied Physics Lab for ME Stream	M25BPHYLM107/ 207

1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Modern Physics & Optics	Involves understanding of wave optics, interference, diffraction, photoelectric effect, and quantum energy relations.
2.	Electronics & Semiconductor Physics	Requires knowledge of semiconductor behavior, electronic components, device characteristics, and circuit analysis.
3.	Electromagnetism & Electrical Circuits	Focuses on magnetic fields, electromagnetic induction, AC/DC circuit behavior, resonance, and impedance.
4.	Material Science & Dielectric Behavior	Emphasizes material properties like resistivity, dielectric constant, and band structure in solids.
5.	Computational & Analytical Skills	Enhances interpretation through simulations, data visualization, motion analysis, and statistical processing using digital tools.

2. Syllabus

Applied physics lab for ME stream Semester-I/II			
Course Code	**M25BPHYLE107/207**	CIE Marks	50
Total Number of Teaching-Learning Hours/Sem (L: T: P:TW:SL)	0:0:32: 0:00 = 32 Hours	SEE Marks	50
		Total Marks	100
Credits	**01**	Exam Hours	03
List of Experiments			
1. Determination of wavelength of LASER using Diffraction Grating.			
2. Determination of acceptance angle and numerical aperture of the given Optical Fiber.			
3. Determination of Magnetic Flux Density at any point along the axis of a circular coil.			
4. Determination of resistivity of a semiconductor by Four Probe Method			
5. Study the I-V Characteristics of the Given Bipolar Junction Transistor.			
6. Determination of dielectric constant of the material of capacitor by Charging and Discharging method			
7. Study the Characteristics of a Photo-Diode and to determine the power responsivity / Verification of Inverse Square Law of Intensity of Light.			
8. Study the frequency response of Series & Parallel LCR circuits.			
9. Determination of Planck's Constant using LEDs.			
10. Determination of Fermi Energy of Copper.			
11. Identification of circuit elements in a Black Box and determination of values of the components.			
12. Determination of Energy gap of the given Semiconductor.			
13. Hall effect experiment.			
14. Step Interactive Physical Simulations.			
15. Study of motion using spread Sheets.			
16. PHET Interactive			

3. Teaching-Learning Process Strategies

1.	Laboratory Learning	Utilize the facilities available in the laboratories to understand the behavior of the materials by performing experiments.

1. **Assessment Details (both CIE and SEE)**

CIE for Practical Course.

- CIE marks for a practical shall be 50 marks.
- The split up of CIE marks for conduction/record/journal and test is to be split in the ratio 60:40.
- Conduction of each experiment/group of experiments in the case of programming labs shall be evaluated for 20 marks.
- The record write-up for the individual experiment shall be evaluated for 10 marks.
- Total marks scored for record writing and conducting the experiment shall be summed up to

30 marks (60% of the maximum marks).

- Two tests, each for 100 marks, shall be conducted, and the final test marks shall be scaled down to 20 marks (40% of the maximum marks).

Test Marks distribution for the Practical Course:

Sl. No.	Description	% Marks	In Marks
1	Write-up, Conduction, Result and Procedure/Algorithm/Flowchart	60%	60
2	Viva-Voce	40%	40
Total		**100%**	**100**

Final CIE in Practical Course:

Sl. No.	Description	% Marks	In Marks
1	Scaled Down marks of conduction, record/journal	60% of the maximum	30
2	Scaled-down marks of the test	40% of the maximum	20
Total		**100%**	**50**

SEE for the Practical Course:

- SEE marks for a practical course shall be 50 marks.
- The practical course is evaluated for 100 marks, and the scored marks shall be scaled down to 50 marks.
- A change of experiment/program is allowed only once, and 20% of the marks allotted to the procedure/write-up part will be zero.
- The duration of SEE shall be 3 hours.

Marks distribution for the Practical Course:

SL. No.	Description	% Marks	Marks
1	Write-up, Procedure	20%	20
2	Conduction and result	60%	60
3	Viva-Voce	20%	20
Total		**100%**	**100**

4. Course Outcomes (COs) and Mapping with Pos:

Course Outcomes (COs)

COs	Description
M25BPHYLE107/207.1	Explain the relation between the working principles and practical measurements in electromagnetic, electronics and Optics
M25BPHYLE107/207.2	Apply the working principles of the given experiments and perform the experiments using required apparatus in Optics, electromagnetic and electronics.
M25BPHYLE107/207.3	Analyse the experimental results through interpretation of graphical/ theoretical values demonstrate and document the same.

CO-PO- Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BPHYLE107/207.1	3	-	-	-	-	-	-	-	-	-	-
M25BPHYLE107/207.2	3	-	-	-	-	-	-	-	-	-	-
M25BPHYLE107/207.3	-	-	-	-	-	-	-	2	-	-	-
M25BPHYLE107/207	**3**	-	-	-	-	-	-	**2**	-	-	-

5. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	SDG 4: Quality Education	Hands-on experiments enhance conceptual clarity and foster inquiry-based learning for engineering students.
2	SDG 7: Affordable and Clean Energy	Experiments involving semiconductors, energy band gap, and thermoelectric principles support research in clean energy technologies.
3	SDG 9: Industry, Innovation, and Infrastructure	Experiments on circuit design, materials, and sensors simulate real-world industrial and technological applications.
4	SDG 13: Climate Action	Studies involving energy-efficient materials, LED-based devices, and simulations promote sustainable practices and emission reduction.
5	SDG 12: Responsible Consumption and Production	Use of simulations and digital tools (e.g., spreadsheets, PHET) encourages low-resource experimentation and efficient data handling.

1st/ 2nd Semester	Ability Enhancement Course (AE) INNOVATION AND DESIGN THINKING	M25BIDTK158/258

1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Basic Understanding of Design and Business Concepts	Familiarity with fundamental design principles and an introductory awareness of business models and market dynamics.
2.	Analytical and Problem-Solving Skills	Ability to analyze challenges logically and apply basic problem-solving frameworks.
3.	Communication and Collaboration Skills	Basic verbal and written communication abilities, with a positive approach to teamwork.
4.	Curiosity and Adaptability (A)	Openness to new ideas, willingness to learn, and adaptability to change in dynamic environments.

2. Syllabus

INNOVATION AND DESIGN THINKING SEMESTER I/II			
Course Code	**M25BIDTK158/258**	CIE Marks	**50**
Teaching Hours/Sem (L: T:P: S:TW:SL)	**16:0:0:12:0=28**	SEE Marks	**50**
		Total Marks	**100**
Credits	**01**	Exam Hours	**01**

Course Objectives This course will enable students to:

1. Introduce students to the fundamentals of design thinking as a human-centered, iterative approach to innovation and creative problem solving.
2. Develop an understanding of design tools, frameworks, and methodologies that facilitate effective ideation, prototyping, and user-centered design in diverse contexts.
3. Foster critical thinking, analytical reasoning, and empathy, enabling students to identify and frame real-world problems from multiple user perspectives.
4. Enhance collaboration, communication, and creativity through hands-on team-based design projects and real-world scenario applications.
5. Equip students with practical skills in prototyping, testing, and iterative design, preparing them to apply design thinking in academic, social, and entrepreneurial settings.

Module-1

Foundations of Design Thinking: Understanding the Process of Design, Principles and Frameworks of Design Thinking, Shared Mental Models in Team-Based Design, Bridging Theory and Practice in Design Thinking, Exploring Presentation and Design Approaches across Cultures and Geographies, Introduction to Minimum Viable Product (MVP) and Basic Prototyping

Module-2

Tools and Techniques for Design Thinking: Capturing and Analyzing Real-Time Design Interactions, Empathy Mapping and User-Centered Design Tools, Enabling Effective Collaboration in Digital and Remote Environments, Understanding Distributed and Cross-Functional Teamwork

Module-3

Application of Design Thinking in IT and Business Contexts: Applying Design Thinking to Business Process Modeling, Integration with Agile Methodologies in Virtual Teams, Creating Scenario-Based Prototypes for User Testing, Role of Design Thinking in Digital Transformation

Module-4

Strategic Innovation through Design Thinking: Design Thinking for Growth and Innovation Strategy, Storytelling as a Tool for Design Communication, Foresight, Change Management, and Sense making in Design, Maintaining Relevance and Value Redefinition in Competitive Markets, Concepts of Standardization vs. Humanization in Design, Fostering a Creative Culture within Organizations, Linking Prototyping, Business Models, and Strategic Planning

Module-5
Immersive Design Thinking Studio: Experiential Learning through Design Thinking Phases- User Discovery (Empathize), Problem Framing (Define), Creative Exploration (Ideate), Team-based Innovation Projects, Reflective Practice.

TextBooks

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "**Engineering Design**",Cengage learning (International edition) Second Edition, 2013.
2. Roger Martin, "**The Design of Business: Why Design Thinking is the Next Competitive Advantage**", Harvard Business Press , 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "**Design Thinking: Understand – Improve Apply**", Springer, 2011
4. Idris Mootee, "Des**ign Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School**", John Wiley & Sons 2013.

References:

1. Yousef Haik and Tamer M.Shahin, "**Engineering Design Process**", CengageLearning, Second Edition, 2011.
2. Book - **Solving Problems with Design Thinking - Ten Stories of What Works** (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

Web links and Video Lectures (e-Resources):

1. www.tutor2u.net/business/presentations/. /product lifecycle/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com › Home › Marketing › Product Development
4. https://www.mindtools.com/brainstm.html
5. https://www.quicksprout.com/. /how-to-reverse-engineer-your-competit
6. www.vertabelo.com/blog/documentation/reverse-engineering
7. https://support.microsoft.com/en-us/kb/273814
8. https://support.google.com/docs/answer/179740?hl=en
9. https://www.youtube.com/watch?v=2mjSDIBaUlM
10. thevirtualinstructor.com/foreshortening.html
11. https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf
12. https://dschool.stanford.edu/use-our-methods/
13. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process
14. http://www.creativityatwork.com/design-thinking-strategy-for-innovation/
15. https://www.nngroup.com/articles/design-thinking/
16. https://designthinkingforeducators.com/design-thinking/

Activity Based Learning(Suggested Activities in Class)/Practical Based learning

1. http://dschool.stanford.edu/dgift/

3. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Not limited to traditional methods but includes diverse teaching methods to develop course outcomes.
2	Multimedia	Use of videos and animations to explain concepts.
3	Group Learning	Encouraging collaborative learning.
4	Higher Order Thinking Questions (HOTS)	Asking at least three HOTS questions to promote critical thinking.
5	Problem Based Learning	Fostering analytical skills and thinking abilities.
6	Problem Solving	Showing different solutions and encouraging creative methods.

4. Assessment Details

Continuous Internal Evaluation

Components		Number	Weightage	Max. Marks	Min. Marks
(i)	Internal Assessment-Tests (A)	3	50%	25	10
(ii)	Assignments/Quiz/Activity (B)*	2	50%	25	10
	Total Marks (A+B)			50	20

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

SEE paper will be set for 50 questions of each of 01 mark. The pattern of the question paper is MCQ. The time allotted for SEE is 01 hours

***Note for Module 5 – Design Thinking Workshop and Practice:**

A class of 60 students shall be divided into 3 subgroups or however feasible. Each group will collaboratively apply the design thinking process to conceptualize and develop a proposal for a new entrepreneurial venture. Through hands-on activities, students will engage in user research (Empathize), problem definition (Define), idea generation (Ideate), prototyping (Prototype), and user testing (Test). The exercise will culminate in a final presentation and reflection on the design journey, emphasizing teamwork, creativity, and practical application of design thinking tools.

5. Course Outcomes and Mapping with POs/ PSOs

Course Outcomes (COs)

CO's	DESCRIPTION OF THE OUTCOMES
M25BIDTK158/258.1	**Make use** the concept of design thinking to develop innovative solution for the problems identified.
M25BIDTK158/258.2	**Illustrate** the design ideas through various tools of Design Thinking
M25BIDTK158/258.3	**Interpret** the Design Thinking approach and model to real world situations
M25BIDTK158/258.4	**Apply** concepts of Agile software methodology, Business process modeling & scenario-based prototyping with design thinking approach to provide solution in IT industries.
M25BIDTK158/258.5	**Analyze** the role of Design thinking approach in various Business challenges by considering strategic innovation.

CO-PO-PSO Mapping

CO No	PO No										
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
M25BIDTK158/258.1	2	3	-	-	-	-	2	-	-	-	-
M25BIDTK158/258.2	-	-	3	-	3	-	-	-	3	-	-
M25BIDTK158/258.3	-	-	-	-	-	-	2	-	-	-	-
M25BIDTK158/258.4	3	-	-	-	3	-	-	-	-	-	-
M25BIDTK158/258.5	-	3	-	2	-	2	-	-	-	2	3
M25BIDTK158/258	**2.5**	**3**	**3**	**2**	**3**	**2**	**2**	**-**	**3**	**2**	**3**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No	SDG	Justification
1	**SDG 4:**Quality Education	Promotes creative, critical, and collaborative learning through experiential education and design thinking.
2	**SDG 8:**Decent Work and Economic Growth	Encourages innovation and entrepreneurial thinking, preparing students to create or contribute to new ventures.
3	**SDG 9:**Industry, Innovation, and Infrastructure	Cultivates skills to ideate, design, and prototype innovative solutions for technological and social challenges.
4	**SDG 11:**Sustainable Cities and Communities	Enables students to frame user-centered problems and design community-driven and sustainable solutions.
5	**SDG 12:**Responsible Consumption and Production	Through prototyping and user feedback, students learn to create solutions that are mindful of resource use.

1st/2nd Semester	Humanities (HS) Samskruthika Kannada	M25BKSKK110/210

1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Knowledge of Kannada Literature	Samskruthika Kannada

2. Syllabus

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

SEMESTER – I/II

Course Code	M25BKSKK107/207	CIE Marks	50
Total Number of Teaching-Learning Hours/sem(L:T: P:TW:SL)	0:16:0:14:00 = 30 Hours	SEE Marks	50
		Total Marks	100
Credits	01	Exam Hours	01

Course objectives : ಸಾಂಸ್ಕೃತಿಕಕನ್ನಡ ಪಠ್ಯಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

1.ವೃತ್ತಿಪರ ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತುಕನ್ನಡ ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

2.ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತುಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ವಾಚನದ ಮೂಲಕ ಪರಿಚಯಿಸುವುದು.

3.ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಶಿಕ್ಷಣ, ಕ್ರೀಡೆ, ವಿಜ್ಞಾನ ಮತ್ತುತಂತ್ರಜ್ಞಾನ, ಉದ್ಯಮ, ಚಳುವಳಿ ಕ್ಷೇತ್ರದ ಸಾಧಕರ ಪರಿಚಯ ಹಾಗು ಪ್ರೇರಣೆಆಸಕ್ತಿಯನ್ನು ಸಂವಹನದ ಮೂಲಕ ಮೂಡಿಸುವುದು.

4.ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.

5.ಕಥೆಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

Module -1

ಘಟಕ–1 ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆಕುರಿತಾದ ಲೇಖನಗಳು: 3ಘಂಟೆ

1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ– ಹಂಪ ನಾಗರಾಜಯ್ಯ.
2. ಕರ್ನಾಟಕದಏಕೀಕರಣ: ಒಂದುಅಪೂರ್ವಚರಿತ್ರೆ– ಜಿ ವೆಂಕಟಸುಬ್ಬಯ್ಯ
3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿಕನ್ನಡ– ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ ಕೇಶವಮೂರ್ತಿ

Module -2

ಘಟಕ–2 **ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳು**3ಘಂಟೆ

ವಚನಗಳು:

ಕೀರ್ತನೆಗಳು:

ತತ್ವಪದ:

ಕವಿತೆಗಳು:

Module -3

ಘಟಕ–3 **ಜಗತ್ತಿನಆಯ್ದ 62 ಸಾಧಕರ ಪರಿಚಯ:**3ಘಂಟೆ

Module -4

ಘಟಕ–4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ 3ಘಂಟೆ

1. ಡಾ. ಸರ್ ಎಂ ವಿಶ್ವೇಶ್ವರಯ್ಯ: ವ್ಯಕ್ತಿ ಮತ್ತುಐತಿಹ್ಯ– ಎ.ಎನ್ ಮೂರ್ತಿರಾವ್
2. ಕರಕುಶಲ ಕಲೆಗಳು ಮತ್ತು ಪರಂಪರೆಯ ವಿಜ್ಞಾನ : ಕರೀಗೌಡ ಬೀಚನಹಳ್ಳಿ

Module -5

ಘಟಕ–5 ಕಥೆ ಮತ್ತು ಪ್ರವಾಸಕಥನ 3ಘಂಟೆ

1. ಯುಗಾದಿ: ವಸುಧೇಂದ್ರ

2. ಮೆಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ ಚಿ ಬೋರಲಿಂಗಯ್ಯ

TEXTBOOKS: ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ವಿತಾವಿ

REFERENCE BOOKS: ಆಧುನಿಕಕನ್ನಡ ಕಾವ್ಯಗಳು ಮೈವಿವಿ

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Contents related activities (Activity-based discussions)
2	Activity based	For active participation of students instruct the students to prepare Flowcharts and Handouts
3	Collaborative Learning	Organizing Group wise discussions
4	Writing exercises	Quizzes and Discussions
5	Real-World Application	Seminars and assignments
6		Contents related activities (Activity-based discussions)

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BKSKK107/207.1	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತುಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.
M25BKSKK107/207.2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನಭಾಗವಾದಕಾವ್ಯಗಳನ್ನು ಮತ್ತುಕಥೆಗಳನ್ನುಕಲಿತುಹೆಚ್ಚಿನ ಓದಿಗೆ ಮತ್ತುಜ್ಞಾನಕ್ಕೆ ಸ್ಪೂರ್ತಿ ಮೂಡುತ್ತದೆ.
M25BKSKK107/207.3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ವಿಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ ಉದ್ಯಮಕ್ರೀಡೆ ಶಿಕ್ಷಣ ಚಳುವಳಿ ಕ್ಷೇತ್ರದ ವ್ಯ ಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರು ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದು ಕೊಂಡು ಇವರಿಗೂಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BKSKK107/207.1	-	-	-	-	-	-	-	2	-	2	-
M25BKSKK107/207.2	-	-	-	-	-	-	-	2	-	2	-
M25BKSKK107/207.3	-	-	-	-	-	-	-	2	-	2	-
M25BKSKK107/207	-	-	-	-	-	-	-	2	-	2	-

6. Mapping to Sustainable Development Goals (SDG):

Note: Minimum 3 SDG's to be mapped with each course

Sl. No.	SDG	Justification
1	**Presenting Seminars**	Students will be at ease with all seminar presentation
2	**Facing Employment process**	If the student taken any civil service examination and their problem issue

1st/2nd Semester	Humanities (HS) Balake Kannada	M25BKBKK110/210

1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Knowledge of Kannada Literature	Balake Kannada

2. Syllabus

ಬಳಕೆ ಕನ್ನಡ **SEMESTER – I/II**			
Course Code	**M25BKBKK107/207**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem(L:T: P:TW:SL)	**0:16:0:14:00 = 30 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**01**	Exam Hours	**01**

