MAHARAJA INSTITUTE OF TECHNOLOGY MYSORE

Autonomous Institution Affiliated to VTU

Competency Based Syllabus (CBS)

for

Mechanical Stream

(Under Outcome Based Education (OBE) and

Choice-Based Credit System (CBCS))

Offered During1st&2ndSemesters of Study

in

Partial Fulfillment for the Award of Bachelor's Degree in

Mechanical Engineering

2023 Scheme

Scheme Effective from the academic year 2023-24

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1st Semester	Basic Science Course (BS) Mathematics-I for ME Stream	M23BMATM101

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Calculus	Understandingthe relationship between Cartesian and polar coordinates, knowledge of curves related to various systems and differentiation w.r.t to the specific variables. Familiaritywithfundamental knowledge of algebra course
2	Series expansion	Knowledgeofcalculus, series of function of one variable, multi-variable limits, convergence and partial differentiation w.r.t several variables.
3	Higher order ODE	Knowledge of factorization and ordinary differential equations. Familiarity with identify the dependent and independent variables
4	ODE	Strong knowledge of basic differential equations, separation of variables to solve differential problems. Familiarity with identify the dependent and independent variables
5	Basic Concepts of Linear algebra	Strong knowledge of matrices, linear algebra and simultaneous system of linear equations. Familiaritywithfundamental knowledge of algebra course.
6	Previous Coursework	CompletionofintroductorycoursesinMathematics-I for ME Stream orarelatedfield

2. Competencies

S/L	Competency	KSADescription
1	**Calculus**	**Knowledge**: Identification of family of curves and differentiation. **Skills**: Solving the curves using different systems **Attitudes:** Polar coordinates can also be used to determine the best audio pickup patterns for cardio-id microphones.
2	**Series solution and multi-variate calculus**	**Knowledge:** Understanding of series and partial differentiation. **Skills:**Should be able to differentiate partially w.r.t several variables **Attitudes:** Valuing the importance of partial derivatives in vector calculus and differential geometry. Computation of stress and strain, Errors and approximations, Estimating the critical points and extreme values.
3	**Ordinary Differential Equations (ODEs) of First Order**	**Knowledge**: Identification of differential equation, variables separation **Skills**: Concept of basic integration **Attitudes:** Ordinary differential equations applications in real life are used to calculate the movement or flow of electricity, motion of an object to and fro like a pendulum, to explain thermodynamics concepts. Rate of Growth or Decay, Conduction of heat.
4	**Ordinary Differential Equations of Higher Order**	**Knowledge**:Identification of differential equation, Factorization ofequations, familiar with dependent and independent variables. **Skills:**Concept of finding real and complex roots using various methods. **Attitudes:** Used to synchronize of model establishment and parameteroptimization and greatly enhances the modeling efficiency.Oscillations of a spring, Transmission lines, Highway engineering.
5	**Linear Algebra**	**Knowledge**: Understanding the concept of matrices, linear algebra andsimultaneous system of linear equations. **Skills**: Arithmetic operations and elementary row operations **Attitudes:**Apply the concept of linear algebra for the analysis of a structure in equilibrium involves writing down many equations in several unknowns. Structural Analysis, Balancing equations.

3. Syllabus

Mathematics-I for ME Stream SEMESTER–I			
CourseCode	**M23BMATM101**	CIEMarks	**50**
NumberofLectureHours/Week(L:T:P:S)	**(2:2:2:0)**	SEEMarks	**50**
TotalNumberofLectureHours	**40 Theory + 08-10 Lab hours**	TotalMarks	**100**
Credits	**4**	Exam Hours	**03**

Courseobjectives: Thiscoursewill enable studentsto:

1. Appreciate the importance of Statistical methods, Probability, Series and Numerical techniques in Engineering Problems.
2. Acquire the knowledge of Statistical methods, Probability, Series and Numerical techniques to apply them in their core domain.
3. Improve their Mathematical thinking and acquire skills required for sustained lifelong learning.

Module -1: Calculus

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

Module -2:Series Expansion and Multivariable Calculus

Taylor's and Maclaurin's series expansion for one variable (Statement only) – problems. Indeterminate forms - L'Hospital's rule-Problems. Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems.

Module -3:Ordinary Differential Equations (ODEs) of First Order

Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ & $\frac{1}{M}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$. Orthogonal trajectories, L-R & C-R circuits. Problems.

Non-linear differential equations: Introduction to general and singular solutions, Solvable for p only, Clairaut's equations,reducible to Clairaut's equations. Problems.

Module-4:Ordinary Differential Equations of Higher Order

Importance of higher-order ordinary differential equations in Mechanical engineering applications. Higher-order linear ODEs with constant coefficients - Inverse differential operator, method of variation of parameters, Cauchy's and Legendre homogeneous differential equations - Problems.

Module -5: Linear Algebra

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

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

1. 2D plots for Cartesian and polar curves 2 Finding angle between polar curves, curvature and radius of curvature of a given curve
2. Finding angle between polar curves, curvature and radius of curvature of a given curve
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.	

Text Books:

1. **B.S.Grewal**:"HigherEngineeringMathematics",Khannapublishers,44th Ed.2021
2. **E.Kreyszig**:"AdvancedEngineeringMathematics",JohnWiley&Sons,10th Ed.(Reprint),2018
3. **David M Burton:** "Elementary Number Theory" McGraw Hill, 7th Ed.,2017**.**

Reference Books

1. **V.Ramana:**"HigherEngineeringMathematics"McGraw-HillEducation,11th Ed.
2. **SrimantaPal&SubodhC.Bhunia:**"EngineeringMathematics"OxfordUniversityPress,3rd Reprint,2016.
3. **N.PBaliandManishGoyal**:"AtextbookofEngineeringMathematics"LaxmiPublications,Latesteditio n.
4. **C.RayWylie,LouisC.Barrett:**"AdvancedEngineeringMathematics"McGraw–HillBookCo.Newyork, Latested.
5. **GuptaC.B,SingS.RandMukeshKumar:**"EngineeringMathematicforSemesterIandII",Mc-GrawHill Education (India)Pvt.Ltd2015.
6. **H.K.DassandEr.RajnishVerma:**"HigherEngineeringMathematics"S.Chand Publication(2014).**JamesStewart:"**Calculus"Cengagepublications,7 edition, 4thReprint 2019.

4. SyllabusTimeline

S/L	SyllabusTimeline	Description
1	Week 1-2: Calculus	Polar coordinates, Polar curves Angle between the radius vector and the tangent Angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric. Curvature and Radius of curvature Polar form Curvature and Radius of curvature Pedal forms. Problems.
2	Week 3-4: Series Expansion and Multivariable Calculus	Taylor's and Maclaurin's series expansion for one variable problem. Indeterminate forms - L'Hospital's rule-Problems. Partial differentiation, Total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems
3	Week 5-6: Ordinary Differential Equations (ODEs) of First Order	Linear and Bernoulli's differential equations. Exact and reducible to exact differential equations - Integrating factors on $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ & $\frac{1}{M}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$. Orthogonal trajectories. L-R & C-R circuits. Problems. **Non-linear differential equations:** Introduction to general and singular solutions Solvable for p problems Clairaut's equations, reducible to Clairaut's equations. Problems.
4	Week 7-8: Ordinary Differential Equations of Higher Order	Introduction, Higher-order linear ODEs with constant coefficients Inverse differential operator- Type-1 Inverse differential operator- Type-2 Inverse differential operator- Type-3 Miscellaneous problems Method of variation of parameters, Cauchy's homogeneous differential equations Legendre homogeneous differential equations - Problems.