Course objectives : **ಬಳಕೆಕನ್ನಡ ಪಠ್ಯಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:**

1. **ಕನ್ನಡ ಭಾಷೆಯ ಮಹತ್ವವನ್ನು ತಿಳಿಸುವುದು.**
2. **ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಬರೆಯುವ. ಓದುವ ಮತ್ತು ಸಂವಹಿಸುವ ಕೌಶಲವನ್ನು ಬೆಳೆಸುವುದು.**

ಪಠ್ಯ ವಿಭಜನೆ
Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
Easy learning of a Kannada Language: A few tips. Hints for correct and polite conservation, Listening and Speaking Activities
Key to Transcription.
ವೈಯಕ್ತಿಕ ಸ್ವಾಮ್ಯ ಸೂಚಕ/ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal Pronouns, Possessive Forms, Interrogative words
Module 2
ಪಠ್ಯ ವಿಭಜನೆ
ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು ಸಂದೇಃಆಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು Possessive forms of nouns, dubitive question and Relative nouns
ಗುಣ ಪರಿಂಆನ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಗಳು ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals
ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ(ಆ ಅದು ಅವು ಅಲ್ಲಿ) Predictive Forms, Locative Case
Module 3
ಪಠ್ಯ ವಿಭಜನೆ
ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು Dative Cases, and Numerals
ಸಂಖ್ಯಾಗುಣಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು–Ordinal numerals and Plural markers
ನ್ಯೂನ ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು Defective / Negative Verbs and Colour Adjectives
Module 4
ಪಠ್ಯ ವಿಭಜನೆ
ಅಪ್ಪಣೆಒಪ್ಪಿಗೆ ನಿರ್ದೇಶನ ಪ್ರೋತ್ಸಾಹ ಮತ್ತುಒತ್ತಾಯ ಅರ್ಥರೂಪಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences)
ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ಸ್ವತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳುAccusative Cases and Potential Forms used in General Communication
ಇರು ಮತ್ತುಇರಲ್ಲ ಸಹಾಯಕ ಕ್ರಯಾಪದಗಳು ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕಕ್ರಿಯಾ ಪದಗಳು Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs
ಹೋಲಿಕೆ ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕಪದಗಳು Comparitive, Relationship, Identification and Negation Words
Module - 5
ಪಠ್ಯ ವಿಭಜನೆ
ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳು ವಿವಿಧ ಪ್ರಕಾರಗಳು different types of forms of Tense, Time and Verbs

ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೋಂದಿಗೆ ಭೂತ ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲವಾಕ್ಯFormation of Past, Future and Present Tense Sentences with Verb Forms
ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು Kannada Vocabulary List Kannada Words in Conversation

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	Conversational practices
3	Collaborative Learning	
4	Writing exercises	Writing practices
5	Real-World Application	

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

Components		Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BKBKK107/207.1	To understand the necessity of learning of local language for comfortable life.
M25BKBKK107/207.2	To speak, read and write Kannada language as per requirement.
M25BKBKK107/207.3	To communicate (converse) in Kannada language in their daily life with kannada speakers.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BKBKK107/207.1	-	-	-	-	-	-	-	2	-	2	-
M25BKBKK107/207.2	-	-	-	-	-	-	-	2	-	2	-
M25BKBKK107/207.3	-	-	-	-	-	-	-	2	-	2	-
M25BKBKK107/207	-	-	-	-	-	-	-	2	-	2	-

6. Mapping to Sustainable Development Goals (SDG):

Note: Minimum 3 SDG's to be mapped with each course

Sl. No.	SDG	Justification
1	**Presenting Seminars**	Students will be at ease with all seminar presentation
2	**Facing Employment process**	If the student taken any civil service examination and their problem issue

1st Semester	Humanities (HS) Professional Writing Skills in English	M25BPWSK 109

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic knowledge of English grammar and vocabulary	Students should have a foundational understanding of sentence structure, parts of speech, tenses, and commonly used vocabulary.
2	Familiarity with general writing formats	Prior exposure to writing simple paragraphs, letters, or essays at the school level helps ease the transition into structured and formal writing.
3	Ability to comprehend spoken English	Students should be able to follow general English conversations, classroom instructions, and audio content, which will be enhanced further in listening modules.
4	Fundamental computer and internet usage skills	Basic skills such as using a word processor, browsing the web, and using email are essential for completing blog writing, document formatting, and online communication activities.

2. Syllabus

Professional Writing Skills in English
Semester I

Course Code	**M25BPWSK109**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**16:0:0:0:0=16**	SEE Marks	**-**
		Total Marks	**50**
Credits	**-**	Exam Hours	**-**

Course Objectives:

1. **To develop active listening skills** by practicing various listening activities, understanding the barriers to effective listening, and applying strategies to enhance comprehension and attention.
2. **To build paragraph writing proficiency** through structured practice in narrative, descriptive, cause-effect, and comparison formats, focusing on coherence, unity, and the use of transitions.
3. **To introduce students to formal and digital communication** including email, blog writing, memos, circulars, and notices with emphasis on clarity, tone, and purpose.
4. **To equip students with the ability to produce technical documents** such as summaries, abstracts, project documentation, reports, and technical proposals aligned with academic and professional standards.

Module -1

Practicing listening activities, advantages of active listening and disadvantages of poor listening. Barriers to effective listening, Techniques and steps to effective listening

Module -2

Paragraph writing : Structure, Construction of a paragraph, Narrative, Descriptive, Comparisons and Contrasts, Cause and Effect, Facts and figures, Use of transitions and connecting devices. Unity and Coherence to be sustained.

Module -3

Email writing, Blog writing, Technical and Academic writing basics. Memo, circular, notice.

Module -4

Project documentation, writing of summary, abstract.

Module -5

Report writing and Technical Proposal writing.

TEXTBOOKS:

1. Communication Skills by Sanjay Kumar and Pushpalatha Part II Oxford Higher Education
2. English for Engineers by N P Sudarshana and C Savitha Cambridge University Press

REFERENCE BOOKS:

1. Practical English Usage by Michael swan, Oxford University Press.
2.Technical communication by Gajendra Singh Chauhan, Cengage Learning India

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Deliver key writing and communication concepts through engaging lectures using examples, concept maps, and structured presentations to establish core understanding.
2	Audio-Visual Aids	Use videos, podcasts, and recorded talks for listening skill development and to model formal/informal communication formats (e.g., email etiquette) and VTU software accessible through MITM library.
3	Collaborative Learning	Promote peer editing, group paragraph construction, and blog-writing teams to foster cooperative skills and knowledge sharing.
4	Real-World Application	Integrate real-life writing tasks like drafting emails, memos, proposals, and project summaries to connect learning with workplace needs.
5	Flipped Classroom Technique	Share writing guides, grammar resources, or sample documents before class; use class time for writing exercises and critique sessions.
6	Hands-on Writing Activities	Practice structured writing tasks in class: paragraph building, report writing, summary/abstract writing, and peer-review sessions.
7	Mini Projects and Portfolios	Assign projects like blog series creation, documentation of a mock project, or technical proposal writing; compile student work into portfolios.
8	Problem-Based Learning (PBL)	Pose real-world communication challenges (e.g., crisis memo, product summary, or report on a lab experiment) to stimulate analytical and creative writing.
9	ICT-Enabled Teaching Tools	Use Google Docs for collaborative editing, Grammarly for feedback, LMS tools for submissions/quizzes, and blogs for publishing content.

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment - Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BPWSK109.1	Develop effective communication skills through active listening, structured writing, and the use of appropriate formats for academic and professional contexts.
M25BPWSK109.2	Apply principles of technical writing to prepare clear, concise, and coherent documents such as emails, reports, proposals, summaries, and project documentation.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BPWSK109.1	3	2	-	-	-	-	-	-	2	3	2
M25BPWSK109.2	3		2	-	2	-	-	-	2	3	2
M25BPWSK109	**3**	**2**	**2**	**-**	**2**	**-**	**-**	**-**	**2**	**3**	**2**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 4:**Quality Education	The course promotes essential communication and technical writing skills, improving students' ability to understand, express, and document knowledge effectively.
2	**SDG 8**: Decent Work and Economic Growth	Effective writing and listening are critical workplace skills, enhancing employability, professionalism, and career growth.
3	**SDG 9**: Industry, Innovation and Infrastructure	Technical documentation, proposals, and reports are vital for innovation, project development, and building efficient industrial practices.
4	**SDG 17**: Partnerships for the Goals	Collaborative writing, peer review, and team-based communication activities build skills necessary for effective teamwork and global cooperation.

2nd Semester	Basic Science (BS) Applied Mathematics-II for ME Stream	M25BMATM201

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Laplace transforms	Knowledge of advanced calculus, linear algebra, and ordinary differential equations, concept of initial value problem
2	Vector Calculus	Having a strong grasp of basic calculus, including differential calculus and integral calculus. Understanding vectors, vector operations, and vector algebra is essential, as Vector Calculus deals with vector fields, line integrals, surface integrals, and vector functions. Knowledge of multivariable calculus, including partial derivatives, gradients, and multiple integrals, is also crucial for learning Vector Calculus effectively.
3	Partial Differential Equations	To learn Partial Differential Equations (PDEs), it is important to have a solid foundation in calculus, including differential equations. Understanding ordinary differential equations (ODEs), partial derivatives, and multivariable calculus is crucial as PDEs involve functions of multiple variables and their partial derivatives. Knowledge of linear algebra and complex variables can also be beneficial for certain types of PDEs.
4	Numerical Methods-I & II	Strong foundation in calculus, linear algebra, and basic programming skills. Understanding concepts such as differentiation, integration, matrices, vectors, and algorithms is essential for effectively applying numerical methods in solving mathematical problems.

2. Syllabus

Applied Mathematics-II for ME Stream **SEMESTER – II**			
Course Code	**M25BMATM201**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**48:0:32:0:30 = 110 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**04**	Exam Hours	**03**

Course Objectives:

1. Familiarize the importance of Integral calculus and vector calculus.
2. Learn Partial differential equations to solve engineering problems.
3. Develop the knowledge of numerical methods and apply them to solve transcendental and differential equations.

Module -1

Elementary Laplace Transform: 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.

Elementary Fourier series: Introduction to infinite series, convergence and divergence. Periodic functions, Dirichlet's condition. Fourier series of periodic functions with period 0 to 2π

Module -2

Vector Calculus: Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, Solenoidal and irrotational vector fields. Problems.

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

Applications: Analysis of velocity and acceleration of a moving particle.

Module -3

Partial Differential Equations: 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 derivatives with respect to one independent variable only. Solution of Lagrange's linear PDE.

Module -4
Numerical Methods -1: Solution of algebraic and transcendental equations - Regula-Falsi and Newton-Raphson methods (only formulae). Problems. 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). Problems. Numerical integration: Trapezoidal, Simpson's (1/3)rd and (3/8)th rules(without proof). Problems.
Module -5
Numerical Methods -2: 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 derivations of formulae). Problems. **Applications:** Finding approximate solutions to ODE related to engineering field.
List of Laboratory experiments 10 lab sessions 1. Computing Laplace transform of standard functions 2. Laplace transform of $e^{at}f(t), t^n f(t)$ 3. Finding gradient, divergent, curl and their geometrical interpretation 4. Verification of Green's theorem 5. Solution of one-dimensional heat equation and wave equation 6. Solution of algebraic and transcendental equations by Ramanujan's, Regula-Falsi and Newton-Raphson method 7. Interpolation/Extrapolation using Newton's forward and backward difference formula 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 **Suggested software**: Mathematica/MatLab/Python/Scilab
TEXTBOOKS: 17. B.S.Grewal:"Higher Engineering Mathematics",Khanna publishers,45th Ed.2025 18. E.Kreyszig:"Advanced Engineering Mathematics",John Wiley & Sons,10th Ed.(Reprint),2018

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding the concepts.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
5	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment - Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BMATM201.1	Apply the concept of Laplace transform, Fourier transform & PDE
M25BMATM201.2	Demonstrate the idea of Laplace transform, Fourier transform, Vector Calculus & PDE to solve the engineering application problems for Mechanical stream.
M25BMATM201.3	Analyze the Engineering application problem through Numerical technique.
M25BMATM201.4	Using modern mathematical tools, prediction and modelling the complex engineering problems by MatLab or Python

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BMATM201.1	3	-	-	-	-	-	-	-	-	-	-
M25BMATM201.2	-	3	-	-	-	-	-	-	-	-	-
M25BMATM201.3	-	3	-	-	-	-	-	-	-	-	-
M25BMATM201.4	-	-	-	-	3	-	-	-	-	-	-
M25BMATM201	**3**	**3**	-	-	3	-	-	-	-	-	-

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 6:** Clean Water and Sanitation	Application of Laplace Transforms in Environmental Engineering: Laplace Transforms are widely used in modelling water treatment systems, fluid dynamics, and chemical reaction processes. By analysing these systems using LT, engineers can improve designs for clean water systems and wastewater treatment.
2	**SDG 7:** Affordable and Clean Energy	Energy systems, especially in the context of renewable energy, involve multiple variables like energy sources, demand forecasts, energy production rates, and storage capacities. These systems can be represented as vector spaces, and their dynamics can be modelled through linear transformations to optimize energy distribution and consumption.
3	**SDG 9:** Industry, Innovation, and Infrastructure	The concepts of divergence and curl are central to the study of fluid flow, heat transfer, and electromagnetic fields in engineering design. For example, the curl of a vector field can be used to understand rotational motion in mechanical systems, such as motors, turbines, and other machinery.
4	**SDG 11:**Sustainable Cities and Communities	Simulating urban development, including traffic patterns, housing growth, and resource usage.

1st / 2nd Semester	Basic Science (BS) Applied Chemistry for ME Stream	M25BCHEM102/202

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic Chemistry	Familiarity with atomic structure, chemical bonding, and periodic properties. Basic understanding of acids, bases, redox reactions, and stoichiometry. Knowledge of common chemical reactions and their applications.
2	Environmental Science	Awareness of pollution, green chemistry, and sustainability concepts. Understanding the impact of fuels and materials on the environment. Exposure to concepts like recycling, biodegradable materials, and energy conservation.
3	Electrochemistry	Understanding of oxidation-reduction reactions and electrode potentials. Basic knowledge of electrochemical cells and their working principles. Awareness of corrosion and simple electroplating processes.
4	Organic Chemistry	Familiarity with hydrocarbons and functional groups. Understanding polymer basics like monomers, polymerization, and uses. Awareness of fuels and their classification.
5	Thermodynamics & Phase Equilibrium	Basic knowledge of energy, heat, and the laws of thermodynamics. Understanding of phase changes and phase diagrams. Familiarity with terms like calorific value and enthalpy.
6	Analytical Techniques	Understanding of measurements, units, and concentrations (e.g., molarity). Exposure to instrumentation methods like titration, sensors, and indicators. Ability to interpret basic experimental data.
7	Mathematics & Data Analysis	Proficiency in handling algebraic expressions and unit conversions. Ability to solve numerical problems involving ratios, averages, and percentages. Understanding of graphical representation and simple statistical interpretation.

2. Syllabus

Applied Chemistry for ME Stream **SEMESTER – I/II**			
Course Code	**M25BCHEM102/202**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**32:32:0:20:00 = 84 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. To enable students to acquire knowledge on principles of chemistry for engineering applications.
2. To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
3. To provide students with a solid foundation in analytical reasoning required to solve societal problems.

Module-1: Energy; Source, Conversion and Storage (8hr)

Fuels: Introduction, calorific value, determination of calorific value of gas / liquid fuel using Boy's calorimeter, numerical problems on GCV and NCV.

Green fuels: Introduction, octane number and cetane number, power alcohol, synthesis and applications of biodiesel.

High energy fuels: Production of hydrogen by electrolysis of water and its advantages.

Energy devices: Introduction, construction, working, and applications of Photovoltaic cells, Li-ion battery and solid oxide fuel cell.

Self - learning: Plastic recycling to fuels and its monomers or other useful products.

Module-2: Corrosion Science and Engineering (8hr)

Corrosion: Introduction, electro chemical theory of corrosion, types of corrosion- differential metal, differential aeration (waterline and pitting), stress corrosion (caustic embrittlement).

Corrosion control: Metal coating - galvanization, surface conversion coating-anodization, **Organic coating**- Paints: Definition, composition and manufacturing process.

Metal finishing: Introduction, technological importance. Electroplating: Introduction, Electroplating of chromium (hard and decorative). Electroless plating: Introduction, electroless plating of nickel.

Self-learning: Factors affecting the rate of corrosion, **f**actors influencing the nature and Quality of electro deposit (Current density, concentration of metal ion, pH and temperature)**.**

Module-3: Macro molecules for Engineering Applications (8hr)

Polymers: Introduction, methods of polymerization (Condensation and Free radical), molecular weight; number average and weightaverage, numerical problems. Synthesis, properties and industrial applications of chloro poly vinyl chloride (CPVC) and polystyrene.

Fibers: Introduction, synthesis, properties and industrial applications of Kevlar and Polyester. **Plastics:** Introduction, synthesis, properties and industrial applications of poly (methylmethacr ylate) (PMMA) and Teflon.

Composites: Introduction, properties and industrial applications of carbon –based reinforced composites (grapheme /carbon nano-tubes as fillers) and metal matrix polymer composites.

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

Self-learning: Biodegradable polymer: Introduction, synthesis, properties and applications of poly lactic acid (PLA).

Module-4: Phase Rule and Analytical Techniques(8hr)

Phase rule: Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: One component H_2O system and Two component-lead-silver system.

Analytical techniques: Introduction, principle, instrumentation of potentiometricsensors; its application in the estimation of iron, Optical sensors (colorimetry); its application in the estimation of the copper, pH-sensor (Glass electrode); its application in the determination of pH of beverages.

Self-learning: Determination of viscosity of bio fuel and its correlation with temperature.

Module-5: Materials for Engineering Applications (8hr)

Alloys: Introduction, classification, composition, properties and applications of Stainless Steel, Brass and Alnico.

Ceramics: Introduction, classification based on chemical composition, properties and applications of perovskites (CaTiO3).

Nanochemistry: Introduction, size- dependent properties of nano material (surface area, catalytical and thermal), synthesis ofnano particles by sol-gel, and co-precipitation method.

Nanomaterials: Introduction,properties and engineering applications of carbon nano tubes and graphene.

Self-learning: Abrasives: Introduction, classification, properties and applications of silicon carbide (carborundum).

TEXTBOOKS:

1. A Text Book of Engg. Chemistry, Shashi Chawla, DhanpatRai & Co.(P)Ltd.
2. Essentials of Physical Chemistry, Bahl &Tuli,S. Chand Publishing
3. Applied Chemistry, Sunita Rattan, Kataria5.Engineering Chemistry, Baskar, Wiley
4. A Text Book of Engineering Chemistry, R.V.Gadagand Nityananda Shetty, I.K.International Publishing house. 2nd Edition, 2016.
5. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4thEdition,1999.

REFERENCE BOOKS:

1. Chemistry for Engineering Students, B.S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar., Subash Publications, 5thEdition,2014
2. "Engineering Chemistry", O.G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, FourthReprint, 2015.