5	Week 9-10: Linear Algebra	Introduction on elementary row transformation of a matrix. Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-elimination method. Gauss-Jordan method Gauss-Seidel method. Eigenvalues and Eigenvectors Rayleigh's power method to find the dominant Eigenvalue and Eigenvector
6	Week 11-12:IntegrationandPractical Applications	Apply learned concepts and competencies to real-world scenarios.Hands-onpractice

5. Teaching-LearningProcessStrategies

S/L	TLPStrategies:	Description
1	LectureMethod	Utilizevariousteachingmethodswithin thelectureformatto reinforce Competencies.
2	Video/Animation	Incorporatevisualaidslikevideos/animationstoenhance UnderstandingofVerilogconcepts.
3	Collaborative Learning	Encouragecollaborative learningforimprovedcompetencyapplication.
4	HigherOrderThinking(HOTS) Questions	PoseHOTSquestionstostimulatecriticalthinkingrelatedtoeach competency.
5	Problem-Based Learning(PBL)	ImplementPBLtoenhanceanalyticalskillsandpracticalapplicationof Competencies
6	MultipleRepresentations	Introducetopicsinvariousrepresentationstoreinforcecompetencies
7	Real-WorldApplication	Discuss practical applications to connect theoretical concepts with real-worldcompetencies.
8	FlippedClass Technique	Utilizeaflippedclassapproach,providingmaterialsbeforeclassto Facilitateeeperunderstandingofcompetencies

6. Assessment Details (both CIE and SEE)

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

Components		Number	Weightage	Max. Marks	Min. Marks
Theory (A)	Internal Assessment-Tests (A)	2*	**60%**	**15**	**06**
	Assignments/Quiz/Activity (B)	2	**40%**	**10**	**04**
	TotalMarks		**100%**	**25**	**10**

Components		Number	Weightage	Max. Marks	Min. Marks
Laboratory(B)	Record Writing	Continuous	**60%**	15	06
	Test at the end of the semester	1	**40%**	10	04
	Total Marks		**100%**	**25**	**10**

Final CIE Marks = (A) + (B)

Semester End Examination:

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

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 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.

7. LearningObjectives

S/L	Learning Objectives	Description
1	Understandingpolar curves and its Fundamentals	Students will learn the use of polar coordinates in solving various curves in different systems equation movement of flow of liquids and other fields of engineering.
2	Understanding Fundamentals of Series solution and partial derivatives	Students will become proficient in writing a series expansion of function of one variable and also know the concept of partial derivatives using standard techniques.
3	Proficiency inODE and higher order ODE	Students will become proficient in calculating the roots of the equation of higher order by using various basic techniques.
4	Project-BasedLearning	Through hands-on projects, students will apply their knowledge ofMake use of the Linear algebra to analyze structure in equilibrium involves writing down many equations in several unknowns.

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

Course Outcomes (COs)

COs	Description
M23BMATM101.1	Apply the knowledge of calculus to solve problems related to polarcurves.
M23BMATM101.2	Learn the notion of partial differentiation to compute rate of change of multivariate functions.
M23BMATM101.3	Analyze the solution of linear and nonlinear ordinary differential equations.
M23BMATM101.4	Make use of matrix theory for solving the system of linear equations and compute eigenvalues and eigenvectors.
M23BMATM101.5	Solving complex Engineering problem using python

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BMATM101.1	**3**											
M23BMATM101.2		**3**										
M23BMATM101.3	**3**											
M23BMATM101.4	**3**											
M23BMATM101.5					**3**							
M23BMATM101	**3**	**3**			**3**							

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						

Module 5						
Total						**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. FuturewiththisSubject

The"Mathematics-I for ME stream"courseinthe first semesteroftheB.Eprograme has a strong foundation for several future courses in the undergraduate program. The contributions ofthis subject extend across various areas, enhancing the students' understanding and skills in thefieldof digital systems. Here aresomenotable contributions:

Kinematics and Dynamics: Calculus is essential for describing the motion of objects. Differentiation is used to find velocities and accelerations from position-time relationships, while integration helps determine positions and velocities from accelerations.

Thermodynamics and Heat Transfer: Calculus is used to analyze changes in thermodynamic properties and to solve heat equations.

Fluid Mechanics: Calculus helps in understanding fluid flow and the equations governing fluid dynamics, such as the Navier-Stokes equations.

Optimization of Systems: Advanced calculus techniques will continue to be crucial in optimizing mechanical systems for efficiency, performance, and cost-effectiveness.

Modeling and Simulation: Enhanced computational tools and numerical methods based on calculus will enable more accurate simulations of complex systems, leading to better designs and innovations.

Complex Systems Analysis: Series expansions, such as Taylor and Fourier series, are used to approximate complex functions and analyze the behavior of mechanical systems.

Multivariable Functions: Multivariable calculus is essential for dealing with functions of several variables, which are common in stress-strain analysis, thermodynamics, and control systems.

Advanced Materials: Understanding and predicting the behavior of new materials under various conditions will rely on multivariable calculus.

Robotics and Automation: The control and optimization of robotic systems, which often involve multiple variables and complex dynamics, will benefit from advancements in this area.

Simple Harmonic Motion: First-order ODEs are used to model systems that exhibit simple harmonic motion, such as springs and pendulums.

Control Systems: They are essential in the analysis and design of control systems where the system's behavior is described by first-order differential equations.

1st Semester	Basic Science Course (BS) Applied Physics for ME Stream	M23BPHYM102

1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Classical Mechanics and waves	Understanding of simple harmonic motion (SHM) oscillations, Damped oscillation and Forced Oscillation 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 behaviour, 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.	Instrumentation and characterization.	A solid understanding of materials science such as crystal structures, and phase transitions, Proficiency in basic physics concepts (e.g., waves, particles, energy levels) helps in understanding various characterization techniques.
6.	Mathematics	Knowledge of calculus, Linear algebra and trigonometry.

2. Competencies

S/L	Competency	KSA Description
3.	Vibrations of bodies and compression waves**.**	**Knowledge:** Understanding Oscillatory Behavior, underdamped, overdamped, and critically damped systems. Understanding how the amplitude of forced oscillations varies with the driving frequency **Skills:** Gain proficiency in solving these differential equations and analyzing oscillatory behaviour**.** **Attitudes:** The importance of Damped oscillations is relevant in shock absorbers, pendulum clocks, and electrical circuits. Forced oscillations are relevant in musical instruments, electrical filters, and communication systems.
4.	Mechanics of Materials	**Knowledge:** Understanding the relationship between applied stress and resulting strain in a material, understandinghow materials deform laterally when subjected to axial stress. Familiarity with different moduli **Skills:**Recognizing how materials respond to plastic deformation, quantifying material stiffness and deformation response. Analyzing beam behaviour under bending loads. Deriving expressions for bending moment and deflection. **Attitudes:** The importance of knowing how to design structures and predict material behaviour under load, material behaviour during plastic deformation, designing components with minimal lateral deformation, and material selection for springs, shock absorbers, and other components.
5.	Thermoelectric technology	**Knowledge**:Familiarity with concepts such as entropy, enthalpy, and heat conduction. Understanding the Seebeck effect and the Peltier effect. **Skills:** Ability to measure electrical conductivity, Seebeck coefficient, thermal conductivity, and other relevant properties. Generate electric current through temperature and voltage differences between two dissimilar conductors **Attitudes:**Valuing the importance of thermos electric materials in

		engineering applications.
6.	Low-temperature physics**.**	**Knowledge**:Students learn about the properties of gases when exposed to extreme cold,and learn about safe handling, storage, and operation of cryogenic fluids. **Skills:**Gain expertise in designing and operating gas liquefaction systems, and principles behind refrigeration technologies used to achieve ultra-low temperatures. **Attitudes:**Explore temperature measurement methods, sensors, and instrumentation specific to cryogenic environments.
7.	Material Characterization and InstrumentationTechniques	**Knowledge:** Students learn the underlying principles behind different characterization techniques, Students acquire knowledge about variousmicroscopy techniques. **Skills**: Develop practical skills in using various microscopes to examine materials at different length scales. learn to interpret microscopy images, spectra, and diffraction patterns. **Attitudes:** Cultivate a curious mindset, exploring how different techniquesreveal material properties. Importance of precision and accuracy incharacterization.

3. Syllabus

Applied Physics for ME Stream			
Course Code	M23BPHYM102/202	CIE Marks	**50**
Number of Lecture Hours/Week (L: T: P: S)	2:2:2	SEE Marks	**50**
Total Number of Lecture Hours	40 + 10-12 Lab Slots	Total Marks	**100**
Credits	**04**	Exam Hours	**03**

Course objectives

- To understand the types of oscillation, shock waves &their generation, andapplications.
- To Study the elastic properties of materials and failures of engineeringmaterials
- To understand the fundamentals of thermoelectric materials and devices and theirapplication.
- To understand the Concepts in Low-temperature phenomena and generation of low-temperature.
- To study the various relevant material characterisationtechniques.

Module -1

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 Y, n and σ (with derivation), mention the relation between K, Y and σ, 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

Thermoelectric materials and devices: Themoemf and thermos 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, Themo couples, thermopile, Construction and Working of Thermoelectric generators (TEG) and Thermoelectric coolers (TEC), low, mid and high-temperature thermoelectric materials, Applications: Exhaust of Automobiles, Refrigerator, Space Program (RTG), numerical problems

Module -4
Production of low temperature - Joule Thomson effect (Derivation with 3 cases), Porous plug experiment with theory, Thermodynamical analysis of Joule Thomson effect, Liquefaction of Oxygen by cascade process, Linde's air liquefier, Liquefaction of Helium and its properties, Platinum Resistance Thermometer, Applications of Cryogenics, in Aerospace, Tribology and Food processing(qualitative), Numerical Problems
Module -5
Introduction to nanomaterials: Nanomaterials and nanocomposites. Principle, construction and working of X-ray Diffractometer, Crystallite size determination by Scherrer equation, Atomic Force Microscopy (AFM): Principle, construction, working and applications, X-ray photoelectron spectroscopy (XPS), Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), numerical problems
Laboratory experiments
1. Determination of Young's modulus of the material of the given bar Uniform Bending.
2. Determination of the Rigidity modulus of the Material of the wire using a Torsional Pendulum.
3. Study of Forced Mechanical Oscillations and Resonance.
4. Study of the frequency response of Series & Parallel LCR circuits.
5. Determination of Fermi Energy of the given Conductor.
6. Determination of Resistivity by Four Probe Method.
7. Determination of effective spring constant of the given springs in series and parallel combinations.
8. Determination of Young's modulus of the material of the given bar Single Cantilever.
9. Determination of the Moment of Inertia of the given irregular body using a torsional pendulum
10. Determination of Wavelength of Laser using Diffraction Grating.
11. Determination of Acceptance angle and Numerical Aperture of the given Optical Fiber.
12. Determination of the Radius of Curvature of the given Plano Convex Lens by setting Newton's Rings. 13. Step Interactive Physical Simulations.
14. Study of motion using spreadsheets
15. Application of Statistics using Spread Sheets.
16. PHET Interactive Simulations
Text Books: **1.** Engineering Physics by Gupta and Gour, Dhanpat Rai Publications, 2016 (Reprint). **2.** Physics for degree students by C L Arora and Dr. P S Hemne, S Chand Publications,2019(Reprint) **Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)** 1. Vibrations and Waves (MIT introductory Physics Series), A P French, CBS, 2003Edition 2. Timoshenko, S. and Goodier J.N. "Theory of Elasticity", 2nd Edition, McGraw Hill Book Co,2001. 3. Sadhu Singh, "Theory of Elasticity", Khanna Publishers,1997 4. Mechanical Properties of Engineered Materials by Wole Soboyejo, CRC Press; 1st edition,2002 5. Heat & Thermodynamics and Statistical Physics (XVIII-Edition) – Singhal, Agarwal & Satyaprakash – Pragati Prakashan, Meerut, 2006.4 6. Heat and Thermodynamics (I-Edition) – D.S. Mathur - S. Chand & Company Ltd., New-Delhi,1991 7. Physics of Cryogenics by Bahman Zohuri, Elsevier,2018 8. Characterization of Materials- Mitra P.K. Prentice Hall India Learning PrivateLimited. 9. Nanoscience and Nanotechnology: Fundamentals to Frontiers – M.S. Ramachandra Rao & Shubra Singh, Wiley India Pvt Ltd. Shock waves made simple by Chintoo S Kumar, K Takayama and K P J Reddy: Willey India Pvt.Ltd, Delhi,2014

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2: Oscillations and Shock waves	Study of SHM Differential equation for SHM, Springs: 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. 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.
2	Week 3-4: Elasticity	Stress-Strain Curve, Stress hardening and softening. Elastic Moduli, Poisson's ratio, Relation between Y, n and σ (with derivation), mention the relation between K, Y and σ, 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.
3	Week 5-6: Thermoelectric materials and devices.	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, thermopile, Construction and Working of Thermoelectric generators (TEG) and Thermoelectric coolers (TEC), low, mid and high-temperature thermoelectric materials, Applications: Exhaust of Automobiles, Refrigerator, Space Program (RTG), numerical problems
4	Week 7-8: Cryogenics	Production of low temperature - Joule Thomson effect (Derivation with 3 cases), Porous plug experiment with theory, Thermodynamical analysis of Joule Thomson effect, Liquefaction of Oxygen by cascade process, Linde's air liquefier, Liquefaction of Helium and its properties, Platinum Resistance Thermometer, Applications of Cryogenics, in Aerospace, Tribology and Food processing(qualitative), Numerical Problems
5	Week 9-10: Material Characterization and InstrumentationTechniques	Introduction to nanomaterials: Nanomaterials and nanocomposites. Principle, construction and working of X-ray Diffractometer, Crystallite size determination by Scherrer equation, Atomic Force Microscopy (AFM): Principle, construction, working and applications, X-ray photoelectron spectroscopy(XPS), Scanning electron microscopy (SEM), Transmission electron microscopy (TEM), numerical problems

5. 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 instrumentation, effects of fatigue, and low-temperature effects on gases.
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

6. Assessment Details for IPCC course. (both CIE and SEE)

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

Components		Number	Weightage	Max. Marks	Min. Marks
Theory (A)	Internal Assessment-Tests (A)	2*	**60%**	**15**	**06**
	Assignments/Quiz/Activity (B)	2	**40%**	**10**	**04**
	TotalMarks		**100%**	**25**	**10**

Components		Number	Weightage	Max. Marks	Min. Marks
Laboratory(B)	Record Writing	Continuous	**60%**	15	06
	Test at the end of the semester	1	**40%**	10	04
	Total Marks		**100%**	**25**	**10**

Final CIE Marks = (A) + (B)

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understand the types of oscillation, shock waves	Understanding Oscillatory Behavior, underdamped, overdamped, and critically damped systems. Understanding how the amplitude of forced oscillations varies with the driving frequency. Study the associated phenomenon of shock waves like sonic boom etc.,
2	Study the elastic properties of materials and failures of engineering materials	Understanding and studying the relationship between applied stress and resulting strain in a material, understandinghow materials deform laterally when subjected to axial stress. Familiarity with different moduli
3	understand the fundamentals of thermoelectric materials and devices	Familiarity with concepts such as entropy, enthalpy, and heat conduction. Understanding the See beck effect and the Peltier effect. Ability to measure electrical conductivity, Seebeck coefficient, thermal conductivity, and other relevant properties
4	Understand the concepts in low-temperature phenomena	Understanding concepts such as entropy, enthalpy, and heat conduction, learned the Seebeck effect and the Peltier effect. Learning principles behind refrigeration technologies used to achieve ultra-low temperatures
5	Study the material characterization	Students learn the underlying principles behind differentcharacterization techniques, Students acquire knowledge about variousmicroscopy techniques
6	Communication Skills and Ethics	Students will work collaboratively in teams in seminars and laboratories, enhancing their ability to communicate effectively, share ideas, and solve problems collectively.

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

Course Outcomes (COs)

CO's	DESCRIPTION OF THE OUTCOMES
M23BPHYM102.1	Understand the fundamental principles of Oscillations, wave theory, elasticity, thermoelectricity, cryogenic and nanophysics.
M23BPHYM102.2	Apply the principles of Oscillations, wave theory, elasticity, thermoelectricity, cryogenic and nanophysics in engineering purview.
M23BPHYM102.3	Analyze the characteristics of Oscillations, wave theory, elastic & thermoelectric materials, cryogenic and nanophysics for device applications.
M23BPHYM102.4	Understand and apply the relation between the working principles and practical measurements to perform the experiments.
M23BPHYM102.5	Analyze the results through the interpretation of graphical and theoretical values and document the same.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10
M23BPHYM102.1										
M23BPHYM102.2	3									
M23BPHYM102.3		2								
M23BPHYM102.4	3									
M23BPHYM102.5				2					2	
M23BPHYM102	3	2		2					2	

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1		**14**	**12**			**26**
Module 2		**14**	**12**			**26**
Module 3		**14**	**12**			**26**
Module 4		**14**	**12**			**26**
Module 5		**14**	**12**			**26**
Theory component						**130(A)**
Practical component				**10**	**15**	**25(B)**

The theory component marks of 140 is reduced to 25.