VIDEO LINKS:

1. https://youtu.be/fIOkI4AAEag?si=MzFUGeFT-GDG3JHo
2. https://youtu.be/76qXCqsGEIs?si=VOjbTBIdc0z4Nbcr

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Deliver structured lectures to introduce key concepts such as energy devices, corrosion mechanisms, and phase diagrams. Integrate questioning and short discussions to reinforce understanding.
2	Video/Animation	Use animations and simulations to explain complex processes like fuel cell operation, polymer synthesis, and corrosion mechanisms visually and spontaneously.
3	Collaborative Learning	Engage students in group discussions and problem-solving tasks, such as case studies on green fuels or team-based analysis of polymer properties.
4	Real-World Application	Relate concepts to real-world engineering practices—e.g., using hydrogen in automotive fuel systems, the role of alloys in construction, and corrosion prevention in pipelines.
5	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies Provide pre-recorded videos or reading materials (on calorific value, electrochemistry, or nanomaterials) before class to encourage active problem-solving and discussion during classroom sessions.
6	Laboratory Learning	Conduct hands-on experiments such as calorific value measurement, corrosion testing, viscosity of biofuels, and sensor-based pH detection to reinforce theoretical knowledge.
7	Numerical and Analytical Problem Solving	Encourage solving of GCV/NCV, molecular weight of polymers, and electrochemical cell problems to enhance quantitative reasoning and application skills.
8	ICT-Enabled Learning	Use smart classroom tools, LMS platforms (like Moodle or Google Classroom), and simulations (e.g., virtual labs for corrosion or electroplating) to support learning anytime-anywhere.

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

Components		Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BCHEM102/202.1	**Understand** various energy sources, fuels, and storage devices and their relevance to sustainability.
M25BCHEM102/202.2	**Apply** basic chemical principles to control corrosion and improve material durability.

M25BCHEM102/202.3	**Analyze** the structure and properties of polymers, composites, and lubricants for engineering uses.
M25BCHEM102/202.4	**Evaluate** phase diagrams and analytical data to make informed decisions in material selection and testing.
M25BCHEM102/202.5	**Create** solutions by comparing modern materials like alloys, ceramics, and nanomaterials for specific applications.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BCHEM102/202.1	3	2	-	-	-	-	-	-	-	-	-
M25BCHEM102/202.2	3	3	-	2	-	-	-	-	-	-	-
M25BCHEM102/202.3	3	2	3	2	-	-	-	-	-	-	-
M25BCHEM102/202.4	3	2	-	3	2	-	-	-	-	-	-
M25BCHEM102/202.5	3	-	3	-	-	2	2	-	-	-	-
M25BCHEM102/202	**3**	**2.25**	**3**	**2.33**	**2**	**2**	**2**	-	-	-	-

6. **Mapping to Sustainable Development Goals (SDG):**

Sl. No.	SDG	Justification
1	**SDG 3**: Good Health and Well-Being	Analytical techniques such as potentiometry, colorimetry, and pH measurement help monitor quality of pharmaceuticals and beverages, contributing to public health and safety.
2	**SDG 6**:Clean Water and Sanitation	Electrochemical sensors and corrosion-resistant materials play a key role in safe water delivery and monitoring of water quality in industrial and environmental systems.
3	**SDG 7**: Affordable and Clean Energy	Study of green fuels, hydrogen production, and photovoltaic cells promotes the development and use of renewable, clean energy sources.
4	**SDG 9**: Industry, Innovation and Infrastructure,	Understanding corrosion, polymer composites, and nanomaterials supports innovation in materials and design for durable and high-performance infrastructure.
5	**SDG 12:** Responsible Consumption and Production	Emphasis on biodegradable polymers, plastic recycling, and sustainable coatings encourages environmentally responsible manufacturing and consumption practices.
6	**SDG 13:** Climate Action	Use of alternative fuels (like biodiesel and hydrogen) and energy-efficient devices contributes to reduced greenhouse gas emissions and climate mitigation efforts.

1st/ 2nd Semester	Engineering Science Course (ES) Computer Aided Engineering Drawing ME Stream	M25BCEDK103/203

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic Geometry and Mathematics	Understanding of geometric shapes, Cartesian coordinate system, algebra, and trigonometry.
2	Fundamentals of Engineering Concepts	Familiarity with engineering terminology and the purpose of engineering drawings.
3	Introduction to Technical Drawing	Awareness of different types of technical drawings and projection methods. Proficiency in free-hand sketching and using drawing instruments.
4	Computer Literacy	Basic knowledge of computer operations and software usage.
5	Visualization Skills	Ability to visualize 3D objects and their 2D representations.
6	Attention to Detail	Precision in creating accurate drawings and following technical standards. Capability to interpret technical drawings and solve related problems.
7	Communication and Learning Abilities	Effective communication of technical information, time management, and adaptability to new tools and techniques.

2. Syllabus

Computer Aided Engineering Drawing-ME Stream			
Course Code	**M25BCEDK203**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**32:0:32:20:00 = 84 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. To understand fundamentals and conventions to grasp the significance of engineering drawing, BIS conventions, and scales for accurate representation
2. To familiarize with CAD software, coordinate systems, and reference planes for creating precise drawings in 2D and 3D environments.
3. To develop proficiency in using CAD commands and techniques to create various geometric entities and perform essential operations.
4. To understand orthographic projections for points, lines, planes, and solids, and master isometric projection techniques and conversion methods.
5. To apply learned concepts and skills in diverse engineering scenarios, including drawing views in 3D environments, lateral surface development, and creating diagrams and charts.

Module -1

Introduction: ***for CIE only***

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

Orthographic Projections of Points, Lines and Planes:

Introduction to Orthographic projections: Orthographic projections of points in 1st and 3rd quadrants.
Orthographic projections of lines (Placed in First quadrant only).
Orthographic projections of planes viz triangle, square, rectangle, pentagon, hexagon, and circular laminae (Placed in First quadrant only using change of position method).

Application on projections of Lines & Planes (For CIE only)

Module -2

Orthographic Projection of Solids:

Orthographic projection of right regular solids (**Solids Resting on HP only**): Prisms & Pyramids (triangle, square, rectangle, pentagon, hexagon), Cylinders, Cones, Cubes &Tetrahedron. ***Projections of Frustum of***

cone and pyramids (For practice only, not for CIE and SEE).
Module -3
Isometric Projections: Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones andspheres. Isometric projection of combination of two simple solids. **Conversion of simple isometric drawings into orthographic views**. Problems on applications of Isometric projections of simple objects / engineering components. ***Introduction to drawing views using 3D environment (For CIE only).***
Module -4
Development of Lateral Surfaces of Solids: Development of lateral surfaces of right regular prisms, cylinders, pyramids and cones resting with base on HP only.Development of lateral surfaces of their frustums and truncations. Problems on applications of development of lateral surfaces like funnels and trays. ***Problems on applications of development of lateral surfaces of transition pieces connecting circular duct andrectangular duct (For CIE Only)***
Module-5
Orthographic Projection and Sectional Views*:* Practice of orthographic projection of simple machine components like nuts, bolts, brackets, and flanges. Introduction to full and half sectional views of these components. Interpretation of hidden features using sectional drawings in CAD. ***(For CIE Only)***
Text Books 1. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt. Limited, 2019. 2. K. R. Gopalakrishna, & Sudhir Gopalakrishna: Textbook Of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017 **Reference Books** 1. Bhattacharya S. K., Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint 2005. 2. S.N. Lal, & T Madhusudhan:, Engineering Visulisation, 1st Edition, Cengage, Publication 3. Parthasarathy N. S., Vela Murali, Engineering Drawing, Oxford University Press, 2015.

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Chalk and Talk method	The drawing views are explained using chalk and talk method
2	Videos Demonstration and Simulations	The assembly drawings are explained with the help of videos and simulations.
3	Use of Charts	The use of charts enables better visualization to students.
4	Software	Assign modeling and drafting tasks to reinforce practical skills associated with competencies.

4. **Assessment Details (both CIE and SEE)**

The weight-age 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) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks).

A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures 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):

The CIE marks for CAED course offered In the 1st year shall be assessed as follows:

1. The CIE marks awarded in the case of Drawing shall be based on Weekly evaluation of the classwork (sketching and computer· aided drawing) \with each drawing evaluated as mentioned module wise in the syllabus. The marks (or all the drawing sheets are added and scaled do to 30marks

2. One class test similar to SEE will be conducted after completion of the syllabus for 100 marks and scaled down to 20Marks.
3. CIE marks (out or 50) scored by the student is the sum of classwork evaluation and test marks.
4. CIE component should comprise of Continuous evaluation of Drawing work of students as and when the Modules are covered based on below detailed weightage.

Module	Max Marks Weightage	Evaluation weightage in marks	
		Computer Display & print out	Preparatory Sketching
Module – 1	20	15	05
Module – 2	25	20	05
Module – 3	20	15	05
Module – 4	20	15	05
Module-5	15	10	05
TOTAL	**100**	**75**	**25**
Consideration of Class work		**100 Marks is scaled down to 25 marks**	

5. At least one Test covering all the modules is to be conducted for 100 marks and evaluation to be based SEE pattern, and the same is to be scaled down to 25Marks
6. The final CIE = Class work marks + Test marks

Semester End Examination (SEE): SEE marks for the practical course is 50 Marks.

- The duration of SEE is 03 hours. Questions shall be set worth of 3 hours
- SEE shall be conducted jointly by the two examiners appointed by the COE.
- SEE shall be conducted and evaluated for maximum of 100 marks. Marks obtained shall be accounted for SEE final marks, reducing it to 50 marks.
- Two questions from each Modules to be set as per the below tabled weightage details. The student has to answer one from each module.

- Question paper for each batch of students has to be set before the commencement of Examination of each batch. The answer sheets will have to be jointly evaluated by the two examiners.
- Two questions to be set from each Module
- Student has to answer one question each from Module
- ***However, the student may be awarded full marks, if he/she completes solution on*** computer ***display without sketch***.

.Module	Max Marks Weightage	Evaluation weightage in marks	
		Computer Display & print out	Preparatory Sketching
Module-1	20	15	05
Module-2	30	25	05
Module-3	25	20	05
Moduel-4	25	20	05
TOTAL	**100**	**80**	**20**

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BCEDK203.1	Ability to apply orthographic projection principles to represent points and lines in various quadrants.
M25BCEDK203.2	Apply orthographic projection principles to represent regular plane surfaces for different resting positions and orientation within the first quadrant.
M25BCEDK203.3	Proficiently apply orthographic projection techniques to represent right regular solids resting on HP.
M25BCEDK203.4	Apply isometric scale and projection techniques to visualize and represent various solids facilitating a comprehensive understanding of engineering drawings
M25BCEDK203.5	Analyze and create lateral surfaces for solids resting on HP

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BCEDK203.1	3	-	-	-	-	-	-	-	-	-	-
M25BCEDK203.2	-	3		-	-	-	-	-	-	-	-
M25BCEDK203.3	-	-	3	-	-	-	-	-	-	-	-
M25BCEDK203.4	-	-	-	3	-	-	-	-	-	-	-
M25BCEDK203.5	-	-	-	-	2	-	-	-	-	-	-
M25BCEDK203	**3**	**3**	**3**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**

6. Mapping to Sustainable Development Goals (SDG):

Note: Minimum 3 SDG's to be mapped with each course

Sl. No.	SDG	Justification
1	SDG 4: Quality Education	Quality Education by providing essential technical and digital skills in engineering drawing and CAD. It promotes inclusive, skill-based learning aligned with modern industry and lifelong learning goals.
2	SDG 9: Industry, Innovation, and Infrastructure	By building foundational skills in technical drawing and CAD, essential for modern engineering design and manufacturing. It fosters innovation and contributes to sustainable industrial development through accurate visualization and digital drafting tools.
3	SDG 12: Responsible Consumption and Production	By teaching precise design and drafting techniques that reduce material wastage and support efficient manufacturing. It encourages sustainable design practices through accurate development of surfaces and optimized use of resources in engineering production.

1st/2nd Semester	Engineering Science Course (ESC) Introduction to Civil Engineering	M25BESK104A/204A

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic Science and Mathematics	Knowledge of basic physics (mechanics, forces) and mathematics (algebra, geometry).
2	Environmental Awareness	Basic knowledge of pollution, sanitation, and sustainable issues.
3	Engineering Drawing and Visualization	Knowledge of sketches, visualization of shapes, sections and projections of buildings.
4	Logical Reasoning and Spatial Ability	Skill to understand space, balance, and visualize structures and forces.

2. Syllabus

Introduction to Civil Engineering

SEMESTER – I/II

Course Code	**M25BESK104A/204A**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/Sem(L: T: P:TW:SL)	**32:32:0: 20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. Explore Civil Engineering scope, materials, and building components aligned with Sustainable Development Goals.
2. Apply fundamental concepts of force systems, equilibrium, and free-body diagrams in basic structural analysis.
3. Calculate and locate centroid of simple and built-up sections for structural applications.
4. Calculate moment of inertia of simple and built-up sections for structural applications

Module 1

Introduction: Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering.

Basic Materials of Construction: Bricks, Cement & mortars, Plain, Reinforced Cement Concrete.

General components of the building and Introduction to sustainable development goals.

Module 2

Analysis of concurrent force systems: Concept of idealization, system of forces, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrent force systems, free body diagram, equations of equilibrium, equilibrium of concurrent coplanar force systems

Module 3

Analysis of non-concurrent force systems: Resultant of non-concurrent coplanar force systems, moment of forces, couple, Varignon's theorem, equilibrium of non-concurrent coplanar force systems

Module 4

Centroid: Methods of determining the centroid, locating the centroid of plane laminae from first principles, centroid of built-up sections. Numerical examples

Module 5

Moment of inertia: Method of determining the second moment of area of plane sections from first principles, parallel axis and perpendicular axis theorem, radius of gyration, moment of inertia of built-up sections, Numerical Examples.

TEXTBOOKS:

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, *Basic Civil Engineering and Engineering Mechanics*, 2015,Laxmi Publications.
2. Kolhapure B K, *Elements of Civil Engineering and Engineering Mechanics*, 2014, EBPB

REFERENCE BOOKS:

1. Beer F.P. and Johnston E. R., *Mechanics for Engineers, Statics and Dynamics*, 1987, McGraw Hill.
2. Irving H. Shames, *Engineering Mechanics*, 2019, Prentice-Hall.
3. Hibbler R. C., *Engineering Mechanics: Principles of Statics and Dynamics*, 2017, Pearson Press.

4. Timoshenko S, Young D. H., Rao J. V., *Engineering Mechanics*, 5th Edition, 2017, Pearson Press.
5. Bhavikatti S S, *Engineering Mechanics*, 2019, New Age International 6. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication

VIDEO LINKS:

1. https://www.youtube.com/watch?v=nGfVTNfNwnk&list=PLOSWwFV98rfKXq2KBphJz95rao7q8PpwT
2. https://www.youtube.com/watch?v=3YBXteL-qY4
3. https://www.youtube.com/watch?v=atoP5_DeTPE
4. https://www.youtube.com/watch?v=ksmsp9OzAsI
5. https://www.youtube.com/watch?v=x1ef048b3CE
6. https://www.youtube.com/watch?v=l_Nck-X49qc
7. https://play.google.com/store/apps/details?id=appinventor.ai_jgarc322.Resultant_Force
8. https://www.youtube.com/watch?v=RIBeeW1DSZg
9. https://www.youtube.com/watch?v=R8wKV0UQtlo
10. https://www.youtube.com/watch?v=0RZHHgL8m_A
11. https://www.youtube.com/watch?v=Bls5KnQOWkY

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Interactive Lectures	Use multimedia presentations, models, and physical samples to explain building materials and structural components.
2	Field Visits	Organize visits to construction sites, water treatment plants, and urban infrastructure projects.
3	Group Activities	Facilitate collaborative work on smart city models and environmental impact discussions.
4	Problem Solving Sessions	Introduce conceptual and numerical problem-solving on centroid, force systems, and moment of inertia.
5	ICT Tools and Videos	Use NPTEL lectures, animations and simulations to demonstrate real-time force analysis and building science.
6	Seminars and Presentations	Assign students short presentations on infrastructure, smart cities, and sustainable practices.

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

Components		Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Tem Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component. The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks.

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

Cos	Description
M25BESK104A.1	Apply knowledge of Civil Engineering disciplines, materials, structural elements, and infrastructure for sustainable development practices.
M25BESK104A.2	Analyze the resultant and equilibrium of force systems on the rigid bodies.
M25BESK104A.3	Determine and locate the centroid of plane and built-up sections.
M25BESK104A.4	Determine the moment of inertia of plane and built-up sections.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BESK104A.1	3	-	2	-	-	2	3	-	-	-	2
M25BESK104A.2	3	3	2	2	2	-	-	-	-	-	2
M25BESK104A.3	3	3	2	2	-	-	-	-	-	-	2
M25BESK104A.4	3	3	2	2	-	-	-	-	-	-	2
M25BESK104	**3**	**3**	**2**	**2**	**2**	**2**	**3**	-	-	-	**2**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 9**: Industry, Innovation and Infrastructure	Students explore fundamental infrastructure design concepts promoting innovation and resilient development.
2	**SDG 11**: Sustainable Cities and Communities	Incorporates clean city, smart city, and solid waste management topics to improve urban livability.
3	**SDG 13**: Climate Action	Introduces environment-friendly practices in construction and energy-efficient buildings.

1st/2nd Semester	Engineering Science Course (ES) INTRODUCTION TO ELECTRICAL ENGINEERING	M25BESK104B/204B

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic Concepts in physics	Understanding of electric charge, voltage, current, resistance, and power. These concepts form the foundation of electrical engineering.
2	Circuit Elements	Familiarity with fundamental concepts of discrete components such as resistors, capacitors and inductors
3	Mathematics	Proficiency in algebra for solving few mathematical expressions using voltage divider rule, integration and differential equations to calculate the desired voltage, frequency of operation
4	Previous Coursework	Gain a basic understanding of electromagnetic theory, including concepts like magnetic fields, electromagnetic induction, and the relationship between electricity and magnetism.
5	Component symbols	Familiarity with electrical components and their symbols, along with safety precautions, lays a strong groundwork for further learning.

2. Syllabus

INTRODUCTION TO ELECTRICAL ENGINEERING SEMESTER – I/II			
Course Code	**M25BESK104B/204B**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem(L:T: P:TW:SL)	**32:32:0:20:20 = 104Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

- To explain the laws used in the analysis of DC and AC circuits.
- To explain the behavior of circuit elements in single-phase circuits.
- To explain the construction and operation of transformers, DC generators, DC motors and Induction motors.
- To introduce concepts of circuit protecting devices and earthing.
- To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.

Module -1: Electrical Energy Sources & DC circuits

Introduction: Sources of Electrical Energy- Hydro, Thermal, Solar, Wind, Single line diagram approach. Brief introduction to the electrical generation using Thermal, Solar, Hydro, Wind (Block diagram approach).