Total CIE marks = Theory Component + Practical component= 25+25= 50

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1		**14**	**6**			**20**
Module 2		**14**	**6**			**20**
Module 3		**14**	**6**			**20**
Module 4		**10**	**6**	**2***	**2***	**20**
Module 5		**14**	**6**			**20**
Total		**70**	**30**			**100**

The practical component question of 4 marks can be asked in any of the modules

Conditions for SEE Paper Setting:

Each module of the SEE question paper should be allocated with questions for 20% of the total SEE marks.

10. Future with this Subject

The "Applied Physics forME" course in the first or second semester of the B.E program lays a strong foundation for several future courses in the undergraduate program. The contributions of this subject extend across various areas, enhancing the student's understanding and skills in the field of science and technology. Here are some notable contributions.

- Students delve deeper into harmonic motion, resonance, and damping. They apply oscillation principles to mechanical systems, structures, and control theory.Project opportunities arise in

nonlinear oscillations, chaos theory, and vibration control. Students may work on projects related to structural dynamics or mechatronics.

- Applications in aerodynamics, propulsion, and materials science. Students study shock wave interactions and design shock-resistant structures.
- Advanced elasticity topics like anisotropy, viscoelasticity, and plastic deformation. Applications in mechanical engineering.
- Projects on energy efficiency, renewable energy, or electronics can explore thermoelectric materials. Study of Energy harvesting and cooling systems in higher classes of Engineering.
  Courses cover a variety of topics, including materials at cryogenic temperatures, gas liquefaction, and refrigeration systems.The field is also essential for the development of cryogenically cooled quantum processors.

1st Semester	Engineering Science Courses - I (ESC) ELEMENTS OF MECHANICAL ENGINEERING	M23BMEM103

1. Prerequisites:

S/L	Proficiency	Prerequisites
1.	Basic understanding of engineering disciplines	Familiarity with different engineering fields and their societal impact.
2.	High school-level physics (work, power, energy, heat)	Foundational knowledge of physics concepts relevant to specific topics.
3.	Workshop skills	Prior experience in a workshop setting would be beneficial.
4.	Basic computer literacy	Familiarity with the concept of computer-controlled manufacturing and basic principles of 3D printing technology.
5.	Familiarity with basic mathematical functions (algebra, trigonometry - advantageous)	Enhances understanding of calculations related to mechanical concepts (e.g., gear ratios, forces).
6.	Analytical thinking skills	Ability to break down problems, identify key elements, and solve them logically.
7.	Visualization skills	Ability to interpret diagrams, schematics, and 3D models relevant to mechanical systems.

2. Competencies:

S/L	Competency	KSA Description
1.	**Understanding the Role of Mechanical Engineering**	**Knowledge:** Different engineering disciplines and their applications. Societal impact of mechanical engineering advancements. **Skills:** Analyze real-world problems and identify potential mechanical engineering solutions. **Attitudes:** Curiosity and interest in the impact of engineering on society.
2.	**Grasping Core Mechanical Engineering Principles**	**Knowledge:** Physics concepts (work, power, energy, heat, mechanics) **Skills:** Apply fundamental principles to solve basic mechanical engineering problems **Attitudes:** Analytical thinking and problem-solving skills.
3.	**Understanding Machine Tools and Operations**	**Knowledge:** Working principles of common machine tools (lathe, drill, milling). Types of machining operations (turning, drilling, milling). **Skills:** Demonstrate a basic understanding of machine tool functionalities (no practical operation required). **Attitudes:** Openness to learning new technologies and appreciating the role of practical skills.
4.	**Exposure to Advanced Manufacturing Systems**	**Knowledge:** Concept of computer-controlled manufacturing (CNC). Basic principles of 3D printing technology. **Skills:** Recognize the potential of advanced manufacturing techniques. **Attitudes:** Adaptability and willingness to embrace technological advancements.
5.	**Understanding Energy Sources and Power Plants**	**Knowledge:** Different types of energy sources (fossil fuels, renewables). Working principles of various power plants (hydro, thermal, nuclear, solar, wind, tidal).

		Skills: Explain the basic functionalities of different power generation technologies. **Attitudes:** Environmental awareness and appreciation for sustainable energy solutions.
6.	**Introduction to Internal Combustion Engines**	**Knowledge:** Engine components and working principles (4-stroke petrol & diesel). **Skills:** Identify the key components of an internal combustion engine. **Attitudes:** Attention to detail and understanding of cause-and-effect relationships in mechanical systems.
7.	**Understanding Refrigeration & Air Conditioning Systems**	**Knowledge:** Refrigeration principles and desirable refrigerant properties. Working principles of basic refrigeration and air conditioning systems. **Skills:** Explain the fundamental concepts behind these systems. **Attitudes:** Appreciation for the importance of thermal comfort and energy efficiency.
8.	**Exploring Mechanical Power Transmission Systems**	**Knowledge:** Different types of gear drives and belt drives. Gear ratios and belt length calculations (simple problems). **Skills:** Analyze basic power transmission mechanisms and solve simple numerical problems **Attitudes:** Logical reasoning and ability to apply theoretical knowledge to practical applications.
9.	**Introduction to Joining Processes**	**Knowledge:** Definitions and classifications of common joining processes (soldering, brazing, welding). **Skills:** Recognize different joining techniques and their applications. **Attitudes:** Safety awareness and appreciation for proper tool and technique selection.
10.	**Understanding Future Mobility Technologies**	**Knowledge:** Components of electric and hybrid vehicles. Advantages and disadvantages compared to traditional vehicles. **Skills:** Analyze the potential of future mobility solutions. **Attitudes:** Sustainability mindset and interest in technological innovation.

3. Syllabus:

ELEMENTS OF MECHANICAL ENGINEERING SEMESTER – I			
Course Code	**M23BEMEM103**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(2:2:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours Theory**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course objectives: This course will enable students to:

- Explain the role of mechanical engineering in society, including the impact of various engineering disciplines and identify potential mechanical solutions to real-world problems.
- Apply core physics concepts (work, power, energy, heat, mechanics) to solve basic mechanical engineering problems and understand the working principles of common machine tools (lathe, drill, mill) and different machining operations.
- Recognize the potential of advanced manufacturing techniques like CNC and 3D printing, explain different energy sources and the working principles of various power plants, and identify the components and basic working principles of internal combustion engines.
- Understand refrigeration principles, refrigerant properties, and the basic operation of air conditioning and refrigeration systems, as well as analyze basic mechanical power transmission

systems (gear ratios, belt lengths) using relevant formulas.

- Recognize the definitions and classifications of common joining processes and analyze future mobility solutions (electric/hybrid vehicles) and their advantages/disadvantages.
- Explain the concepts of mechatronics and robotics (open/closed-loop systems, robot anatomy, applications), demonstrating a foundational understanding of these interdisciplinary fields.

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:
Modes of heat transfer, 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, tapping, counter sinking, counter boring,
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, 3D printing.

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

Textbooks:

1.Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008
2. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media promotersand Publishers Pvt. Ltd., 2010.

Reference Books:

1. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition.
2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rd Ed., 2003.
3. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1.

4. Syllabus Timeline:

S/L	Syllabus Timeline	Description
1	Week 1-3: Introduction to Mechanical Engineering, Steam Formation, Energy Resources.	**Week 1 (4 Hours):** • Introduction to Mechanical Engineering and Role of Mechanical Engineers in Industry and Society. • Steam Formation and its Properties **Week 2 (4 Hours):** • Numerical problems of Steam formation.

		• Energy resources effective utilization along with advantages and dis advantages.
2	Week 4-6: Machine Tool Operations, Introduction to Advanced Manufacturing Systems	**Week 3 (4 Hours):** • Introduction to various types of Mechanical Tools. • Machine Tools operations (Lathe and Drilling Machine) **Week 4 (4 Hours):** • Machine tool Operations(Milling Machine) • CNC, Advantages and Disadvantages of CNC • 3D Printing
3	Week 6-8: Introduction to IC Engines, Refrigeration and Air Conditioning	**Week 5(4 Hours):** • Introduction to IC Engines, 4 – Stroke Petrol Engine. • 4- Stroke Diesel Engine. • Numerical Problems. **Week 6 (4 Hours):** • Introduction to Refrigeration systems • Working principle of Vapour Compression Refrigeration system • Introduction of Air Conditioning system. • Working principle of Room air Conditioner
4	Week 8-10: Mechanical Power Transmission, Joining Processes	**Week 7(4 Hours):** • Introduction to Mechanical Power transmission. • Gear Drive and its types • Numerical Problems on gear drives **Week 8(4 Hours):** • Introduction to Joining Processes(Soldering, Brazing, Welding) • Welding, Classifications of welding. • Arc welding, Gas welding, TIG welding.
5	Week 10-12: Insight into future mobility technology, Introduction to Mechatronics and Robotics	**Week 9(4 Hours):** • Introduction to Electric vehicles. • Hybrid vehicles: Types of Hybrid vehicles • Advantages and Dis advantages of Electric and Hybrid Vehicle. **Week 10(4 Hours):** • Introduction to Mechatronics, open loop and closed loop systems. • Introduction to Robotics and its Anatomy. • Applications of Robots in material handling, processing and assembly and inspection.

5. Teaching-Learning Process Strategies:

S/L	TLP Strategies:	Description
1	Lectures & Presentations	Deliver core concepts and foundational knowledge. - Utilize multimedia (images, diagrams, 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	Multiple Representations	Introduce topics in various representations to reinforce competencies
6	Project-Based Learning	Encourage research and design thinking through project-based learning activities
7	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
8	Educational Technology	Utilize online learning platforms, simulations, and interactive software to supplement classroom learning. Provide opportunities for self-paced learning and personalized learning experiences.

6. **Assessment Details (both CIE and SEE) :**

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. **Learning Objectives:**

S/L	**Learning Objectives**	**Description**
1.	Explain the fundamental principles of mechanics (work, power, energy, heat)	Students will be able to clearly define and explain the core concepts of mechanics, including work, power, energy, and heat. This includes understanding the relationships between these concepts and how they apply to basic mechanical systems.
2.	Differentiate between various types of energy sources (fossil fuels, renewables)	Students will be able to identify and distinguish between different energy sources, such as traditional fossil fuels (coal, oil, natural gas) and renewable energy sources (solar, wind, hydro).
3.	Analyze the working principles of different power generation technologies (hydro, thermal, nuclear, solar, wind, tidal).	Students will be able to break down and explain the fundamental operating principles of various power generation technologies. This includes understanding the energy conversion processes involved in each type of power plant.
4.	Identify the key components of internal combustion engines (4-stroke petrol & diesel).	Students will be able to recognize and name the essential components of internal combustion engines, differentiating between those found in petrol and diesel engines.
5.	Explain the basic working principles of internal combustion engines.	Students will be able to describe the fundamental operating cycle of a 4-stroke internal combustion engine, including the intake, compression, combustion, and exhaust strokes.
6.	Understand refrigeration principles and desirable refrigerant properties	Students will be able to grasp the core concepts behind refrigeration, including the role of refrigerants and their key properties (e.g., low boiling point, high heat capacity) for efficient heat transfer.
7.	Describe the working principles of basic refrigeration and air conditioning systems	Students will be able to explain the fundamental operation of refrigeration and air conditioning systems, including the use of compressors, condensers, expansion valves, and evaporators in the cooling cycle.
8.	Analyze basic mechanical power transmission systems (gear ratios, belt lengths) using relevant formulas	Students will be able to apply mathematical formulas to calculate gear ratios and belt lengths in basic power transmission systems. This will involve understanding the relationship between gear teeth, pulley diameters, and transmission efficiency.
9.	Analyze the potential of future mobility solutions (electric/hybrid	Students will be able to critically examine the potential benefits and drawbacks of future mobility solutions like electric and

	vehicles)	hybrid vehicles compared to traditional internal combustion engine vehicles. This may involve considerations of environmental impact, energy efficiency, and infrastructure requirements.
10.	Describe the concepts of mechatronics and robotics (open/closed-loop systems, robot anatomy)	Students will be able to explain the basic principles of mechatronics and robotics, including the integration of mechanical, electrical, and control systems. This includes understanding the concept of open-loop and closed-loop systems, as well as the various components that make up a robot's anatomy.

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

Course Outcomes (COs)

CO's	DESCRIPTION OF THE OUTCOMES
M23BEMEM103.1	**Interpret** the impact of Mechanical Engineering on various industries and society, including emerging trends in various sectors. **Apply** the principles of heat transfer and steam properties to solve basic problems related to steam formation and its role in power generation.
M23BEMEM103.2	**Analyze** the working principles and functionalities of various machine tools. **Explain** the advantages and applications of CNC and 3D printing in modern manufacturing systems.
M23BEMEM103.3	**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.
M23BEMEM103.4	**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.
M23BEMEM103.5	**Analyze** future mobility challenges with Electric & Hybrid Vehicles & design a basic mechatronic system for open/closed-loop systems explaining its automation role.

CO's	PO No											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
M23BEMEM103.1	-	3	-	-	-	-	-	-	-	-	-	-
M23BEMEM103.2	3	-	-	-	-	-	-	-	-	-	-	-
M23BEMEM103.3	-	3	-	-	-	-	-	-	-	-	-	-
M23BEMEM103.4	3	-	-	-	-	-	-	-	-	-	-	-
M23BEMEM103.5	3	-	-	-	-	-	-	-	-	-	-	-
M23BEMEM103	3	3	-	-	-	-	-	-	-	-	-	-

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	**20%**					**10**
Module 2		**20%**				**10**
Module 3			**20%**			**10**
Module 4				**20%**		**10**
Module 5					**20%**	**10**
Total	**10**	**10**	**10**	**10**	**10**	**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	**20%**					**20**
Module 2		**20%**				**20**

Module 3			**20%**			**20**
Module 4				**20%**		**20**
Module 5					**20%**	**20**
Total	**20**	**20**	**20**	**20**	**20**	**100**

10. Future with this Subject

The future of mechanical engineering is brimming with exciting possibilities fueled by advancements in technology, a growing emphasis on sustainability, and the increasing need for automation and efficiency. Here are some key trends that will shape the landscape of mechanical engineering in the years to come:

1. Integration of Advanced Technologies:

- **Robotics and Automation:** Mechanical engineers will play a crucial role in designing, developing, and implementing advanced robots across various industries. Collaborative robots (cobots) working alongside humans will become commonplace.
- **Artificial Intelligence (AI) & Machine Learning (ML):** AI and machine learning will be integrated into mechanical systems for predictive maintenance, process optimization, and autonomous decision-making, leading to smarter machines.
- **Internet of Things (IoT):** Mechanical systems will become increasingly interconnected through the IoT, enabling real-time data collection, remote monitoring, and improved control over operations.

2. Focus on Sustainability:

- **Renewable Energy Systems:** Mechanical engineers will be instrumental in designing and developing efficient renewable energy technologies like solar, wind, and geothermal power plants.
- **Sustainable Materials and Manufacturing:** Developing and utilizing sustainable materials with lower environmental impact will be a major focus. Additive manufacturing (3D printing) will play a significant role in reducing waste and creating complex parts.
- **Energy Efficiency:** Designing mechanical systems with optimized energy consumption and minimal environmental footprint will be a priority.

3. Advancements in Materials Science:

- **New Materials with Unique Properties:** The development of new materials with superior strength, lightweight properties, and heat resistance will enable the creation of next-generation machines and structures.
- **Biomimicry:** Drawing inspiration from nature's design principles will lead to the development of innovative materials and functionalities in mechanical systems.

4. Rise of Mechatronics:

- **Fusion of Disciplines:** The seamless integration of mechanical, electrical, and computer engineering will be crucial for designing complex mechatronic systems that can perform intricate tasks and interact with their environment.

1st Semester	Engineering Science Courses - I(ESC) Introduction to Civil Engineering	M23BESK104A

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Mathematics	Basicalgebraandtrigonometry
2	Physics	Mechanicsand propertiesofmaterials
3	Chemistry	Understandingofchemicalreactionsrelevant tomaterials
4	EngineeringDrawing	Visualizationandinterpretationoftechnicaldrawings
5	EnvironmentalScience	Awarenessofenvironmentalissuesandregulations

2. Competencies (A minimum of four competencies may be written)

S/L	Competency	KSA Description
1	Analyzing,Designing,Implementing	**Knowledge:**StructuralandGeotechnicalprinciples. **Skill:**Applicationofdesigncodes. **Attitude:**Attentiontodetail.
2	Planning,Managing,Optimizing	**Knowledge:**Constructionmanagementtechniques. **Skill:**Projectscheduling. **Attitude:**Strategicthinking.
3	Evaluating,Innovating,Enhancing	**Knowledge:**Sustainabledevelopmentpractices. **Skill:**Problem-solvingforurbanissues. **Attitude:**Environmentalconsciousness.
4	Measuring,Calculating,Reporting	**Knowledge:**Surveyingmethods. **Skill:** Useofsurveyingequipment. **Attitude:**Precisionandaccuracy.
5	Designing,Calculating,Assessing	**Knowledge:**Fluidmechanicsinhydraulics. **Skill:**Waterresourcemanagement. **Attitude:**Analyticalthinking.