DC circuits: Ohm's law and Kirchhoff's laws, analysis of series, parallel and series – parallel circuits excited by independent voltage sources. Power and energy, Illustrative examples

Module -2: Single phase and Three phase AC circuit

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

Three Phase Circuits:

Generation of Three phase AC quantity, advantages and limitations; star and delta connection, relationship between line and phase quantities.

Module -3: DC Machines

DC Generator: Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple numerical.

DC Motor: Principle of operation, back emf and its significance. Torque equation, types of motors, characteristics and speed control (armature & field) of DC motors (series & shunt only). Applications of DC

motors. Simple numerical.
Module -4: Transformer & Induction Motor
Transformers: Necessity of transformer, principle of operation, Types and construction of single phase transformers, EMF equation, losses, variation of losses with respect to load. Efficiency and simple numerical. **Three-phase induction Motors**: Concept of rotating magnetic field, Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance simple numerical.
Module -5: Domestic Wiring & Electrical Safety
Domestic Wiring: Requirements, Types of wiring: casing, capping. Two way and three way control of load. **Electricity Bill**: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. **Equipment Safety measures**: Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. **Personal safety measures**: Electric Shock, Earthing and its types, Safety Precautions to avoid shock
TEXTBOOKS: 1. Fundamentals of Electrical Engineering & Electronics by B L Theraja, S. Chand and Company Pvt. Ltd. Reprint edition, 2013 2. Basic Electrical Engineering D. C. Kulshreshtha McGraw-Hill Education 1st edition, 2019 **REFERENCE BOOKS:** 1. Electrical Technology E Huges Pearson International Students 9th edition 2. Principles of Electrical Engineering & Electronics V K Mehta and Rohit Mehta S. Chand and Company Pvt. Ltd. **VIDEO LINKS:** 1. https://youtu.be/OC8Lbyeyh-E 2. https://youtu.be/5CHufqAF-p0

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of generation of electrical energy.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
5	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
6	Laboratory Learning	Utilize the facilities available in the laboratories to understand the behavior of the materials by performing few experiments.

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Engineering Science Course ES1/ES2

Components		Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BESK104B.1	**Understand** the concepts of hydel, thermal, solar & wind energy sources and Electric circuits.
M25BESK104B.2	**Apply** Ohm's law and Kirchhoff's laws to solve DC & AC circuits
M25BESK104B.3	**Illustrate** the construction and working principles of DC & AC Machines
M25BESK104B.4	**Describe** the types of wiring, tariff and safety measures in an electrical system.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BESK104B.1	3	3									
M25BESK104B.2	3	3									
M25BESK104B.3	3	3									
M25BESK104B.4	-					3					
M25BESK104B	**3**	**3**				**3**					

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	SDG 7: Affordable and Clean Energy	Electrical engineers are crucial in designing, installing, and maintaining systems for solar, wind, hydro, and geothermal power. This involves understanding circuits, power electronics, energy conversion, and grid integration.
2	SDG 9: Industry, Innovation, and Infrastructure	Applying basic electrical engineering principles leads to the development of energy-efficient industrial processes, automation, and control systems that reduce resource consumption and waste.
3	SDG 11: Sustainable Cities and Communities	Smart Cities: The development of smart cities heavily relies on electrical engineering for smart infrastructure, energy conservation, efficient waste management, and sustainable urban living. Sustainable Transportation: Electrical engineers are vital in the design and development of electric vehicles (EVs) and their charging infrastructure, reducing reliance on fossil fuels and improving air quality in urban areas.

1st/2nd Semester	Engineering Science Course - (ESC) INTRODUCTION TO ELECTRONICS AND COMMUNICATION	M25BESK104C/204C

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic knowledge on Physics	A fundamental understanding of physics concepts such as electricity, circuits, and waves.
2	Basic knowledge on Mathematics	A fundamental understanding of mathematics such as algebra, basic calculus and logarithms functions.
3	Semiconductor Fundamentals	Basic concepts of conductors, insulators, and semiconductors. Understanding of charge carriers, p-n junctions, and diode/transistor behavior.
4	Basic Electronics	Familiarity with basic electronic components like resistors, capacitors, inductors, and semiconductors is necessary.
5	Basic circuit analysis	Proficiency in circuit theory is important. This includes understanding concepts such as voltage, current as well as basic circuit analysis techniques like Ohm's Law, is fundamental.

2. Syllabus

INTRODUCTION TO ELECTRONICS AND COMMUNICATION SEMESTER – I/II			
Course Code	**M25BESK104C/204C**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem(L:T: P:TW:SL)	**32:32:0:20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. To prepare students with fundamental knowledge/ overview in the field of Electronics and Communication Engineering.
2. To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of electronic circuits, logic design, embedded systems, and communication systems.
3. Professionalism & Learning Environment: To inculcate in first-year engineering students an ethical and professional attitude by providing an academic environment inclusive of effective communication, teamwork, ability to relate engineering issues to a broader social context, and life-long learning needed for a successful professional career.

Module -1

Power Supplies –Block diagram, Half-wave rectifier, Full-wave rectifiers and filters, Voltage regulators, Output resistance and voltage regulation, Voltage multipliers.

Amplifiers – Transistors and its applications, DC Load line, Types of amplifiers, Gain, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback, Transistor Amplifier (Text 1)

Module -2

Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Multi vibrators, Single-stage as table oscillator, (Only Concepts, working, and waveforms. No mathematical derivations)

Operational amplifiers -Operational amplifier parameters, Operational amplifier characteristics, Operational amplifier configurations, Operational amplifier circuits.(Text 1)

Module -3

Boolean Algebra and Logic Circuits: Number Base Conversion, Complements, Binary subtraction using 1's and 2's complement method, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Digital Logic Gates (Basic and Universal Gates).

Combinational logic: Introduction, Design procedure, Adders- Half adder and Subtractor, Full adder and Subtractor (Text 2)

Module -4
Embedded Systems – Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Microprocessor vs Microcontroller, RISC vs CISC, Harvard and Von-Neumann architecture. **Sensors and Interfacing** – Instrumentation and control systems, Transducers, Sensors, Actuators, LED, 7-Segment LED Display. (Text 3)
Module -5
Analog Communication Schemes – Modern communication system - Information source, and input transducer, Transmitter, Channel or Medium – Hardwired and Soft wired, Noise, Receiver, Multiplexing, Types of communication systems. Types of modulation (only concepts) – AM , FM, PM. Concept of Radio wave propagation (Ground, space, sky) **Digital Modulation Schemes:** Advantages of digital communication over analog communication, ASK, FSK, PSK, Multiple access techniques. (Text 4)
Text Books 1. Mike Tooley, 'Electronic Circuits, Fundamentals & Applications',4thEdition, Elsevier, 2015. DOI https://doi.org/10.4324/9781315737980. eBook ISBN9781315737980 2. Digital Logic and Computer Design, M. Morris Mano, PHI Learning, 2008 ISBN-978-81-203- 0417-84. 3. K V Shibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India), Private Limited, 2016 4. S L Kakani and Priyanka Punglia, 'Communication Systems', New Age International Publisher, 2017. **Reference Book** 1. Alberto Malvino, David J. Bates 7th edition**,** McGraw Hill Education (India), Private Limited, 2017

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of electronics components.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

Components		Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M23BESK104C/204C.1	**Present** the comprehensive knowledge of electronic circuits encompassing power supplies, amplifiers, operational amplifiers, oscillators, boolean algebra and logic circuits.
M23BESK104C/204C.2	**Apply** the basic concepts of electronics engineering required for comprehending the operation and application of electronic circuits encompassing power supplies, amplifiers, operational amplifiers, oscillators, boolean algebra and logic circuits.
M23BESK104C/204C.3	**Apply** the knowledge of digital electronics concepts to realize the combinational logic circuits.
M23BESK104C/204C.4	**Illustrate** the role of sensor and actuator in embedded system and study the various modulation and demodulation techniques of analog and digital communication systems.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M23BESK104C/204C.1	3	-	-	-	-	-	-	-	-	2	-
M23BESK104C/204C.2	3	3	-	-	-	-	-	-	-	2	-
M23BESK104C/204C.3	3	3	-	-	-	-	-	-	-	-	-
M23BESK104C/204C.4	3	2	-	-	-	-	-	-	2	-	-
M23BESK104C/204C	**3**	**2.66**	**-**	**-**	**-**	**-**	**-**	**-**	**2**	**2**	**-**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 4**: Quality Education	Learning advanced electronics builds foundational engineering skills.
2	**SDG 9**: Industry, Innovation and Infrastructure	Embedded systems, communication technologies, amplifiers, digital logic.
3	**SDG 11**: Sustainable Cities and Communities	Sensors, automation, embedded applications in smart cities

1st/2nd Semester	Engineering Science Course -1 (ES-1) INTRODUCTION TO MECHANICAL ENGINEERING	M25BESK104D /204D

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic understanding of engineering disciplines	Familiarity with different engineering fields and their societal Impact.
2	Basic mathematical and physical science knowledge	Foundational understanding of mathematics and physics concepts such as force, energy, and material behaviour relevant to mechanical systems.
3	Analytical thinking skills	Ability to break down problems, identifies key elements, and solves them logically.
4	Visualization skills	Ability to interpret diagrams, schematics, and 3D models relevant to mechanical systems.

2. Syllabus

INTRODUCTION TO MECHANICAL ENGINEERING SEMESTER – I/II			
Course Code	**M25BESK104D/204D**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**32:32:0:20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

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.

Module -1

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.

Energy: Introduction and applications of Energy sources like Nuclear fuels, Hydel, Solar (Solar Pond), wind, and Environmental issues like Global warming and Ozone depletion.

Module -2

Machine Tool Operations: Working Principle of lathe, **Lathe operations:** Turning, Facing, Knurling.
Working principles of Drilling Machine, **Drilling operations:** Drilling, Boring, and Reaming.
Working principles of Milling Machine, **Milling operations:** Plane milling, End Milling and Slot milling.
(No sketches of machine tools, sketches to be used only for explaining the operations).

Automation in industry: Definition, types – Fixed, programmable and flexible automation, basic elements with block diagrams, advantages.

Module -3

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.

Module -4

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.

Module -5
Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Classification based on robotics configuration: polar cylindrical, Cartesian coordinate and spherical. Application, Advantages and disadvantages. **Introduction to Advanced Manufacturing Systems**: Introduction, components of CNC, advantages and applications of CNC, 3D printing.
TEXTBOOKS: 1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2018 2. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media promoters and Publishers Pvt. Ltd., 2013. **REFERENCE BOOKS:** 1. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Fourth Edition. 2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 5th Ed., 2018. 3. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1 **VIDEO LINKS:** 1. https://youtu.be/mCd89QE3t8c?si=mHuVn-BWeVHWvSs6 2. https://youtu.be/H6guqGSzcNc?si=Ra7nfv_6bGqvxFaD

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lectures & Presentations	Deliver core concepts and foundational knowledge. - Utilize multimedia (images, diagrams, and animations, videos) to enhance understanding.
2	Interactive Discussions & Q&A	Encourage active participation and clarification of doubts. Facilitate critical thinking and analysis of concepts through student-led discussions
3	Hands-on Activities	Provide laboratory or simulation-based activities to demonstrate real-world applications of mechanics or machine tools.
4	Case Studies	Present real-world engineering challenges and have students analyze potential solutions.
5	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
6	Project-Based Learning	Encourage research and design thinking through project-based learning activities

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Professional Course (ES-1)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component.
The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a

maximum of 3 sub questions), may have mix of topics under that module if necessary.

3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BESK104D/204D.1	**Interpret** the role of mechanical engineering in various industrial sectors**; Illustrate** the working principles and applications of energy sources and environmental impact, including issues such as global warming and ozone depletion.
M25BESK104D/204D.2	**Analyze** the working principles and functionalities of various machine tools. **Classify** industrial automation systems into fixed, programmable, and flexible types based on control strategy and adaptability.
M25BESK104D/204D.3	**Evaluate** the construction and working of Internal Combustion (IC) engines with respect to energy conversion processes; and **analyse** the working principles and challenges of electric and hybrid vehicles in future mobility.
M25BESK104D/204D.4	**Utilize** material properties to select appropriate engineering materials for mechanical applications, and **Interpret** the working principles and applications of metal joining processes such as welding, brazing, and soldering.
M25BESK104D/204D.5	**Analyze** the integration of mechanical, electrical, electronic, and computing subsystems in mechatronic systems, and **Illustrate** the configurations and applications of robotic systems and advanced manufacturing technologies such as CNC and 3D printing.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BESK104D/204D.1	3	-	-	-	-	-	-	-	-	-	-
M25BESK104D/204D.2	3	-	-	-	-	-	-	-	-	-	-
M25BESK104D/204D.3	-	3	-	-	-	-	-	-	-	-	-
M25BESK104D/204D.4	3	-	-	-	-	-	-	-	-	-	-
M25BESK104D/204D.5	3	-	-	-	-	-	-	-	-	-	-
M25BESK104D/204D	**3**	**3**	-	-	-	-	-	-	-	-	-

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 7**: Affordable and Clean Energy	The introduction and applications of renewable energy sources (solar, wind) and emerging technologies like electric and hybrid vehicles promote clean, sustainable, and affordable energy solutions, reducing dependence on fossil fuels and mitigating environmental issues. aligning with SDG 7
2	**SDG 9**: Industry, Innovation and Infrastructure,	CNC, 3D printing, robotics, and automation drive innovation, enhancing productivity, precision, and sustainability in industries, supportingSDG 9
3	**SDG 12**: Responsible Consumption and Production	Efficient manufacturing, advanced materials, and responsible practices help minimize waste, promote recycling, and support sustainable consumption, aligning with SDG 12

1st/ 2nd Semester	Engineering Science Course (ESC) Introduction to C Programming	M25BESK104E/204E

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	**Basic computer Skills**	Understanding how to use a computer, Functionality of Computer and perform basic Programming.
2	**Logical Thinking**	Ability to think logically and analytically, which is crucial for understanding algorithms and problem-solving in programming.
3	**Understanding of Algorithms**	Understanding the logic behind different algorithms (e.g., sorting, searching) can improve the efficiency of the code and its role in solving problems efficiently.
4	**Basic Modular Arithmetic**	Basic Number Theory: Understanding of integers, Datatypes. Algebra: Proficiency in algebraic manipulations and understanding of congruence relations.
5	**Problem-Solving Skills**	Ability to break down complex problems into smaller, manageable parts and develop step-by-step solutions

2. Syllabus

Introduction to C Programming **SEMESTER – I/II**			
Course Code	**M25BESK104E/204E**	CIE Marks	**50**
Number of Lecture Hours/Week (L:T: P: S:TW:SL)	**32:32:0:0:20:0=84Hrs**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. Understand basic programming concepts.
2. Provide knowledge for problem solving through programming.
3. Illustrate solutions to the given problem using C

Module -1

Introduction: Introduction to computers, Algorithms, flowcharts, pseudo codes, structure of a C program, writing the first C program, keywords, identifiers, basic data types, variables, constants, input / output statements, operators and expressions, type conversion and typecasting. Compilers, Compiling and executing C programs.

Module -2

Branching Statements: Conditional Branching

Control Statements: if, if-else, if-else-if, switch case.

Looping Statements: for, while, do-while statements, nested loops, break and continue statements.

Module -3

Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, operations on arrays – searching for a value in an array (Linear search, Binary search) and sorting the elements in an array (Bubblesort, Selection sort), two dimensional arrays and operations**.**

Module -4

Functions: Introduction, declaration/prototype, definition, function call, return statement, passing parameters to functions, storage classes, recursion. Strings: Introduction–reading and writing strings, string operations, miscellaneous string and character functions.

Preprocessor Directives: Introduction, Types of Preprocessor Directives, #define, #include, #undef.

Module -5

Structures: Introduction to structures, nested structures, arrays of structures, structures and functions.

File Processing: Introduction to Files, Using Files in C, Reading Data from Files(fscanf(), fgets(),fgetc()) , and Writing data to Files(fprintf(), fputs(),fputc()).

Textbooks:

1.Reema Thareja, Computer Fundamentals and Programming in C, 2nd edition, Oxford University Press, 2016.

Reference Books:

1. Brian Kernighan and Dennis Ritchie, The C Programming Language, 2nd edition, Prentice Hall, 2012.
2.Yashavant P. Kanetkar, Let Us C, 16th edition, BPB Publications, 2017.
VIDEO LINK:
https://onlinecourses.nptel.ac.in/noc22_cs40/preview

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of Programming concepts.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Higher Order Thinking (HOTS) Questions:	Pose HOTS questions to stimulate critical thinking related to each competency.
5	Problem-Based Learning (PBL)	Implement PBL to enhance analytical skills and practical application of competencies
6	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
7	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

Components		Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	2	50%	25
2	Assignments/Quiz/Activity (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Assignments/Quiz/Activity marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component. The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

Cos	Description
M25BESK104E/204E.1	Understanding the basic concepts of programming in C
M25BESK104E/204E.2	Apply concepts of procedure-oriented programming to solve a given problem
M25BESK104E/204E.3	Analyze the given code segment for syntactic and logical errors
M25BESK104E/204E.4	Design and develop modularized solution for given requirements

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BESK104E/204E.1	3	-	-	-	-	-	-	-	-	-	-
M25BESK104E/204E.2	3	-	-	-	-	-	-	-	-	-	-
M25BESK104E/204E.3	-	3	-	-	-	-	-	-	-	-	-
M25BESK104E/204E.4	-	-	3	-	-	-	-	-	-	-	-
M25BESK104E/204E	**3**	**3**	**3**	-	-	-	-	-	-	-	-

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 4**: Quality Education	The course builds critical computational and analytical thinking skills, empowering students with lifelong learning tools in computer science. Promotes technical education and employability
2	**SDG 8**: Decent Work and Economic Growth	By equipping students with key programming and problem-solving skills, the course enhances career opportunities in IT and software sectors, contributing to economic growth.
3	**SDG 9**: Industry, Innovation and Infrastructure	Programming using C form the backbone of modern technology and software infrastructure. The course fosters innovation and prepares students for building efficient, scalable digital systems

1st / 2nd Semester	Professional Course (PC) Green Buildings	M25BETK105A/205A

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Mathematics.	Fundamentals of arithmetic and algebra calculations.
2	Physics.	Fundamentals of heat, light, and building physics.
3	Material Science.	Understanding how materials respond to external loads.
4	Construction Methods and Materials.	Knowledge of construction materials observed in day-to-day life.

2. Syllabus

Green Buildings

SEMESTER – I/II

Course Code	**M25BETK105A/205A**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/Sem(L: T: P:TW:SL)	**32:32:0: 20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. Understand the Definition, Concept & Objectives of the terms cost effective construction and green building.
2. Apply cost effective Technologies and Methods in Construction.
3. Understand the Problems due to Global Warming.
4. Understand green building ratings and sustainable design.
5. Understand the concept of utilization of solar energy and green composites.

Module -1

Introduction to the concept of cost-effective construction

- Different types of materials, their availability, requirements/properties and application – Stones, Laterite Blocks, Burnt Bricks, Concrete Blocks, Stabilized Mud Blocks, Lime Pozzolana Cement, Fiber Reinforced Cement Components, Fiber Reinforced Polymer Composite, Bamboo.
- Recycling of building materials–Bricks, Concrete, Steel, Plastics.
- Environmental issues related to quarrying of building materials.

Module -2

Environment friendly and cost-effective Building Technologies

- Alternates for wall construction - Flemish Bond, Rat Trap Bond, Cavity Wall.
- Ferro Cement and Ferro Concrete constructions.
- Different pre cast members using these materials - Wall and Roof Panels,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.
- Contributions of agencies - Cost ford, Nirmithi Kendra, Habitat

Module -3

Global Warming

- Definition, Causes and Effect, Contribution of Buildings towards Global Warming,
- Carbon Footprint – Global Efforts to reduce carbon Emissions.
- Green Buildings – Definition, Features, Necessity, Environmental benefit, Economical benefits, Health and Social benefits, Major Energy efficient areas for buildings.
- Embodied Energy in Materials.
- Comparison of cost of Green V/s Conventional Building.
- Life cycle Assessment of Buildings.

Module -4

Green Building rating Systems – BREEAM, LEED, GREEN STAR, GRIHA (Green Rating for Integrated Habitat Assessment) and IGBC for new buildings – Purpose - Key highlights - Point System with Differential weight age. **Green Design** – Definition, Principles of sustainable development in building design, Characteristics of Sustainable Buildings, sustainably managed Materials.
Module -5
Utility of Solar Energy in Buildings Utility of Solar energy in buildings concepts – Passive Cooling and Heating of Buildings, Low Energy Cooling, Case studies of Solar Passive Cooled and Heated Buildings. **Green Composites for Buildings –** Concepts of Green Composites, **Water Utilization in Buildings** – Low Energy Approaches to Water Management, Management of Solid Wastes, Management of Sullage Water and Sewage. **Green Cover and Built Environment.**
TEXTBOOKS: 3. HarharaIyer G, ***Green Building Fundamentals***, Notion Press 4. Dr. Adv. Harshul Savla, ***Green Building: Principles & Practices***. Notion press. **REFERENCE BOOKS:** 1. Jimmy C.M. Kao, Wen-Pei Sung, Ran Chen, ***Green Building, Materials and Civil Engineering,*** 1st edition, CRC Press. 2. Ross Spiegel, Dru Meadows, ***Green Building Materials: A Guide to Product Selection and Specification***, 3. Sam Kubba, ***Handbook on green building design and construction,*** **BH publications.** **VIDEO LINKS:** **1. https://www.youtube.com/watch?v=THgQF8zHBW8** **2. https://www.youtube.com/watch?v=DRO_rIkywxQ**

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of Verilog concepts.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
5	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies.
6	Site Visits	Visting the sites to understand the concept of green building materials and technologies.

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component. The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 questions from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks.

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BETK105A/205A.1	**Apply** the knowledge of science and engineering fundamentals to study environmental issues in building materials and environmentally friendly/alternative building materials for cost effective and energy efficient construction.
M25BETK105A/205A.2	**Illustrate** the concept of global warming due to different materials and buildings in construction.
M25BETK105A/205A.3	**Exemplify** the concept of green building rating systems used in buildings.
M25BETK105A/205A.4	**Illustrate** the alternate source of energy and effective water & solid waste management used in buildings to meet sustainable environment.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BETK105A/205A.1	3	-	-	-	-	2	-	-	-	-	-
M25BETK105A/205A.2	3	-	-	-	-	2	-	-	-	-	-
M25BETK105A/205A.3	3	2	-	-	-	2	-	-	-	-	-
M25BETK105A/205A.4	3	-	-	-	-	2	-	-	-	-	2
M25BETK105A/205A	**3**	**2**	**-**	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**2**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 3:** Good Health and Well-being	Improves indoor air quality, reduces exposure to harmful materials, and promotes healthier living and working environments
2	**SDG 6:** Clean Water and Sanitation	They will learn about rainwater harvesting, greywater reuse, and better sanitation systems.
3	**SDG 7:** Affordable and Clean Energy	Focuses on energy efficiency and renewable integration (solar systems)
4	**SDG 9**: Industry, Innovation and Infrastructure,	By adapting these green technologies can ensure buildings and components can handle real-world loads and environmental effects, which is crucial for developing resilient infrastructure.
5	**SDG 11**: Sustainable Cities and Communities,	Supports urban resilience, resource-efficient neighbourhoods, and inclusive city planning.
6	**SDG 12:** Responsible Consumption and Production	The efficient use of materials and adoption of construction practices that minimize waste and environmental impact.
7	**SDG 13:** Climate Action	Promotes deep decarbonization, greenhouse gas reduction, and climate adaptation resilience
8	**SDG 15:** Life on Land	Supports biodiversity, ecosystem preservation, sustainable forestry, and green landscapes

1st /2nd Semester	Emerging Technology Course (ET) Smart Building Services and Sustainable Systems	M25BETK105B/205B

1. Prerequisites.

S/L	Proficiency	Prerequisites
1	Basic knowledge of science and mathematics	Studied in 10+2 level and implementation of the concepts through fundamentals
2	Familiarity with basic engineering drawing	The subject imparts ability to visualize spatial arrangements.
3	General awareness of buildings and infrastructure	Understanding of common utilities in homes/buildings.
4	Basic communication skills	Understand and interpret instructions, manuals, and maintenance records

2. Syllabus

Smart Building Services and Sustainable Systems **SEMESTER – I/II**			
Course Code	**M25BETK105B/205B**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L: T: P:TW:SL)	**32:32:0:16:20=100Hrs**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. Learn the importance of sanitation, domestic water supply, and fire services.
2. Understand the concepts of heat, ventilation and air conditioning.
3. Develop technical and practical knowledge in Building Services.

Module -1

Water Supply Services for building:
Basics of water supply for different building types, Simple water purification techniques, Water-saving methods and practices, Service connections: mains, sump, storage tanks, Simple layout plans for water supply systems in building.

Plumbing services for building:
Introduction to plumbing services, Basic plumbing, Types/sizes of pipes and pipe fittings and special setups for multi-storeyed buildings, Common materials, bathroom fixtures, and modern fittings (e.g., taps, mixers, showers).

Module -2

Heat Ventilation and Air Conditioning (HVAC):
Basics of heat transfer and thermal insulating materials, Common methods of thermal insulation for roofs and walls.

Ventilation: importance, types, and basic systems, Fundamentals of air conditioning and air cooling systems, Principles of Air conditioning, Types of ducting and air distribution methods, Essentials of air-conditioning system.

Module -3

Electrical Services for building:
Basics of electricity and electrical supply (Single & Three-phase), Protective devices in buildings (fuse, MCB, RCCB, etc.), Electrical safety and types of earthling (pipe, plate, chemical), ISI standards and safety norms, Types of electrical wiring and cables used in buildings, Electrical layout planning for residential buildings, Components: Main board, distribution board, Basic principles of lighting and illumination.

Fire Fighting services for building:
Classification of buildings based on fire risk and occupancy, Common causes and spread of fire in buildings Fire protection systems: active and passive, Fire detection equipment: smoke detectors, heat sensors, alarms Fire suppression systems: sprinklers, extinguishers, hydrants, wet & dry risers, Escape route planning: fire stairs, doors, signage, fire safety provisions.

Module -4

Solar Energy Systems in Buildings:
Introduction to Solar Energy: Basics of solar radiation and photovoltaic (PV) principle, Solar potential in India, Solar Power Systems: Components of a rooftop solar system, Applications in Buildings: Rooftop solar electricity generation, Solar water heating systems, Solar streetlights and garden lighting, Solar-

powered fans and pumps.

Rainwater Harvesting: Introduction to Rainwater Harvesting, Need and Importance of RWH in Modern Context, Basic Components of Rainwater Harvesting System, Types of Rainwater Harvesting Systems, Benefits of Rainwater Harvesting, Limitations and Challenges in Implementation.

Module -5

Engineering Services in Buildings:

Introduction of Engineering Services, Vertical Transportation Systems: Lifts and escalators – types, safety norms, Cold and hot water supply systems, Electrical Systems: Overview of building wiring, power distribution, Heating Systems: Hot water boilers – types and usage.

Building Maintenance:

Introduction to Building Maintenance: Importance and scope, Types of Maintenance: Preventive: Regular inspections, servicing, Protective: Weatherproofing, anti-corrosion measures, Scheduled: Periodic maintenance routines, Contingency: Emergency repairs and breakdown response, Maintenance Planning: Planning tools and scheduling, Maintenance Information System (MIS), Maintenance Standards and Practices.

Text Books

1. Charangith shah, Water supply and sanitary engineering, Galgotia publishers.
2. E. G. Butcher, Smoke control in Fire-safety Design.
3. Energy Conservation Building Code – 2017 (with amendments up to 2020), Bureau of Energy Efficiency.

Reference Books:

1. National Building Code.
2. O. H. Koenigsberger, "Manual of Tropical Housing and Building", Longman Group United Kingdom.

3. Teaching-Learning Process Strategies

S/L	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of concepts.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Multiple Representations	Introduce topics in various representations to reinforce competencies
5	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
6	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation (CIE)

The minimum CIE marks requirement is 40% of maximum marks in each component.

Test Marks distribution for the Engineering Science Course

Components		Number	Weightage	Max. Marks
(i)	Internal Assessment-Tests (A)	2	50%	25
(ii)	Assignments/Quiz/Activity (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

Average internal assessment shall be the average of the 2 test marks conducted.

Semester End Examination (SEE)

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

The question paper will have ten questions. Each question is set for 20 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.

The students have to answer 5 full questions, selecting one full question from each module.

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

Cos	Description
M25BETK105B/205B.1	**Demonstrate** the understanding of basic engineering services in buildings including water supply, HVAC, electrical, and solar systems.
M25BETK105B/205B.2	**Apply** sustainable solutions in buildings through the use of rainwater harvesting, solid waste management, and energy-saving methods.
M25BETK105B/205B.3	**Identify** and **interpret** safety systems and maintenance strategies including firefighting systems, accessibility features, and building upkeep procedures.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BETK105B/205B.1	3	-	-	-	-	-	2	-	-	-	2
M25BETK105B/205B.2	3	-	-	-	-	2	-	-	-	-	-
M25BETK105B/205B.3	-	3	-	-	-	-	-	-	-	-	-
M25BETK105B/205B	**3**	**3**	**-**	**-**	**-**	**2**	**2**	**-**	**-**	**-**	**2**

6. Mapping to Sustainable Development Goals (SDG)

Sl. No.	SDG	Justification
1	**SDG 3**: Good Health and Well-being	HVAC, Fire safety, Ventilation, Building maintenance
2	**SDG 6**: Clean Water and Sanitation	Water supply, Rainwater harvesting, Wastewater systems
3	**SDG 7**: Affordable and Clean Energy	Solar energy systems, Energy-efficient electrical layout
4	**SDG 9**: Industry, Innovation and Infrastructure	Engineering services in buildings, Lift systems, Automation in waste management
5	**SDG 11**: Sustainable Cities and Communities	Solid waste management, Fire safety, Accessibility, HVAC
6	**SDG 12**: Responsible Consumption and Production	Waste segregation, Composting, Energy-efficient lighting
7	**SDG 13**: Climate Action	Rainwater harvesting, Solar PV systems, Sustainable HVAC systems

1st / 2nd Semester	Emerging Technology Courses (ET) RENEWABLE SOURCES OF ENERGY	M25BETK105C/205C

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic Physics	Understanding of energy, heat, light, pressure, and motion-related concepts.
2	Basic Electrical Engineering	Familiarity with electric circuits, power generation, and basic electrical measurements
3	Mathematics (High School Level)	Knowledge of algebra, trigonometry, and elementary calculus for analyzing technical data.
4	Environmental Studies Awareness	Understanding of environmental concerns, sustainability concepts, and the impact of energy usage on ecosystems.
5	Basic Mechanical Engineering Concepts	Familiarity with mechanical systems such as turbines, pumps, and fluid mechanics, which are relevant to energy conversion technologies.

2. Syllabus

RENEWABLE ENERGY SOURCES SEMESTER – I/II			
Course Code	**M25BETK105C/205C**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/Sem (L:T: P:TW:SL)	**32:32:0:20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. To understand energy scenario, energy sources and their utilization.
2. To explore society's present needs and future energy demands.
3. To Study the principles of renewable energy conversion systems.
4. To exposed to energy conservation methods.

Module -1

Introduction: Energy source and classification, India's energy production and reserves of commercial energy sources, Need of Renewable energy, energy and sustainable development, fundamentals and social implications. Worldwide renewable energy availability, renewable energy availability in India, Advantages & disadvantages of renewable energy, Introduction to Internet of energy (IOE) and its applications.

Module -2

Solar Energy: Fundamentals; Solar Radiation; Solar radiation Measurements: Pyrheliometer, Pyrometer and Sunshine Recorder. Solar Thermal systems: Flat plate collector; Solar distillation; Solar pond electric power plant. **Solar electric power generation:** Principle of Solar cell, Photovoltaic system for electric power generation, advantages, Disadvantages and applications of solar photovoltaic system.

Module -3

Wind Energy: Properties of wind, availability of wind energy in India, wind velocity and power from wind; major problems associated with wind power, Basic components of wind energy conversion system (WECS); Classification of WECS: Horizontal axis, Vertical axis: Savonius and darrieus types. **Biomass Energy:** Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies-fixed dome; Urban waste to energy conversion; Biomass gasification (Downdraft)

Module -4

Tidal Power: Tides and waves as energy suppliers and their mechanics; fundamental characteristics of tidal power, Single & double basin system, harnessing tidal energy, advantages and limitations.

Ocean Thermal Energy Conversion: Principle of working, OTEC power stations in the world, problems associated with OTEC.

Module -5

Geo Thermal Energy: Introduction, working, advantages & dis advantages, applications.

Hydrogen Energy: Introduction, Fuel cells: Classification of fuel cells – H2; Operating principles, Zero energy Concepts. Benefits of hydrogen energy, hydrogen production technologies (electrolysis method only).

Hydroelectric plants: General layout of hydel power plants. Advantages & disadvantages
TEXTBOOKS: 1. *"Nonconventional Energy sources"*, G D Rai, Khanna Publication, Fourth Edition, 2. *"Energy Technology"*, S.Rao and Dr. B.B. Parulekar, Khanna Publication. Solar energy, Subhas P Sukhatme, Tata McGrawHill, 2ndEdition,1996. **REFERENCE BOOKS:** 1. *"Principles of Energy conversion"*, A. W. Culp Jr.,, McGraw Hill, 1996 2. *"Non-Convention Energy Resources",* Shobh Nath Singh, Pearson, 2018 **VIDEO LINKS:** *1.* *https://www.youtube.com/@mitmysore-mechanicalengine81073* *2.* *https://www.youtube.com/watch?v=mh51mAUexK4&list=PLwdnzlV3ogoXUifhvYB65lLJCZ74o_fAk*

3. **Teaching-Learning Process Strategies**

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of RES concepts.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
5	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies.

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Emerging Technology Courses (ET)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component. The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary
5. The students have to answer 5 full questions selecting one full question from each module.
6. Marks scored will be proportionally scaled down to 50 marks

5. **Course Outcomes (COs) and Mapping with POs/ PSOs**

Course Outcomes (COs)

COs	Description
M25BETK105C/205C.1	**Identify** and classify various energy sources, explain the need for renewable energy and the concept of sustainable development.
M25BETK105C/205C.2	**Apply** the principles of solar radiation, measuring instruments, and evaluate solar thermal and PV systems.
M25BETK105C/205C.3	**Illustrate** wind and biomass energy systems and compare technologies used for energy conversion.
M25BETK105C/205C.4	**Interpret** the operation of tidal and ocean thermal energy systems and assess their limitations and advantages.
M25BETK105C/205C.5	**Employ** appropriate technologies like fuel cells and electrolysis to explain the functioning of geothermal and hydrogen energy systems.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BETK105C/205C.1	3	-	-	-	-	-	-	-	-	-	-
M25BETK105C/205C.2	3	-	-	-	-	-	-	-	-	-	-
M25BETK105C/205C.3	3	-	-	-	-	-	-	-	-	-	-
M25BETK105C/205C.4	3	-	-	-	-	-	-	-	-	-	-
M25BETK105C/205C.5	3	-	-	-	-	-	-	-	-	-	-
M25BETK105C/205C	**3**	-	-	-	-	-	-	-	-	-	-

6. **Mapping to Sustainable Development Goals (SDG):**

Sl. No.	SDG	Justification
1	**SDG 7:**Affordable and Clean Energy	Focus on solar, wind, biomass, tidal, and hydrogen energy promotes clean and sustainable energy solutions.
2	**SDG 13:**Climate Action	Emphasizes renewable energy to reduce dependence on fossil fuels and mitigate climate change.
3	**SDG 9:**Industry, Innovation, and Infrastructure	Covers innovative technologies like IoE and fuel cells, supporting sustainable industrial development.

1sT/ 2nd Semester	Emerging Technology Course (ET) MODERN MOBILITY	M25BETK105D/205D

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Comprehensive understanding of vehicle architecture	Basic knowledge of engineering disciplines such as mechanical, electrical, and thermal systems.
2	Ability to work with automotive tools and components	Workshop practice experience—familiarity with hand tools, mechanical assembly, or disassembly techniques.
3	Knowledge of automotive emission sources and control methods	Awareness of environmental science basics and pollution sources.
4	Insight into alternate fuel vehicles (EV, hybrid, hydrogen, solar)	Basic understanding of renewable energy technologies and sustainability goals.
5	Evaluation of automotive safety systems (airbags, ABS, crumple zones)	Understanding of basic physics and real-world safety scenarios in vehicles.

2. Syllabus

MODERN MOBILITY SEMESTER – I/II			
Course Code	**M25BETK105D/205D**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**32:32:0:20:20= 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives: This course will enable students to:

- To understand the different chassis design & main components of automobile
- To understand the working of transmission and control system employed in automobiles
- To understand the automotive pollution and alternative automotive technologies
- To understand different types of storage batteries and their applications in vehicles
- To highlight the importance of safety systems in modern vehicles

Module-1Mobility Systems

History of Automobile, Classification of Automobile w.r.t Usage, Chassis, Body, Power Sources, capacity, main components of Internal Combustion Engines and their Functions, Cooling System& Lubrication System.

Module -2Power Transmission& Suspension System

Clutches; Types of Clutches, Cone Clutch, Centrifugal Clutch, Fluid Flywheel.
Suspension – layout & working Air suspension, Independent suspension, Functions& advantages of Leaf Spring, Torsion Bar.

Module -3Direction Control & Braking

Steering system- mechanisms & Linkages, power Steering construction & working, Wheel balancing.
Braking System- Requirements of Braking System, Mechanical Brakes, Power Brakes, Parking brakes, Anti lock Braking System.

Module -4Automotive Emission & Alternate Vehicles

Automotive Emission-Sources of Automobile pollutants and their effects on environment, Emission norms, extraction& availability.
Hydrogen - fuel cell vehicles, advantages & disadvantages, solar powered vehicles, wind powered vehicles, super capacitors, supply rails.