3. Syllabus

INTRODUCTIONTOCIVILENGINEERING SEMESTER– I/II			
CourseCode	**M23BESK104/204A**	CIEMarks	**50**
NumberofLectureHours/Week (L:T: P:S)	**(2:2:0)**	SEE Marks	**50**
TotalNumberofLectureHours	**50hours**	Total Marks	**100**
Credits	**03**	ExamHours	**03**
Module-1			
CivilEngineeringDisciplinesandBuilding Science Introduction to Civil Engineering: Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering, Construction planning & Project management. BasicMaterialsofConstruction:Bricks,Cement&mortars,Plain,Reinforced&Pre-stressedConcrete,Structuralsteel,ConstructionChemicals. Structural elements of abuilding:foundation,plinth,lintel,chejja,Masonry wall,column, beam, slab and staircase			
Module-2			
SocietalandGlobalImpact ofInfrastructure Infrastructure: Introduction to sustainable development goals, Smart cityconcept, clean city, concept, Safe city concept Environment:WaterSupplyandSanitarysystems,urbanairpollutionmanagement,Solid waste management, identification of Landfill sites, urban flood control Built-environment: Energy efficient buildings, recycling, Temperature and Sound control in buildings, Security systems; Smart buildings.			
Module-3			

Analysis of force systems: Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution and composition of forces, Law of Parallelogramof forces, Resultant ofconcurrent and non-concurrent coplanar force systems, moment offorces, couple, Varignon's theorem, free bodydiagram, equations ofequilibrium, equilibriumofconcurrentandnon-concurrentcoplanarforcesystems
Module-4
Centroid: Importanceofcentroidandcentreofgravity, methodsofdeterminingthecentroid, locating the centroid of plane laminae from first principles, centroid of built-up sections. Numerical examples
Module-5
Moment of inertia: Importance of Moment of Inertia, method of determining the second moment of area (moment of inertia) of plane sections from first principles, parallel axis theorem and perpendicular axis theorem, section modulus, radius of gyration, moment of inertia of built-upsections, Numerical Examples.
TextBooks: 1. BansalR. K.,RakeshRanjanBeohar andAhmadAliKhan, BasicCivilEngineeringandEngineering Mechanics, 2015,Laxmi Publications. 2. KolhapureBK,ElementsofCivilEngineeringandEngineeringMechanics,2014,EBPB **ReferenceBooks:** 1. Beer F.P.andJohnstonE.R.,Mechanicsfor Engineers, StaticsandDynamics, 1987,McGrawHill. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall. 2. HibblerR.C.,EngineeringMechanics:Principles ofStaticsandDynamics,2017,PearsonPress. 3. TimoshenkoS,YoungD.H.,RaoJ.V.,EngineeringMechanics, 5thEdition,2017,PearsonPress.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week1-3:	Students will learn about various disciplines of civil engineering such as Surveying, StructuralEngineering, GeotechnicalEngineering, Hydraulics &WaterResources,TransportationEngineering,Environmental Engineering,Constructionplanning&Projectmanagement.
2	Week4-6:	Students will learn about sustainable development goals, Smart city concept, clean city, concept, Safe city concept, Water Supply andSanitary systems, urban air pollution management, Solid waste management, identification of Landfill sites, urban flood control. Energy efficientbuildings,recycling,TemperatureandSoundcontrolin buildings, Securitysystems;Smartbuildings.
3	Week7-9:	Students will learn about Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrentandnon-concurrentcoplanar forcesystems, momentofforces, couple,Varignon'stheorem,freebodydiagram,equationsof equilibrium, equilibriumofconcurrent andnon-concurrent coplanar force systems
4	Week10-12:	Students will learn about Importance of centroid and centre of gravity, methods of determining the centroid, locating the centroid of plane laminaefromfirstprinciples,centroidofbuilt-upsectionsandnumerical examples.
5	Week13-16:	Students will learn about Importance of Moment of Inertia, method of determining the second moment of area (moment of inertia) of plane sections from first principles, parallel axis theorem and perpendicularaxis theorem, section modulus, radius of gyration, moment of inertia of built-up sections and numerical examples.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lectures	Delivertheoreticalknowledgeand foundationalconcepts.
2	PracticalLabs	Hands-

		onsessionsforsurveying,materialtesting,andgeotechnicalinvestigations.
3	GroupProjects	Collaborativeprojectsto designandanalyzestructuralelementsor urban planning initiatives.
4	CaseStudies	Real-worldexamplestoillustratetheapplicationofenvironmental engineering and project management concepts.
5	GuestLectures	Industryexpertstoprovideinsightsoncurrentpracticesandfuture trends in civil engineering.
6	Interactive Seminars	Discussionsessionsto deepenunderstandingandencouragecritical thinking.
7	FieldTrips	Visitstoconstructionsites,watertreatmentplants,andsmartcity projectsfor practicalexposure.

6. Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	**Learning Objectives**	**Description**
1	Understand FundamentalConcepts	Graspthebasicprinciplesandconceptsinsurveying,structural engineering,andgeotechnicalengineering.
2	ApplyKnowledgeto Practical Scenarios	Utilizetheoreticalknowledgetosolvereal-worldproblemsin hydraulics,waterresources,andtransportationengineering.
3	DevelopSustainable Solutions	Designsolutionsthat integratesustainabledevelopmentgoalsand smartcityconcepts.
4	Manage EnvironmentalImpact	Implementstrategiesforairpollutionmanagement,solidwaste management,andurbanflood control.
5	AnalyzeStructural Elements	Performdetailedanalysisanddesignofstructural componentsusing principleslearned.

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

Course Outcomes (COs)

COs	**Description**
M23BESK104.1	Comprehendandapplytheknowledgeoffundamentalsofengineeringtoknowabout variousdisciplinesofcivilengineering,basicconstructionmaterials,structuralelements of a building and infrastructure requirement for sustainable development.
M23BESK104.2	Analyzetheresultantandequilibriumofforcesystemsontherigid bodies.
M23BESK104.3	Determineandlocatethecentroidofplaneandbuilt-up sections.

M23BESK104.4	Determinethemoment ofinertiaofplaneandbuilt-up sections.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M23BESK104.1	**3**					**2**	**2**					
M23BESK104.2		**2**										
M23BESK104.3		**2**										
M23BESK104.4		**2**										
M23BESK104	3	**2**				2	2					

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	CO6	**Total**
Module 1	10				10	10	
Module 2	10				10	10	
Module 3		10			10		10
Module 4			10		10		
Module 5				10	10		
Total	**20**	**10**	**10**	**10**	**50**	**20**	**10**

Semester End Examination (SEE)

	20				20	20	
Module 1	20				20	20	
Module 2		20			20		20
Module 3			20		20		
Module 4				20	20		
Module 5	**40**	**20**	**20**	**20**	**100**	**40**	**20**
Total	20				20	20	

ConditionsforSEEPaperSetting:
EachmoduleofSEEquestionpaper should beallocatedwithquestions for 20%ofthetotalSEE marks.

10. Future with this Subject

This subject lays the foundational knowledge and practical skills required for a career in civil engineering. Mastery of these concepts enables students to pursue advanced studies or professional roles in various sub-disciplines such as structural engineering, environmental engineering, and urban planning. The integration of sustainable development goals and smartcity concepts prepares students to contribute to the future of resilient and sustainable infrastructure development.