Module -5Storage Batteries & Safety systems

Batteries –construction & working principle of Lead acid, Lithium ion battery & Zinc -Air batteries. Battery charging types and requirements.
Safety system – Safety measures in modern vehicle – safety frames – working of - air bags, seat belt, collapsible steering, fire safety measures in heavy vehicles, bullet proof vehicles.

TEXTBOOKS:

1. Electric Vehicle Technology Explained James Larminie Oxford Brookes University, Oxford, UK John Lowry Acenti Designs Ltd., UK
2. Automobile engineering, Kirpal Singh, Vol I and II (12th Edition) Standard Publishers 2011 2

REFERENCE BOOKS:

1. Automotive Mechanics, S. Srinivasan, (2nd Edition) Tata McGraw Hill 2003.
2. Automotive Systems & Modern Mobility by Dr T Madhusudhan, et al., Cengage publications
3. Modren Electric, Hybrid Electric, and Fuel Cell Vehicles,MehrdadEhsani, YiminGao, CRC Press, Taylor & Francis Group

VIDEO LINKS:

8. https://archive.nptel.ac.in/course.html
9. https://nptel.ac.in/courses/107106088

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lectures & Presentations	Deliver core concepts and foundational knowledge. - Utilize multimedia (images, diagrams, and animations, videos) to enhance understanding.
2	Interactive Discussions & Q&A	Encourage active participation and clarification of doubts. Facilitate critical thinking and analysis of concepts through student-led discussions
3	Hands-on Activities	Provide laboratory or simulation-based activities to demonstrate real-world applications of mechanics or machine tools.
4	Case Studies	Present real-world engineering challenges and have students analyze potential solutions.
5	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
6	Project-Based Learning	Encourage research and design thinking through project-based learning activities

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Engineering Science Course(ES)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component. The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

2. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
3. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
4. The students have to answer 5 full questions selecting one full question from each module.
5. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BETK105D/205D.1	**Interpret** the role of Automobile Engineering in transportation and assess its impact on society, safety, and sustainability, including emerging electric and autonomous technologies.
M25BETK105D/205D.2	**Analyze** the construction, principles, and applications of clutch types for efficient power transmission and vehicle control.
M25BETK105D/205D.3	**Apply** the concepts of steering and braking systems to understand how they ensure effective vehicle control and safety.
M25BETK105D/205D.4	**Apply** knowledge of emissions and norms to evaluate alternative energy vehicles and technologies.
M25BETK105D/205D.5	**Analyze** battery technologies and charging methods, along with essential vehicle safety systems.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BETK105D/205D.1	3	-	-	-	-	-	-	-	-	-	-
M25BETK105D/205D.2	-	3	-	-	-	-	-	-	-	-	-
M25BETK105D/205D.3	3	-	-	-	-	-	-	-	-	-	-
M25BETK105D/205D.4	3	-	-	-	-	-	-	-	-	-	-
M25BETK105D/205D.5	-	3	-	-	-	-	-	-	-	-	-
M25BETK105D/205D	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 3:** Good Health and Well-being	Through vehicle safety systems (airbags, seat belts, crash safety) reducing road accidents and injuries aligning with SDG 3
2	**SDG 9**: Industry, Innovation and Infrastructure,	This aligns with SDG 9. Industry, Innovation, and Infrastructure, which promotes sustainable industrial development, innovation in manufacturing technologies, and resilient infrastructure—key drivers behind advances in automotive engineering, power transmission systems, and modern vehicle manufacturing processes.
3	**SDG 12**: Responsible Consumption and Production	This aligns with SDG 12: Responsible Consumption and Production, emphasizing efficient resource use in vehicle design, adherence to emission norms, and the promotion of sustainable energy and materials in the automotive industry.

1st/ 2nd Semester	Emerging Technology Course (ET) INTRODUCTION TO EMBEDDED SYSTEMS	M25BETK105E/ 205E

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Physics Fundamentals	Ohm's Law, Kirchhoff's Laws (basic), series and parallel circuits, basic understanding of current, voltage, power, resistance
2	Digital Concepts	Logic gates, memory basics, buses
3	Mathematics	Knowledge of algebra is important for understanding and manipulating mathematical expressions
4	Computer Knowledge	Basic knowledge of computers, peripherals and its operating system

2. Syllabus

INTRODUCTION TO EMBEDDED SYSTEMS

SEMESTER – I/II

Course Code	**M25BETK105E/205E**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**32:32:0:20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. To understand the basic hardware components and their selection method based on the characteristics and attributes of an embedded system.
2. To develop the hardware-software co-design and firmware design approaches.
3. To provide an overview of various applications and domains of embedded systems

Module -1

Introduction to Embedded Systems: Embedded Vs General computing system, Classification of Embedded systems, Major applications and purpose of embedded systems, Elements of an Embedded System.
Embedded System Design Concepts: Characteristics and Quality Attributes of Embedded Systems, Operational and non-operational quality attributes. (Text 1).

Module -2

Embedded systems-The hardware point of view: Microcontroller unit (MCU), a popular 8-bit MCU: General Purpose I/O (GPIO), Clock, Power on Reset, Brown Out Reset, Real-time Clock (RTC), (Text 2), Memory (Text 1).

Module -3

Embedded System Components: Sensors, Actuators, Buses and Protocols: Defining Buses and Protocols, On-board Buses for Embedded Systems, External Buses (USB, Ethernet), Controller Area Network (CAN), Wireless Communications Protocols. (Text 2).

Module -4

Examples of Embedded Systems: Mobile Phone, Automotive Electronics, Radio Frequency Identification (RFID), Wireless Sensor Networks (WISENET). (Text 2).

Module -5

Examples of Embedded Systems: Robotics, Biomedical applications. (Text 2).
Embedded System Design Concepts: Hardware Software Co- Design and Program Modeling, Embedded firmware design approaches. (Text 1).

TEXTBOOKS:

1. Shibu K V, "Introduction to Embedded Systems", Tata McGraw Hill Education Private Limited, 2nd Edition.
2. Das, Lyla B. Embedded systems: An integrated approach. Pearson Education India, 2012

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of embedded system working or protocols or buses.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Higher Order Thinking (HOTS) Questions:	Pose HOTS questions to stimulate critical thinking related to each competency.
5	Problem-Based Learning (PBL)	Implement PBL to enhance analytical skills and practical application of competencies
6	Multiple Representations	Introduce topics in various representations to reinforce competencies
7	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
8	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate a deeper understanding of competencies
9	Student Role-Play Assignments	. Assign any embedded components to give seminars associated with competencies.

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment - Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component. The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BETK105E/205E.1	**Describe** the basic concepts and design attributes of embedded systems
M25BETK105E/205E.2	**Describe** the elements of an embedded system like core, sensors, actuators, memory and communication buses and protocols.
M25BETK105E/205E.3	**Apply** the modeling techniques for designing embedded system firmware.
M25BETK105E/205E.4	**Analyze** the applications of embedded systems in various domains.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BETK105E/205E.1	2	-	-	-	-	-	-	-	-	-	2
M25BETK105E/205E.2	3	-	-	-	-	-	-	-	-	-	2
M25BETK105E/205E.3	3	3	-	-	-	-	-	-	-	-	2
M25BETK105E/205E.4	3	-	2	-	-	-	-	-	-	-	2
M25BETK105E/205E	**2.75**	**3**	**2**	-	-	-	-	-	-	-	**2**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 4**: Quality education	Focuses on design embedded systems and use of OS.
2	**SDG 9:** (Industry, Innovation, and Infrastructure)	Embedded systems form the backbone of modern industrial automation, IoT, and smart infrastructure. By learning system design, students contribute to advancements in robotics, automation, and efficient computing solutions.
3	**SDG 11:** (Sustainable Cities and Communities)	Students are exposed to embedded applications in smart cities, including sensor networks, real-time communication, and automation. These help in the development of smart transportation, environmental monitoring, and public safety systems.

1st/ 2nd Semester	Emerging Technology Courses (ET) INTRODUCTION TO BIOMEDICAL INSTRUMENTATION	M25BETK105F/205F

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Mathematics	Understanding of basic arithmetic operations.
2	Basic Electronics	Understanding of semiconductor components and their applications.
3	Basic Electrical	Understanding of Alternating Current, Direct current and their appliances.
4	Computer Knowledge	Basic knowledge of computers, peripherals and its operating system

2. Syllabus

INTRODUCTION TO BIOMEDICAL INSTRUMENTATION SEMESTER – I/II			
Course Code	**M25BETK105F/205F**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**32:32:0:20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

1. To understand the fundamental principles of biomedical instrumentation and physiological signal generation.
2. To study the operation and application of biomedical sensors and transducers.
3. To analyze the functioning of diagnostic and monitoring instruments such as ECG, EEG, EMG, and BP monitors.
4. To apply basic signal conditioning methods to biomedical signals.
5. To evaluate safety standards, ethical practices, and regulations in biomedical instrumentation.

Module -1

Physiology, Sensory organs and transducers: Cell and its structure, Nervous system: Structure of nervous system, neurons, Cardiovascular system, respiratory system, Kidney, Basic components of a biomedical system

Sensory organs :Structure and function of Eye, Ear mechanism of hearing

Transducers: Transducer, types of transducers, Piezo-electric, Ultrasonic transducer.

Module -2

Electro-physiological Measuring devices: Electrodes, ECG, EEG, EMG, ERG (Block diagram approach and its typical waveforms), Dialysis of Kidney.

Module -3

Non-electrical Measuring devices: Measurement of blood pressure, Heart rate, Spirometer, pH of blood, finger-tip oximeter, PPG, ESR, GSR (Block diagram approach, typical waveforms and its measurements).

Module -4

Medical Imaging: Introduction to Radiographic and fluoroscopic techniques, X-rays, Computer Tomography, MRI, Ultrasonography, Endoscopy, Thermography, PET (working principle with merits and demerits).

Module -5

Assistive/therapeutic Equipment and Electrical safety: Pacemakers, Ventilators, Hearing Aids, Audio meters.

Electrical safety: Electrical danger, physiological effect of current, Micro-Shock & Macro-Shock.

TEXTBOOKS:

1. R.S. Khandpur, 'Hand Book of Bio-Medical instrumentation', Tata McGraw Hill Publishing Co Ltd., 2003.
2. Leslie Cromwell, Fred J.Weibell, Erich A. Pfeiffer, 'Bio-Medical Instrumentation and Measurements', II edition, Pearson Education, 2002 / PHI.

https://kahedu.edu.in/naac/C-3/Additional%20documents/E-content/2651.pdf

REFERENCE BOOKS:

1. J. Webster, 'Medical Instrumentation', John Wiley & Sons, 1995.
2. L.A. Geddes and L.E. Baker, 'Principles of Applied Bio-Medical Instrumentation', John Wiley & Sons, 1975.

VIDEO LINKS:

https://onlinecourses.nptel.ac.in/noc25_bt49/preview

https://www.coursera.org/learn/medical-image-processing

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Conceptual Lectures with Visual Aids	Deliver fundamental concepts using presentations, diagrams, animations, and videos for better understanding of physiological systems and instruments.
2	Case Studies and Clinical Application Examples	Analyze real-life medical instrumentation cases from hospitals or published studies.
3	Demonstrations of Medical Devices	Live demos or videos of devices like ECG, pulse oximeters, BP monitors to connect theory with practice.
4	Guest Lectures / Industry Interaction	Invite professionals from hospitals or biomedical industries for expert talks.
5	Quizzes, Group Discussions & Peer Teaching	Encourage active learning through formative assessments and collaborative discussion.

5. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

CIE Split up for Emerging Technology (ET)

Components		Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): The students should take up online courses from any recognized platforms and submit the certificate.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

6. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BETK105F/205F.1	Explain the basic structure and function of physiological systems relevant to biomedical instrumentation.
M25BETK105F/205F.2	Apply the principles and characteristics of sensors and transducers in biomedical instrumentation.

M25BETK105F/205F.3	Apply signal conditioning techniques for acquisition and processing of biomedical signals.
M25BETK105F/205F.4	Analyze the working of diagnostic and therapeutic devices such as ECG, EEG, EMG, and BP monitors.
M25BETK105F/205F.5	Evaluate safety standards, ethical practices, and emerging trends in biomedical instrumentation and healthcare technology.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BETK105F/205F.1	3	2			-	-	-	-	-	-	-
M25BETK105F/205F.2	3		2		-	-	-	-	-	-	-
M25BETK105F/205F.3	3	2	3		-	-	-	-	-	-	-
M25BETK105F/205F.4	3			2	-	-	-	-	-	-	-
M25BETK105F/205F.5					2	3	3	-	-	-	-
M25BETK105F/205F	**3**	**2**	**2**	**2**	**2**	**3**	**3**	**-**	**-**	**-**	**-**

7. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 3**: Good Health and Well-Being	Core objective of biomedical instrumentation is to improve diagnosis, treatment, and monitoring in healthcare.
2	**SDG 4**: Quality Education	The course imparts interdisciplinary knowledge in engineering and healthcare technologies.
3	**SDG 9**: Industry, Innovation and Infrastructure,	Encourages innovation through the design and development of medical devices and systems.

1st/ 2nd Semester	Emerging Technology Course (ETC) Introduction to Cyber Security	M25BETK105G/205G

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic knowledge	Basic knowledge of computer systems, networks and the internet.
2	Security Concepts	Familiarity with security concepts like confidentiality, integrity and availability.
3	Awareness of web threats and security	Addressing security and privacy implications for organizations in the context of social computing and web threats.
4	Understanding of basic data privacy concepts and principles.	Ability to analyze and assess privacy risks and threats in different domains.
5	Awareness of common data privacy attacks	Competence in addressing privacy issues and challenges in various domains such as medical and financial sectors.

2. Syllabus

Introduction to Cyber Security SEMESTER – I/II			
Course Code	**M25BETK105G/205G**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem(L:T: P:TW:SL)	**32:32:0:20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives: This Course will enable students to

- Understand various types of cyber-attacks and cyber-crimes
- Learn threats and risks with in context of the cyber security
- Have an overview of the cyber laws & concepts of cyber forensics
- Study the defensive techniques against these attacks.

Module -1

Introduction to Cyber Security: Introduction, Cyber crime, Cyber crime and Information Security, Who are cybercriminals? , Classification of Cybercriminals, Cybercrime: The Legal Perspectives, Cybercrimes: An Indian Perspective, Cybercrime and the Indian ITA 2000, A Global Perspective on Cybercrimes, Cybercrime Era: Survival Mantra for the Netizens,
Textbook 1 : Chapter 1

Module -2

Cybercrime: Mobile and Wireless Devices: Introduction, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Trends in Mobility, Credit Card Frauds in Mobile and wireless Computing Era, Security Challenges posed by Mobile Devices, Registry Settings for Mobile Devices, Attacks on Mobile Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Organizational Security Policies and Measures in Mobile Computing Era, Laptops.
Textbook 1 : Chapter 3

Module -3

Cybercrimes and Cyber security: **The Legal Perspectives**: Introduction, Cybercrime and the Landscape around the world, Why Do We Need Cyber laws: The Indian Context, The Indian IT Act, Challenges to Indian Law and Cybercrime Scenario in India ,Digital Signatures and the IT Act, Amendments to the Indian IT Act, Cybercrime and Punishment, Cyber law, Technology and Students: Indian Scenario.
Textbook 1 : Chapter 6

Module -4

Understanding Computer Forensics-Forensics of Hand held Devices: Introduction, Historical Background of Cyber forensics, Digital Forensics Science, The Need for Computer Forensics, Cyber forensics and Digital Evidence, Forensics Analysis of E-Mail, Understanding Cell Phone Working Characteristics, Hand-Held

Devices and Digital Forensics, Toolkits for Hand-Held Device Forensics, Forensics of ipad and Digital Music Devices. Textbook : Chapter 7 And Chapter 8
Module -5
Cyber security: Organizational Implications : Introduction, Cost of Cybercrimes and IPR Issues Social Computing and the Threats for Organization, Security and Privacy Implications, Social Media Marketing, Social Computing and the Associated Challenges for Organizations, Protecting People's Privacy in the Organization, Organizational Guidelines for Internet Usage, Safe Computing Guidelines and Computer Usage Policy, Incident Handling, Forensics Best Practices for Organizations, Media and Asset Protection ,Importance of Endpoint Security in Organization. Textbook : Chapter 9
TEXTBOOKS: 1. Nina Godbole and Sunit Belpure, Cyber Security Understanding Cyber Crimes, Computer Forensics and Legal Perspectives, Wiley 2. B.B.Gupta, D.P.Agrawal, Haoxiang Wang, Computer and Cyber Security: Principles, Algorithm, Applications and Perspectives, CRC Press, ISBN 9780815371335, 2018. **REFERENCE BOOKS:** 1. Cyber Security Essentials, James Graham, Richard Howard and Ryan Otson CRC Press. 2. Introduction to Cyber Security, Chwan- Hwa(john)Wu ,J.DavidIrwin ,CRC Press T&F Group

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Interactive Lectures	Incorporate interactive elements such as discussions, case studies, and real-life examples to engage learners actively in the learning process. Encourage participation and critical thinking by asking questions and facilitating discussions
3	Problem-Based Learning(PBL)	PBLpreparesstudentstotacklethedynamicandevolvingchallengesofcybersecurityeffectively. It fosters a deep understanding of cyber security principles, encourages lifelong learning, and cultivates the skills needed to thrive in the cyber security profession.
4	Peer Feedback and Peer Review	Encourage peer feedback and peer review activities, where learners provide constructive feedback to their peers on written and oral communication assignments.
5	Real-World Application	These real-world applications demonstrate the diverse ways in which cyber security principles and practices are applied to safeguard digital assets, mitigate risks, and defend against evolving cyber Threats in today's inter connected world.
6	Programming Assignments	It provides students with practical skills and real-world experience in applying programming concepts to address security challenges.

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Emerging Technology Course (ETC)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks = (A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Self-Learning (SL): If applicable, the teaching faculty shall motivate the students to take up online courses from any recognized platforms. There shall not be any assessment of the Self-Learning component.

The faculty must collect the certificate from the students who have successfully completed the self-learning relevant to the course.

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BETK105G/205G.1	Analyze cyber-attacks, types of cyber-crimes, cyber laws and also how to protect themselves and Ultimately the entire Internet community from such attacks.
M25BETK105G/205G.2	Interpret and forensically investigate security incidents.
M25BETK105G/205G.3	Apply policies and procedures to manage Privacy issues
M25BETK105G/205G.4	Design and develop secure software modules

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BETK105G/205G.1	-	3	-	-	-	-	-	-	-	-	-
M25BETK105G/205G.2	-	-	3	-	-	-	-	-	-	-	-
M25BETK105G/205G.3	-	-	-	3	-	-	-	-	-	-	-
M25BETK105G/205G.4	-	-	-	-	3	-	-	-	-	-	-
M25BETK105G/205G	**-**	**3**	**3**	**3**	**3**	**-**	**-**	**-**	**-**	**-**	**-**

6. Mapping to Sustainable Development Goals (SDG):

Note: Minimum 3 SDG's to be mapped with each course

Sl. No.	SDG	Justification
1	**SDG 4**: Quality Education	Enhances students' understanding of national and international cyber laws, supporting education in digital rights and responsibilities.
2	**SDG 9**: Industry, Innovation and Infrastructure	Ensures resilient and secure mobile infrastructure by addressing emerging threats and enforcing security best practices in mobility.
3	**SDG 11**: Sustainable Cities and Communities	Ensures digital safety in smart workplaces and connected communities by addressing social computing threats, privacy, and incident response.

1st/2nd Semester	Emerging Technology Course (ET) AI for Everyone	M25BETK105H/205H

1. Prerequisites

S/L	Proficiency	Prerequisites
6.	Curiosity and Critical Thinking	AI involves problem-solving and continuous learning. Having a curious mindset and the ability to think critically about different AI applications and their implications is important.
7.	Mathematics Fundamentals	Familiarity with basic mathematics concepts such as algebra, calculus, probability, and statistics is essential for understanding the algorithms and models used in AI.
8.	Understanding of Data	Knowledge of how data is collected, structured, and processed is crucial in AI. This includes familiarity with databases, data formats, and data preprocessing techniques.
9.	Community Engagement	Joining AI communities, forums, or local meetups can provide opportunities to learn from others, ask questions, and stay updated on the latest developments in the field.

2. Syllabus

AI FOR EVERYONE **SEMESTER – I/II**			
Course Code	**M25BETK105H/205H**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**32:32:0:20:20 = 104 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course Objectives:

2. To introduce the fundamental concepts and goals of Artificial Intelligence (AI)
3. To understand the components and architecture of intelligent agents and systems
4. To develop problem-solving skills using AI techniques
5. To understand AI techniques in strategic decision-making and game playing
6. To understand natural language processing and its challenges

Module -1

Overview of Artificial Intelligence: Introduction, Definitions of Al, Is Automating Intelligence Is Possible, Man Vs. Computers, Simulation of Sophisticated and Intelligent Behaviour, How Al Techniques Help Computers to be Smarter?
(Chapter 1: 1.1 - 1.6)

Module -2

Brief History of Al, Branches of Al, Natural Language, Automated Reasoning, Visual Perception, Intelligent Agents, Major Components of Intelligent System, Important Definitions and Concepts.
(Chapter 1: 1.6 - 1.14)

Module -3

Problem Solving: Problem Solving by Intelligent Computers, Problem Formulation, State Space Representation, Examples of Search Problems, Problem Reduction, Production Systems, Example of Production System-8-Puzzle Problem.
(Chapter 2: 2.1 - 2.7)

Module -4

Problem solving in Games: Introduction, Adversarial search, Game Playing Cycle, A Simple Game Tree, Game Playing Search, Minimax Procedure.
(Chapter 4: 4.1 - 4.6)

Module -5

Understanding Natural Languages: Introduction, Need of Natural Language Understanding, Why Is Natural Language Understanding Difficult, Levels of Knowledge Used in Language Understanding, Working of Natural Language Processing System, Syntactic Processing, Languages of Grammars, Classification of Grammar.
(Chapter 5: 5.1 - 5.9)

Text Books:

1. Munesh Chandra Trivedi, A Classical Approach to Artificial Intelligence, Second edition.
2. R. B Mishra, Artificial intelligence PHI Learning Pvt. Ltd., 2010

Reference Books:

1. Stuart J. Russell and Peter Norvig, Artificial Intelligence, 4th Edition, Pearson, 2021
2. Elaine Rich, Kevin Knight, Artificial Intelligence, 3rd edition, Tata McGraw Hill,2013

VIDEO LINKS:

1. https://nptel.ac.in/courses/106106226
2. https://www.youtube.com/watch?v=xXCszgfPN6Y
3. https://nptel.ac.in/courses/106101007

3. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Video/Animation	Incorporate visual aids like videos/animations to enhance understanding of concepts.
3	Collaborative Learning	Encourage collaborative learning for improved competency application.
4	Problem-Based Learning (PBL)	Implement PBL to enhance analytical skills and practical application of competencies
5	Multiple Representations	Introduce topics in various representations to reinforce competencies
6	Real-World Application	Discuss practical applications to connect theoretical concepts with real-world competencies.
7	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies

4. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

	Components	Number	Weightage	Max. Marks
1	Internal Assessment-Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BETK105H/205H.1	Understand the fundamentals of Artificial Intelligenceand how AI simulates human intelligence.
M25BETK105H/205H.2	Describe the major branches, components, and concepts of intelligent systems.
M25BETK105H/205H.3	Formulate and represent AI problems using appropriate methods such as state space, problem reduction, and production systems.
M25BETK105H/205H.4	Apply and analyse adversarial search strategies such as Minimax for solving game-based problems.
M25BETK105H/205H.5	Explain and evaluate Natural Language Processing (NLP) systems.

CO-PO-PSO Mapping

COs/Pos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BETK105H/205H.1	-	3	-	-	-	-	-	-	-	-	-
M25BETK105H/205H.2	-	3	-	-	-	-	-	-	-	-	-
M25BETK105H/205H.3	-	-	3	-	-	-	-	-	-	-	-
M25BETK105H/205H.4	-	-	3	-	-	-	-	-	-	-	-
M25BETK105H/205H.5	-	-	-	-	3	-	-	-	-	-	-
M25BETK105H/205H	**-**	**3**	**3**	**-**	**3**	-	-	-	-	-	-

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	SDG 3	Good Health and Well-being – Covering aspects of health, hygiene, and well-being relevant to the syllabus
2	SDG 4	Quality Education – Emphasizing inclusive and equitable quality education and promoting lifelong learning opportunities for all
3	SDG 13	Climate Action – Addressing environmental awareness, conservation, and sustainable practices included in the curriculum.

1st/2nd Semester	Engineering Science Lab C Programming Lab	M25BECPL106/206

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Basic Computer Skills	Understanding how to use files, folders, and applications. Familiarity with installing and using software
2	Logical Thinking and Problem Solving	Ability to break problems into steps. Familiarity with if/then logic or flowcharts is a bonus.
3	Basic Math Skills	Comfort with simple arithmetic (addition, subtraction, multiplication, division).Basic understanding of variables and equations
4	Typing Skills	Not required, but being comfortable with a keyboard will improve your coding speed and reduce frustration.

2. Syllabus

C Programming Lab
SEMESTER – I/II

Course Code	**M25BECPL106/206**	**CIE Marks**	**50**
Number of Lecture Hours/Week (L: T: P: S:TW:SL)	**0:0:32:0:0=32Hrs**	**SEE Marks**	**50**
		Total Marks	**100**
Credits	**01**	**Exam Hours**	**03**
Examination nature (SEE)	**Practical**		

Course objectives: This course will enable students to:

1. To develop an in-depth knowledge of functional and logical concepts of C Programming with Basic Syntax and Semantics.
2. To enhance students' analytical and logical thinking skills, enabling them to translate real-world problems into algorithmic solutions and then into working C code.
3. Equipping students with the foundational skills to design, write, and debug C programs, as well as fostering problem-solving abilities through programming.

Sl. No	Experiments
1	Simulation of a Simple Calculator.
2	Compute the roots of a quadratic equation by accepting the coefficients. Print appropriate messages.
3	An electricity board charges the following rates for the use of electricity: for the first 200 units 80 paise per unit for the next 100 units 90 paise per unit: beyond 300 units Rs 1 per unit. All users are charged a minimum of Rs. 100 as meter charge. If the total amount is more than Rs 400, then an additional surcharge of 15% of total amount is charged. Write a program to read the name of the user, number of units consumed and print out the charges.
4	Write a C Program to display the following by reading the number of rows as input, 1 1 2 1 1 2 3 2 1 1 2 3 4 3 2 1 ---------- Nth row
5	Implement Binary Search on Integers.
6	Implement Matrix multiplication and validate the rules of multiplication.
7	Compute sin(x)/cos(x) using Taylor series approximation. Compare your result with the built-in library function. Print both the results with appropriate inferences.
8	Sort the given set of N numbers using Bubble sort
9	Write functions to implement string operations such as compare, concatenate, and find string length. Use the parameter passing techniques.
10	Implement structures to read, write and compute average- marks of the students, list the students scoring above and below the average marks for a class of N students.
11	Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers.
12	Write a C program to copy a text file to another, read both the input file name and target file name.

1. Kernighan.B.W,andRitchie.D.M ,"The C Programming Language", second edition, pearson publisher,2015.

2.Computer fundamentals and programming in c, "Reema Thareja", Oxford University, Second edition,2017.

Reference Books:

1. Yashwanth Kanetkar, "Let us C ", Second Edition, BPB Publishers,2021.
1. E. Balaguruswamy, Programming in ANSI C, 7th Edition, Tata McGraw-Hill.
2. Brian W. Kernighan and Dennis M. Ritchie, The 'C' Programming Language, Prentice Hall of India

3. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Interactive Demonstration	Students observe syntax, logic, and output flow in real-time to build a conceptual foundation.
2	Hands-on Practice	Students apply concepts by solving lab exercises independently on computers. Practice focuses on reinforcing learning by Executing the programs.
3	Problem-Based Learning (PBL)	Students are given real-world problems (e.g., data analysis, file handling) to solve using C fostering critical thinking and application skills.
4	Incremental Learning Approach	Concepts are taught from simple (variables, loops), Modular Programming (functions) and structural programming to break down complex problems into smaller, manageable parts.
5	Lab Reports	Students prepare reports summarizing their lab experience. These reports typically include: **1.** Program **2.** Output

4. Assessment Details (both CIE and SEE)

Test Marks distribution for the Practical Course

Sl. No.	Description	% Marks	In Marks
1	Write-up, Conduction, Result and Procedure/Algorithm/Flowchart	60%	60
2	Viva-Voce	40%	40
Total		**100%**	**100**

Final CIE in Practical Course including AEC:

Sl. No.	Description	% Marks	In Marks
1	Scaled Down marks of conduction, record/journal	60% of the maximum	30
2	Scaled-down marks of the test	40% of the maximum	20
Total		**100%**	**50**

❖ **SEE for the Practical Course:**

1. SEE marks for a practical course shall be 50 marks.
2. The practical course is evaluated for 100 marks, and the scored marks shall be scaled down to 50 marks.
3. A change of experiment/program is allowed only once, and 20% of the marks allotted to the procedure/write-up part will be zero.
4. The duration of SEE shall be 3 hours.

Marks distribution for the Practical Course

SL. No.	Description	% Marks	Marks
1	Write-up, Procedure	20%	20
2	Conduction and result	60%	60
3	Viva-Voce	20%	20
Total		**100%**	**100**

Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BECPL106/206.1	Interpret the Mathematical Problems and to Develop C programs using basic knowledge of contructs and Appropriate Conditional and Control Structure.
M25BECPL106/206.2	Apply the knowledge of modular programming to Decompose the problem into Functions and use Arrays, to solve problems of Matrix ,searching and sorting by using C programming.
M25BECPL106/206.3	Implement the structural programming, file operations using Pointers a develop application and formulate using C programs and Effectively Documenting it.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BECPL106/206.1	**3**	-	-	-	-	-	-	-	-	-	-
M25BECPL106/206.2	**3**	**3**	2	-	3	-	-	-	-	2	-
M25BECPL106/206.3	**3**	**3**	2	-	3	-	-	-	-	2	-
M25BECPL106/206	**3**	**3**	2	-	3	-	-	-	-	2	-

5. SDG: Sustainable Development goals with justification (minimum 3)

Sl. No.	SDG	Justification
1	Quality Education	C Lab promotes computational thinking, problem-solving, and digital literacy. It empowers students with technical skills that are crucial for a knowledge-based society.
2	Decent Work and Economic Growth	By learning C programming ,students become industry-ready, opening opportunities for careers in IT, data science, AI, and automation—fields that contribute to economic growth.
3	Industry, Innovation, and Infrastructure	C Programming skills support innovation and technological development, including areas like software engineering, automation, IoT, and AI-based infrastructure.

1st / 2nd Semester	Basic Science Lab (BSL) Applied Chemistry Laboratory for ME Stream	M25BCHEL107/ 207

1. Prerequisites (Minimum 4 Pre-requisites)

Sl. No.	Proficiency	Pre-requisites
1	Analytical Chemistry Techniques	Understanding of acid-base, redox, and complexometric titrations. Familiarity with indicators, titration curves, and stoichiometric calculations.
2	Instrument Handling	Prior experience in handling instruments like pH meters, conductivity meters, potentiometers, viscometers, flame photometers, and colorimeters.
3	Sensor and Digital Interface Usage	Basic knowledge of using electrochemical sensors and optical sensors. Understanding how digital sensors interface with microcontrollers or PC-based data acquisition systems.
4	Chemical Handling and Lab Safety	Knowledge of MSDS (Material Safety Data Sheet), safe handling of acids, bases, and organic solvents. Correct usage of PPE like gloves, goggles, and lab coats.
5	Data Recording and Interpretation	Ability to systematically record observations, tabulate data, calculate molarity/normality, and perform result interpretation with suitable units and significant figures.
6	Fundamentals of Electrochemistry	Understanding of electrochemical cells, electrode potential, plating mechanisms, and corrosion. Required for plating, corrosion rate, and battery acid strength experiments.

2. Syllabus

Applied Chemistry Laboratory for ME Stream **SEMESTER – I/II**			
Course Code	**M25BCHEL107/207**	**CIE Marks**	**50**
Number of Lecture Hours/Week (L: T: P: S:TW:SL)	**(0:0:32:0:0)=32Hrs**	**SEE Marks**	**50**
Total Number of Lecture Hours	**15 Sessions**	**Total Marks**	**100**
Credits	**01**	**Exam Hours**	**03**
Examination nature (SEE)	**Practical**		

Course objectives: This course will enable students to:

1. Demonstrate basic and advanced laboratory techniques in physical, inorganic, and analytical chemistry.
2. Apply chemical principles using instruments and sensors for the estimation of chemical substances in various samples.
3. Perform synthesis of materials and metal plating through electrochemical and green chemistry methods.
4. Analyze experimental data, interpret results, and understand environmental and industrial applications.
5. Practice safe laboratory procedures and develop skills in scientific documentation and teamwork.

Sl. No	Experiments
A–Demonstration (any two) offline/virtual:	
A1	Chemical Structure drawing using software: Chem Draw or ACD/Chem Sketch.
A2	Determination of strength of an acid iPb acid battery.
A3	Synthes is of Iron-oxide Nanoparticles.
A4	Electrolysis of water.
B-Exercise (compulsorily any 4 to be conducted):	
B1.	Conductometric estimation of acid mixture.
B2.	Potentiometric estimation of FAS using $K_2Cr_2O_7$.
B3.	Determination of pKa of vinegar using pH sensor (Glass electrode).
B4.	Estimation of Copper present in electroplating effluent by optical sensor (colorimetry).
B5.	Determination of Viscosity coefficient of lubricant (Ostwald's viscometer).
C–Structured Enquiry (compulsorily any 4 to be conducted):	

C1.	Estimation of total hardness of water by EDTA method.
C2.	Determination of Chemical Oxygen Demand (COD)of industrial waste water sample.
C3.	Estimation of iron in TMT bar by diphenyl amine/external indicator method
C4.	Determination of total alkalinity of the given water sample
C5.	Determination of rate of corrosion of mild steel by weight loss method
D–Open Ended Experiments (anytwo):	
D1.	Evaluation of acid content in beverages by using pH sensors and simulation.
D2.	Construction of photo voltaic cell.
D3.	Design an experiment to Identify the presence of proteins in given sample.
D4.	Searching suitable PDB file and target for molecular docking.

Reference Books:

1. Vogel's textbook of qualitative chemical analysis
   By: Vogel, A. I Mendham, J Denney, R.C Barnes, J.DThomas, M Siavsankar -6 th edn-Pearson Education Services Pvt.Ltd, 2017.
2. Vogel's textbook of quantitative chemical analysis
   By: Vogel, A. I G H Jeffery,J Bassett, J Mendham, R C -5 th edn-

3. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	**Pre-Lab Sessions**	Lecturer introduces the theoretical background of the experiment. • Covering: Chemical principles, purpose of the experiment, instrument working principles, safety precautions, and expected outcomes. Encourages questions to clarify key concepts.
2	**Pre-Lab Assignments**	Students are assigned relevant textbook or lab manual sections, videos, or articles to review before the lab. These materials cover concepts like titration principles, calibration techniques, and use of sensors to ensure preparedness.
3	**Experimentation**	Students individually or in teams perform the experiments. This includes: • Setting up apparatus • Handling chemicals safely • Using instruments (pH meter, colorimeter, conductivity meter, etc.), • Recording precise data, and • Applying calculations.
4	**Live Demonstration& Guidance**	Lecturer providing guidance and assistance to students as needed. This could involve: • Demonstrating proper use of the instruments. • Answering conceptual or procedural questions. • Ensuring strict adherence to safety protocols and best lab practices.
5	**Lab Reports, conclusion & Inference**	Students prepare reports summarizing their lab experience. These reports typically include: • Objectives of the experiment. • Description of the procedure followed. • Recorded data in tables or graphs. • Calculations performed and analyzed results. • Discussion of observations, errors, inferences, and applications of the experiment.
6	**Reflection & Peer Discussion**	Students discuss their findings with peers and lecturer to reinforce understanding, clarify doubts, and relate experiments to real-world or industrial applications, fostering scientific communication and collaborative learning.

4. Assessment Details (both CIE and SEE)

Test Marks distribution for the Practical Course

Sl. No.	Description	% Marks	In Marks
1	Write-up, Conduction, Result and Procedure	90%	90
2	Viva-Voce	10%	10
Total		**100%**	**100**

Final CIE in Practical Course including AEC:

Sl. No.	Description	% Marks	In Marks
1	Scaled Down marks of conduction, record/journal	60% of the maximum	30
2	Scaled-down marks of the test	40% of the maximum	20
Total		**100%**	**50**

❖ **SEE for the Practical Course:**

1. SEE marks for a practical course shall be 50 marks.
2. The practical course is evaluated for 100 marks, and the scored marks shall be scaled down to 50 marks.
3. A change of experiment/program is allowed only once, and 20% of the marks allotted to the procedure/write-up part will be zero.
4. The duration of SEE shall be 3 hours.

Marks distribution for the Practical Course

SL. No.	Description	% Marks	Marks
1	Write-up, Procedure	20%	20
2	Conduction and result	70%	70
3	Viva-Voce	10%	10
Total		**100%**	**100**

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BCHEL107/207.1	Apply fundamental chemical principles to carry out synthesis, electrochemical, analytical, and environmental experiments using appropriate procedures.
M25BCHEL107/207.2	Operate modern chemical instrumentation and sensors to measure physicochemical properties and estimate constituents in various samples.
M25BCHEL107/207.3	Analyze experimental data, interpret results with scientific reasoning, and communicate findings through systematic lab reports.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BCHEL107/207.1	**3**	**2**	**-**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**
M25BCHEL107/207.2	**2**	**3**	**-**	**2**	**3**	**-**	**-**	**-**	**-**	**-**	**-**
M25BCHEL107/207.3	**2**	**2**	**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**
M25BCHEL107/207	**2.33**	**2.33**	**-**	**2.33**	**2.33**	**-**	**-**	**-**	**-**	**-**	**-**

6. SGD: Sustainable Development goals with justification

Sl. No.	SDG	Justification
1	SDG 3: Good Health and Well-being	Experiments involving water quality (hardness, COD), corrosion, and effluent analysis help ensure environmental and human health by detecting and reducing harmful agents.
2	SDG 6: Clean Water and Sanitation	Estimation of hardness, COD, and analysis of effluents/soil helps monitor and improve water quality, supporting sustainable water resource management.
3	SDG 7: Affordable and Clean Energy	Synthesis of conducting polymers (like polyaniline) and understanding battery chemistry (acid strength in Pb-acid battery) align with clean energy and storage solutions.
4	SDG 9: Industry, Innovation, and Infrastructure	Hands-on experience with sensors, nanomaterials, and plating techniques promotes innovation and prepares students for industrial applications and smart material design.
5	SDG 12:Responsible Consumption and Production	Open-ended experiments on e-waste metal recovery and green synthesis methods promote sustainable practices and resource efficiency in chemical processing.