1. **FoundationforFurtherStudy:** Understandingthebasicsofcivilengineeringprovidesa strong foundation for students who may later choose to specialize in civil engineering or related fields during their undergraduate studies. This subject introduces them to key concepts, principles, and disciplines within civil engineering.
2. **Career Paths:** Even if students do not pursue civil engineering as a major, theknowledge gained from this subject can be beneficial in various career paths. Many industries, such as construction management, urban planning, environmental consulting, and infrastructure development, value individuals with a basic understanding of civil engineering principles.
3. **Interdisciplinary Knowledge:** Civil engineering concepts often overlap with other engineering disciplines and fields such as architecture, environmental science, and urban design. Students gain interdisciplinaryknowledge that canbe applied indiverse contexts.
4. **Problem-Solving Skills:** Civil engineering emphasizes analytical thinking, problem-solving, and project management skills. These skills are transferable to manyprofessions and are highly valued in industries that require systematic problem-solving abilities.
5. **Sustainability and Urban Development:** With increasing emphasis on sustainabilityand smart cities, knowledge gained in civil engineering can contribute to addressing global challenges like climate change, urbanization, and infrastructure resilience.
6. **Professional Development:** Introduction to civil engineering subjects often include

exposure to industry practices, standards, and regulations. This early exposure can help students develop professional skills and understand the expectations of the civil engineering profession.

7. **Entrepreneurship Opportunities:** Understanding civil engineering basics can inspire entrepreneurial ventures in construction technology, sustainable development solutions, or infrastructure innovations.

1st Semester	Engineering Science Courses - I (ESC) Introduction to Electrical Engineering	M23BESK104B

1. Prerequisites

S/L	Proficiency	Prerequisites
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 componentssuch 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. Competencies

S/L	Competency	KSA Description
1.	**Basics of power generation and DC circuits**	**Knowledge:** • Insight into how electricity is generated from various sources, transmitted over long distances through high-voltage transmission lines, and distributed to end-users through the grid. • Techniques for analyzing simple DC circuits containing resistors, voltage sources, and current sources**.** **Skills:** • Ability to apply voltage divider rule, ohms-law, KVL, KCL and Thevenin theorem to design the required DCcircuit for small signal using transistor. • Understanding power generation technologies and their applications is valuable in fields such as renewable energy, electrical utilities, and sustainable development. **Attitudes:** • Learning about renewable energy technologies encourages a commitment to sustainability and the preservation of natural resources for future generations
2.	**Analysis of Single Phase and Three Phase Circuits**	**Knowledge:** • Will gain an understanding of the differences between single-phase and three-phase electrical systems, including their configurations, advantages, and applications. • Will achieve knowledge of impedance, power, power factor and related concepts. **Skills:** • Skills gained include circuit analysis techniques, problem-solving, critical thinking, technical communication, hands-on application, teamwork etc. **Attitudes:** • Appreciation for the essential role of electrical engineering roles in diverse industries
3.	**DC Generators and Motors**	**Knowledge:** • Understanding their principles enables efficient conversion between mechanical and electrical energy, vital for various applications like industrial machinery and transportation. **Skills:** • Imparts electrical engineering skillsand troubleshooting techniques, crucial for engineering innovation. **Attitudes:** • Valuing the knowledge of conversion of various forms of energy in to electrical energy

4.	**Transformers and Three phase Induction Motors**	**Knowledge:** • Involves comprehending electromagnetic principles, transformer configurations, and transformer losses, crucial for power distribution and voltage transformation. • Understanding three-phase induction motors encompasses principles of rotating magnetic fields, motor construction, starting methods **Skills:** • Exploring transformers and three-phase induction motors enriches electrical engineering proficiencyfor industrial machinery applications. **Attitudes:** • Appreciation for understanding AC machines for specific application
5.	**Domestic Wiring and Safety Measures**	**Knowledge:** • It involves understanding wiring regulations, circuitry layouts, and safety protocols to prevent electrical hazards such as shocks and fires. . **Skills:** • Learning domestic wiring and safety measures cultivates essential electrical skills for residential installations.. **Attitudes:** • Proficiency in wire sizing, grounding, and proper insulation ensures safe and reliable electrical systems, promoting household safety.

3. Syllabus

Introduction to Electrical Engineering **SEMESTER – I / II**			
Course Code	**M23BESK104/204B**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**4:0:0:0**	SEE Marks	**50**
Total Number of Lecture Hours	**40(T)Hrs**	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 and 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

Introduction: Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.Power Generation: Hydel, Nuclear, Solar & wind power generation (Block Diagram approach).DC Circuits:Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits. Simple Numerical.

Module -2

A.C. Fundamentals:Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phasedifference, average value, RMS value, form factor, peak factor. (only definitions)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 (excluding proof)

Module -3

DC Machines:**DC Generator**: Principle of operation, constructional details, induced emf expression, types ofgenerators.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

Transformers: Necessity of transformer, principle of operation, Types and construction of singlephase 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: Requirements, Types of wiring: casing, capping.Two way and three way controof 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.

Suggested Learning Resources:

Text Books:

1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019.
2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014.

Reference Books:

1. Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019.
2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015.
3. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3rd edition, 2014.

Web links and Video Lectures(e-Resources):

- www.nptel.ac.in

Course outcomes: This course will enable students to:

- Understand the concepts of various energy sources and Electric circuits.
- Apply the basic Electrical laws to solve circuits.
- Discuss the construction and operation of various Electrical Machines.
- Identify suitable Electrical machine for practical implementation.
- Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3:	Students learn Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.Power Generation: Hydel, Nuclear, Solar & wind power generation (Block Diagram approach) as introduction to Electrical Engineering. . Further, basics of DC Circuits:Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits with Simple Numerical
2	Week 4-5:	**A.C. Fundamentals**suchasEquation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phasedifference, average value, RMS value, form factor, peak factor. (only definitions)Voltage and current relationship with phasor diagrams in R, L, and C circuits are discussed. 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 with Simple Numerical etc are also included.
3	Week 6-8:	**Three Phase Circuits:**Generation of Three phase AC quantity, advantages and limitations; star and delta connection,relationship between line and phase quantities (excluding proof) are discussed. **DC Generator**: Principle of operation, constructional details, induced emf

		expression, types ofgenerators.Relation between induced emf and terminal voltage with Simple numerical also covered. **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 with Simplenumerical are discussed.
4	Week 9-10	**Transformers**: Necessity of transformer, principle of operation, Types and construction of singlephase transformers, EMF equation, losses, variation of losses with respect to load. Efficiency and simple numerical are addressed. **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 with simple numerical are included.
5	Week 10-11:	**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 consumersare addressed.
6	Week 12:	**Equipment Safety measures:** Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits are discussed. **Personal safety measures:** Electric Shock, Earthing and its types, Safety Precautions to avoid shock are also covered.

5. 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 Verilog 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.

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

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description
1	To explain the laws used in the analysis of DC and AC circuits.	This course help the students to solve parameters of DC / AC circuits by applying electrical laws.
2	To explain the behaviour of circuit elements in single-phase circuits.	Students will be able to understand the operation of inductors and capacitors with respect to AC circuits.
3	To explain the construction and operation of transformers, DC generators and motors and induction motors.	These topics are applications of the concepts they learned in DC and AC circuits.
4	To introduce concepts of circuit protecting devices and earthing.	Students learn the details of domestic wiring.
5	To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.	The basics of power generation, distribution, safety measures to be followed when working with electrical systems, electricity bill calculation etc are discussed.

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

Course Outcomes (COs)

COs	Description
M23BESK104B.1	**Interpret** the operation of hydel, nuclear, solar and wind power generators.
M23BESK104B.2	**Illustrate** the electrical safety rules and standards for domestic wiring.
M23BESK104B.3	**Illustrate** the construction and working principle of electrical machines**.**
M23BESK104B.4	**Apply** Ohm's law and Kirchoff's laws to determine voltage, current and powerin electrical circuits and machines**.**

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M23BESK104B.1	3	-	-	-	-	-	2	-	-	3	-	2
M23BESK104B.2	3	-	-	-	-	-	2	-	-	-	-	3
M23BESK104B.3	3	2	-	-	-	-	-	-	-	-	-	-
M23BESK104B.4	3	3	-	-	-	-	-	-	-	-	-	-
M23BESK104B	**3**	**2.5**	-	-	-	-	**2**	-	-	**3**	-	**2.5**

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	**Total**
Module 1	7			5	**12**
Module 2				7	**7**
Module 3			8	5	**13**
Module 4			7	5	**12**
Module 5		6			**6**
Total	**7**	**6**	**15**	**22**	**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	**Total**
Module 1	14			10	**24**
Module 2				14	**14**
Module 3			16	10	**26**
Module 4			14	10	**24**
Module 5		12		-	**12**
Total	**14**	**12**	**30**	**44**	**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

The "**Introduction to Electrical Engineering**" course in the I / II semester of the B.E program lays a strong foundation for several future courses in the undergraduate program. The contributions of this subject extend across various areas, enhancing the students' understanding and skills in the field of electrical systems. Here are some notable contributions:

Introduction to Electrical Engineering sets the stage for a dynamic future at the intersection of innovation and technology. It equips individuals to tackle evolving challenges in power generation, distribution, and renewable energy integration. With the rise of smart grids, electric vehicles, and IoT, EE graduates are poised to lead advancements in automation, sustainable infrastructure, and telecommunications. Moreover, as society leans towards cleaner energy solutions, expertise in electrical engineering becomes indispensable for shaping a greener, more connected world. EE professionals will drive progress, ensuring efficient energy utilization and pioneering breakthroughs that redefine how we interact with technology and power our lives. In summary, the "Introduction to Electrical Engineering" course serves as a stepping stone, equipping students with foundational knowledge and skills that are essential for the subsequent courses in their B.E program and for their future careers in various technology-related fields.