1st/ 2nd Semester	Any Department (AE) Scientific Foundations of Health	M25BSFHK158/258

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	Basic Health and Fitness	Awareness of personal health and hygiene practices. Understand the concept of holistic health, including physical, mental, emotional, and social well-being.
2	Interest in self-improvement**,** fitness, nutrition, and mental wellness.	Develop and maintain a healthy lifestyle and mindset through diet, fitness, communication, and stress management.
3	Basic communication and interpersonal skills	Enhance self-awareness, build caring relationships, and adopt a growth-oriented attitude toward health.
4	Motivation for personal development **and behaviour change.**	Identify and address psychological, social, and behavioral factors influencing health. Recognize and avoid health-compromising behaviors including addictions.
5	Common infections and chronic illnesses.	Apply preventive and wellness strategies to protect against diseases and manage chronic illnesses.

2. Syllabus

SCIENTIFIC FOUNDATION OF HEALTH SEMESTER – I/II			
Course Code	**M25BSFHK158/258**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**15:0:0:0 = 15 Hours**	SEE Marks	**50**
		Total Marks	**100**
Credits	**01**	Exam Hours	**01**

Course Objectives:

ThecourseScientificFoundationsofHealth(M25BSFHK108/208)willenablethestudents,

1. To know about Health and wellness (and its Beliefs) & It's balance for positive mindset.
2. To Build the healthy life styles for good health for their better future.
3. To Create a Healthy and caring relationships to meet the requirements of good/social/positive life.
4. To learn about Avoiding risks and harmful habits in their campus and out side the campus for their bright future
5. To Prevent and fight against harmful diseases forgo d health through positive mindset

Module -1

GoodHealth&It'sbalanceforpositivemindset: Health-ImportanceofHealth,InfluencingfactorsofHealth, Health beliefs, Advantages of good health, Health & Behavior, Health & Society, Health & family, Health & Personality, Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.

Module -2

Building of healthy lifestylesforbetterfuture: Developinghealthydietforgoodhealth,Food&health,Nutritional guidelines for good health, Obesity & overweight disorders and its management, Eating disorders, Fitness components for health, Wellness and physical function, How to avoid exercise injuries.

Module -3

Creation of Healthy and caring relationships: Building communication skills, Friends and friendship-Education, The value of relationship and communication skills, Relationships for Better or worsening of life, understanding of basic instincts of life (more than a biology), Changing health behaviors through sports and physical activities.

Module -4

Avoiding risks and harmful habits: Characteristics of health compromising behaviors, Recognizing and avoiding of Addictions, How addiction develops, Types of addictions, influencing factors of addictions, Differences between addictive people and non-addictive people & their behaviors. Effects of addictions Such as how to recovery from addictions.

Module -5

Preventing & fighting against diseases for good health: How to protect from different types of infections, How to Reduce risks for good health, Exercise CHD(Coronary heart disease) yoga and stress Management , Management of chronic illness for Quality of life, Health & Wellness of youth :a challenge for upcoming future, Measuring of health & wealth status.

TEXTBOOKS:

1. **"Scientific Foundations of Health"–Study Materia lPrepared by Dr. L Thimmesha, Published in VTU-University Website.**
2. **"Scientific Foundations of Health",**(ISBN-978-81-955465-6-5) published by Infinite Learning Solutions, Bangalore – 2022.
3. **Health Psychology - A Textbook,** FOURTH EDITION by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press.

REFERENCE BOOKS:

1. **Health Psychology** (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor– Published by Rout ledge 711 Third Avenue, New York, NY 10017.
2. **HEALTH PSYCHOLOGY (Ninth Edition)** by SHELLEYE.TAYLOR-University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press.
3. **SWAYAM/NPTL/MOOCS/Weblinks/Internet sources/YouTube videos** and other materials/notes.
4. **Scientific Foundations of Health (Health & Welness)-General Books** published for university and colleges references by popular authors and published by the reputed publisher.

VIDEO LINKS:

2. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	Lecture Method	Direct instructional method (Low/Old Technology),
2	Demonstration and Laboratory Learning	Flipped classrooms (High/ advanced Technological tools),
3	Video/Animation Aids	Blended learning (Combination of both) Use of audio visual methods.
4	Collaborative and Peer Learning	Personalized learning, Enquiry and evaluation based learning,
5	Case-Based and Real-World Application	Problems based learning through discussion,
6	Flipped Classroom Approach	Following the method of expeditionary learning Tools and techniques,

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

	Components	Number	Weightage	Max. Marks
1	Internal Assessment - Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BSFHK158/258.1	Develop the healthy life styles for good health for their better future.
M25BSFHK158/258.2	Build a Healthy and caring relationships to meet the requirements of good/ social/ positive life.
M25BSFHK158/258.3	To learn about Avoiding risks and harm ful habits in their campus and outside the campus for their bright future.
M25BSFHK158/258.4	To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future
M25BSFHK158/258.5	To Prevent and fight against harmful diseases for good health through positive mindset

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BSFHK158/258.1	-	-	-	-	-	3	-	-	-	-	-
M25BSFHK158/258.2	-	-	-	-	-	-	3	-	-	-	-
M25BSFHK158/258.3	-	-	-	-	-	-	-	3	-	-	-
M25BSFHK158/258.4	-	-	-	-	-	-	-	-	3	-	-
M25BSFHK158/258.5	-	-	-	-	-	-	-	-	-	3	-
M25BSFHK158/258	-	-	-	-	-	**3**	**3**	**3**	**3**	**3**	-

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	SDG 6: Health Awareness & Positive Mindset	Understand the **importance of health** and identify factors (biological, environmental, psychological, social) that influence it.
2	SDG 7: Healthy Lifestyles for the Future	Create a **personalized healthy diet plan** based on nutritional guidelines.
3	SDG 8:T**eamwork and social connection** through sports and physical activities.	Recognize how **relationships can positively or negatively impact health and life choices**.
4	SDG 9: Risk Behavior Prevention	Understand the **psychology and stages of addiction**, and how it affects the brain and behavior.
5	SDG 10: Disease Prevention and Wellness	Gain knowledge of **disease prevention techniques**, including hygiene, vaccinations, and lifestyle.

1st / 2nd Semester	Humanities (HS) BIOLOGY FOR ENGINEERS	M25BBEK210

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Basic Knowledge of Biology	A basic understanding of high school-level biology concepts can be beneficial. This includes knowledge of cell structure, basic physiology, and fundamental biological processes.
2	Basic Knowledge of Biochemistry	Familiarity with major biological molecules and their application (carbohydrates, proteins, lipids, nucleic acids, vitamins, enzymes, and hormones).
3	Basic Knowledge of Mathematics and Physics	Understanding the human anatomy and physiological systems in comparison with bioengineering principles.
4	Basic Concepts of Design	Understanding of basic design and system thinking, which will help in bioengineering design and nature-bioinspired materials and mechanisms.
5	Engineering Fundamentals	Ability to analyze and apply basic engineering principles to solve biological problems.

2. Syllabus

BIOLOGY FOR ENGINEERS SEMESTER – II			
Course Code	**M25BBEK301**	**CIE Marks**	**50**
Number of Lecture Hours/Sem (L: T: P: S:TW:SL)	**16:0:0:0=16Hrs**	**SEE Marks**	**50**
		Total Marks	**100**
Credits	**01**	**Exam Hours**	**01**

Course objectives:

1. To acquaint the students with fundamental biological principles and their application to bioengineering.
2. To enable the students to understand the bio-design principles to create novel devices and structures.
3. To show the students how biological systems can be re-designed as substitute products for natural systems.
4. To encourage students to create an interdisciplinary view of biological engineering.

MODULE - 1

CELL BIOLOGY

Introduction to cell (Types, structure, and major functions of Cells and Cell Organelles) Stem cells and their application. Biomolecules: Properties and functions of Carbohydrates, Nucleic acids, Proteins, Lipids, Enzymes, Vitamins, and Hormones.

MODULE 2

BIOMOLECULES AND THEIR APPLICATION

Carbohydrates as Cellulose-based water filters, PHA and PLA as Bioplastics, Nucleic acids in Vaccines and Diagnosis, Proteins in food production (Plant-based protein, Whey protein, and Meat analogs), Lipids as biodiesel, and cleaning agents/detergents, Enzymes in Biosensors fabrication, Food processing, Detergent formulation, and Textile processing.

MODULE 3

ADAPTATION OF ANATOMICAL PRINCIPLES FOR BIOENGINEERING DESIGN

Brain as a CPU System. Eye as a Camera System. Heart as a Pump System. Lungs as Purification System. Kidney as a Filtration System.

MODULE 4

NATURE-BIOINSPIRED MATERIALS AND MECHANISMS

Echolocation, Photosynthesis. Bird Flying, Lotus Leaf Effect, Plant Burrs, Sharkskin, Kingfisher Beak. Human Blood Substitutes - Hemoglobin-Based Oxygen Carriers (Hbocs) and Perfluorocarbons (Pfcs).

MODULE 5

TRENDS IN BIOENGINEERING:

1. Scaffolds In Muscular, Skeletal Systems and Tissue Engineering, Bioprinting Techniques and Materials.
2. Electrical Tongue and Electrical Nose in Food Science, DNA Origami and Biocomputing, Bioimaging, and Artificial Intelligence for Disease Diagnosis. Bioconcrete. Bioremediation. Biomining.

3. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	**Lecture Method**	Explanation via real-life problems, situation modeling, deliberation of solutions, hands-on sessions, reflective and questioning /inquiry-based teaching.
2	**Live Demonstration**	Instructions with interactions in classroom lectures (physical/hybrid).
3	**Collaborative Learning**	Encourage collaborative learning for improved competency application.
4	**ICT Tools**	Use of ICT tools, including YouTube videos, related MOOCs, AR/VR/MR tools.
5	**Problem-Based Learning (PBL)**	Implement PBL to enhance analytical skills and practical application of competencies
6	**Multiple Representations**	Introduce topics in various representations to reinforce competencies
7	**Gamification Tools**	Use of gamification tools (in both physical/hybrid classes) for creative learning outcomes
8	**Student Seminars**	Solo, group /oral presentations.
9	**Model Making**	Demonstration using working models.

4. Assessment Details (both CIE and SEE)

Components		Number	Weightage	Max. Marks
1	Internal Assessment - Tests (A)	3	50%	25
2	Term Work - TW (B)	2	50%	25
	Total Marks			**50**

Final CIE Marks =(A) + (B)

A = Average of best two Test marks

B = Average of two Term Work marks

Semester End Examination:

1. Question paper pattern will be ten questions. Each question is set for 20marks. The medium of the question paper shall be English unless otherwise it is mentioned.
2. There shall be 2 question from each module, each of the two questions under a module (with a maximum of 3 sub questions), may have mix of topics under that module if necessary.
3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

COs	Description
M25BBEK210.1	Elucidate the fundamentals of biological concepts employing pertinent health, and engineering applications.
M25BBEK210.2	Assess the biological ideologies for the design and development of novel bioengineering solutions.
M25BBEK210.3	Substantiate and apply the ideologies amid nature-inspired biomimetics perceptions for explicit engineering solutions.
M25BBEK210.4	Exploring innovative bio-based solutions for relevant biological complications.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BBEK210.1	**3**	**-**	**-**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**
M25BBEK210.2	**3**	**-**	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**
M25BBEK210.3	**3**	**3**	**3**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**
M25BBEK210.4	**3**	**-**	**3**	**-**	**3**	**-**	**3**	**-**	**-**	**-**	**-**
M25BBEK210	**3**	**3**	**3**		**3**	**3**	**3**				

6. SGD: Sustainable Development goals with justification

Sl. No.	SDG	Justification
1	SDG 3 – Good Health and Well-being	The syllabus includes stem cells, tissue engineering, bioimaging, and AI for disease diagnosis, contributing to advanced healthcare and improved health outcomes.
2	SDG 6 – Clean Water and Sanitation	Application of cellulose-based water filters derived from carbohydrates helps in developing sustainable water purification systems for safe and clean water access.
3	SDG 9 – Industry, Innovation & Infrastructure	Modules on bio-inspired design, bioprinting, biosensors, and biomimetics promote innovation in sustainable engineering and infrastructure.
4	SDG 12 – Responsible Consumption & Production	Use of bioplastics (PHA/PLA), biodiesel from lipids, and enzyme-based green chemistry promotes eco-friendly production and reduced environmental impact.

2nd Semester	Humanities (HS) Communicative English	M25BENGK 209

1. Prerequisites

Sl. No.	Proficiency	Pre-requisites
1	**Basic proficiency in English language**	Students should have elementary skills in reading, writing, speaking, and understanding English, typically acquired at the high school level.
2	**Awareness of general communication scenarios**	Familiarity with everyday conversations and interactions (e.g., greetings, asking for information) is helpful for interpersonal communication and situational dialogues.
3	**Willingness to speak and participate actively**	Students should be open to engaging in oral activities like role-plays, group discussions, and presentations, which are central to learning in this course.
4	**Basic understanding of pronunciation and reading techniques**	Some prior exposure to reading aloud, stress patterns, and sounds of English words will assist in overcoming Mother Tongue Influence (MTI) and developing better fluency.

2. Syllabus

Communicative English **Semester II**			
Course Code	**M25BENGK209**	CIE Marks	**50**
Total Number of Teaching-Learning Hours/sem (L:T: P:TW:SL)	**16:0:0:0:0=16**	SEE Marks	**-**
		Total Marks	**50**
Credits	-	Exam Hours	-

Course Objectives:

1. **To develop students' active listening skills** by introducing them to barriers, techniques, and strategies for effective listening in academic and professional environments.
2. **To enhance interpersonal communication abilities** through conversation practice, situational dialogues, and the application of care, courtesy, and consideration in social and professional interactions.
3. **To improve reading comprehension and analytical skills** by training students to identify and overcome reading obstacles, and by applying effective reading strategies.
4. **To strengthen verbal communication and presentation skills** by addressing Mother Tongue Influence (MTI) and building confidence in oral presentations using appropriate structure and delivery techniques.

Module -1

Practising listening activities. Disadvantages of poor listening, Barriers to effective listening, Advantages of and techniques for effective listening, Practising listening activities.

Module -2

Basics of Interpersonal skills :-Developing skills through conversations and dialogues, Purpose of general conversations: interaction, awareness, building credibility, Tips for improving conversations, application of "the three Cs": Care, Courtesy and Consideration in conversation ,Situational Dialogues.

Module -3

Reading Skills : Differences between efficient and inefficient readers; Basics steps and tips for improving reading ability , Overcoming common obstacles to effective reading , strategies for effective reading.

Module -4

Overcoming MTI or Mother Tongue Influence: Awareness of numerous deviations from Standard English Usage in Indian English, Techniques for the neutralization of MTI.

Module -5

Oral Presentation and PPTs

TEXTBOOKS:

1. Communication Skills by Sanjay Kumar and Pushpalatha Part II Oxford Higher Education
2. English for Engineers by N P Sudarshana and C Savitha Cambridge University Press

REFERENCE BOOKS:

1. Practical English Usage by Michael swan, Oxford University Press.
2.Technical communication by Gajendra Singh Chauhan, Cengage Learning India

3. Teaching-Learning Process Strategies

Sl. No.	TLP Strategies	Description
1	**Lecture Method**	Explain key communication concepts, barriers, and strategies through structured lectures using whiteboard/PowerPoint, supported by real-life examples.
2	**Audio & Video Listening Practice**	Use podcasts, speeches, news clips, and TED Talks to develop listening comprehension and identify poor vs. effective listening practices.
3	**Role Play & Situational Dialogues**	Conduct role plays and dialogues based on workplace and social scenarios to improve interpersonal communication and apply the "Three Cs."
4	**Group Discussions & Peer Interaction**	Foster interpersonal and reading skills by encouraging student-led discussions, topic sharing, and peer evaluation of listening and reading practices.
5	**Reading Circles & Skimming Activities**	Conduct group reading activities focused on identifying main ideas, improving vocabulary, and distinguishing efficient from inefficient reading habits.
6	**Pronunciation Labs & MTI Correction**	Use language lab tools and drills (tongue twisters, minimal pairs, phoneme practice) to neutralize MTI and promote standard pronunciation.
7	**PPT and Oral Presentation Practice**	Conduct mock presentations on various topics to build student confidence, body language, clarity, and coherence in verbal expression.
8	**ICT-Enabled Tools**	Use digital tools like Google Slides (for PPTs), Grammarly (for writing), YouTube (for listening), and online quizzes (for listening/reading practice).
9	**Self and Peer Feedback Sessions**	Encourage students to reflect on their performance and provide constructive feedback on each other's listening, speaking, and presentation tasks.

4. **Assessment Details (both CIE and SEE)**

Continuous Internal Evaluation:

CIE Split up for Professional Course (PC)

Components		Number	Weightage	Max. Marks
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3. The students have to answer 5 full questions selecting one full question from each module.
4. Marks scored will be proportionally scaled down to 50 marks

5. Course Outcomes (COs) and Mapping with POs/ PSOs

Course Outcomes (COs)

COs	Description
M25BENGK210.1	Apply effective listening, reading, and interpersonal communication strategies in both academic and professional contexts.
M25BENGK210.2	Demonstrate improved verbal communication skills by reducing Mother Tongue Influence (MTI) and delivering structured oral presentations.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
M25BENGK210.1	-	-	-	-	-	-	-	-	2	3	2
M25BENGK210.2	-	-	-	-	-	-	-	-	2	3	2
M25BENGK210	-	-	-	-	-	-	-	-	**2**	**3**	**2**

6. Mapping to Sustainable Development Goals (SDG):

Sl. No.	SDG	Justification
1	**SDG 4**: Quality Education	Enhances essential communication skills including listening, reading, speaking, and presentation—key components of a quality, holistic education.
2	**SDG 8**: Decent Work and Economic Growth	Improves workplace readiness through effective communication, interpersonal skills, and presentation abilities—critical for employment and career advancement.
3	**SDG 10**: Reduced Inequalities	Reducing MTI and promoting clear, inclusive communication helps students from diverse linguistic backgrounds participate equally in academic and professional spaces.
4	**SDG 17**: Partnerships for the Goals	Promotes teamwork, collaboration, and respectful dialogue—skills essential for global partnerships and effective communication in multidisciplinary settings.