1st Semester	Engineering Science Courses - I (ESC) Introduction to Electronics and Communication	M23BESK104C

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Basic knowledge on Physics	A fundamental understanding of physics.
2	Basic knowledge on Mathematics	A fundamental understanding of mathematics.
3	Semiconductor Fundamentals	Basic knowledge of semiconductor physics and semiconductor devices is beneficial.
4	Basic Electronics	Familiarity with basic electronic components like resistors, capacitors, inductors, and semiconductors is necessary
5	Circuit Theory	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.

1. Competencies

S/L	Competency	KSA Description
1	**Power supplies**	**Knowledge:** Understanding the Basic Principles, Voltage Regulation, Current Limiting etc key knowledge areas is crucial for selecting, operating, and maintaining DC power supplies effectively in electronic systems. Additionally, knowledge of safety standards and regulations is essential to ensure safe operation and compliance with industry standards. **Skills:** By mastering Electrical Engineering Fundamentals, Voltage Regulation Techniques etc skills, you'll be well-equipped to effectively operate, maintain, and troubleshoot DC power supplies in electronic systems while ensuring safety and compliance with industry standards. **Attitudes:** By cultivating a positive attitude characterized by safety consciousness, attention to detail, patience, curiosity, respect, professionalism, and adaptability, you'll be well-equipped to work with DC power supplies effectively and contribute to the success of your projects and endeavors.
2	**Amplifiers**	**Knowledge:** Understanding Basic Amplifier Operation, Amplifier Frequency Response, and Feedback is key knowledge areas is essential for selecting, and using amplifiers effectively in electronic systems. Additionally, proficiency in amplifier theory enables engineers to troubleshoot problems, optimize performance, and innovate in amplifier technology. **Skills:** By mastering skills, you'll be well-equipped to design, analyze, test, and troubleshoot amplifier circuits effectively, contributing to the success of your projects and endeavors in electronics. **Attitudes:** By cultivating attitudes, you'll not only enhance your effectiveness and success when working with amplifiers but also contribute to a positive and productive work environment for yourself and those around you.
3	**Oscillator**	**Knowledge:** Understanding key knowledge areas is essential for designing, analyzing, and troubleshooting oscillator circuits effectively in electronic systems.. **Skills:** By mastering skills, you'll be well-equipped to design, build, and optimize oscillator circuits for a wide range of applications, from communication systems and signal generators to precision timing and frequency synthesis. **Attitudes:** By cultivating attitudes, you'll not only enhance your effectiveness and success when working with oscillators but also contribute to a positive and productive work environment for yourself and those around you

4	**Number base conversion**	**Knowledge:** Understanding number base conversion is essential for working with digital systems, computer programming, data encoding, and various other applications where different base systems are used. **Skills:** By honing skills through practice, application, and continuous learning, you'll become proficient in number base conversion and be able to handle a wide range of conversion tasks effectively and efficiently. **Attitudes:** By adopting attitudes, you'll not only enhance your proficiency in number base conversion but also develop valuable problem-solving skills, a deeper understanding of mathematical concepts, and a greater appreciation for the beauty and complexity of numbers.
5	**Boolean algebra**	**Knowledge:** Understanding Boolean algebra is essential for working with digital systems, logic design, programming, and various other applications in computer science and engineering. **Skills:** By honing skills, you'll become proficient in Boolean algebra and logic design, enabling you to design, analyze, and optimize digital systems and logic circuits effectively. **Attitudes:** By cultivating attitudes, you'll not only improve your skills in Boolean algebra but also develop valuable problem-solving abilities, logical reasoning skills, and a deeper appreciation for the role of logic in our understanding of the world.
6	**combinational logic**	**Knowledge:** Understanding combinational logic is crucial for designing digital systems, implementing arithmetic operations, and constructing various logic circuits used in computer hardware and other applications. **Skills:** By honing skills through practice, experimentation, and continuous learning, you'll become proficient in designing, analyzing, and optimizing combinational logic circuits for various digital system applications. **Attitudes:** Combinational logic is like the foundation of a sturdy building in the world of digital electronics. It's all about making decisions based on the current inputs without any memory of past events, kind of like a snap judgment. It's straightforward, precise, and essential for tasks like arithmetic operations, data encoding, and decoding .
7	**Embedded systems**	**Knowledge:** Embedded systems are like the hidden heroes of modern technology—they're everywhere, from your microwave to your car, quietly working behind the scenes to make our lives easier. These systems are specialized computers designed to perform specific tasks within a larger system. They're typically low-power, compact, and optimized for real-time operation **Skills:** Embedded systems skills encompass a broad range of technical abilities essential for designing, developing, and maintaining embedded systems. **Attitudes:** Embedded systems require a particular mindset and attitude to navigate the complexities of designing, developing, and maintaining these intricate systems
8	**Analog and digital communication**	**Knowledge:** Analog and digital communication knowledge encompasses a wide range of concepts and technologies essential for transmitting and receiving information in both analog and digital forms. **Skills:** Skills in analog and digital communication are essential for professionals working in fields such as telecommunications, networking, electronics, and signal processing. **Attitudes:** By embodying attitudes, professionals in the field of analog and digital

		communication can navigate the complexities of communication technology effectively, drive innovation, and contribute to the advancement of communication systems that empower connectivity and collaboration in the digital age.

2. Syllabus

Introduction to Electronics & Communication SEMESTER – I/II			
Course Code	**M23BESK104C/204C**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(3:0:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course objectives: This course will enable students to:

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 – Types of amplifiers, Gain, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback, multi-stage amplifiers (Text 1)

Module -2

Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators (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: Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 2: 1.2, 1.3, 1.4, 1.5,2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7) **Combinational logic:** Introduction, Design procedure, Adders- Half adder, Full adder (Text 2:4.1, 4.2, 4.3)

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, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC
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 scheme, 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, Concept of Radio wave propagation (Ground, space, sky)
Digital Modulation Schemes: Advantages of digital communication over analog communication, ASK, FSK, PSK, Radio signal transmission Multiple access techniques. (Text 4)

Text Books

(Title of the Book/Name of the author/Name of the publisher/Edition and Year)

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.

3. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2: Power Supplies and Amplifiers	Power supplies convert AC to DC, regulate voltage, and filter output for stable operation. They consist of transformers, rectifiers, filters, regulators, and loads, ensuring reliable power delivery. Amplifiers increase the strength of electrical signals, such as voltage or current. They come in various types like voltage, current, and power amplifiers, each with specific applications and characteristics, including gain, input/output resistance, and frequency response.
2	Week 3-4: Oscillators and Operational amplifiers	Oscillators rely on the Barkhausen criterion for sustained oscillations and can be sinusoidal or non-sinusoidal (providing essential functions in signal generation and timing circuits. Operational amplifiers (Op-amps) are versatile integrated circuits used for amplification. They feature high input impedance, low output impedance, and high gain, making them crucial components in a wide range of electronic circuits, including amplifiers and voltage comparators.
3	Week 5-6: Boolean Algebra , Logic Circuits and Combinational logic	Binary numbers, octal, and hexadecimal numbers represent data in digital systems, often converted between bases. Complements, basic definitions, and axiomatic definitions define Boolean algebra, with theorems and properties aiding simplification of Boolean functions into canonical and standard forms. Logic operations and gates implement Boolean functions in digital circuits. Combinational logic processes inputs to produce outputs without internal memory. Design involves specifying desired behavior and implementing with logic gates. Adders, including half adders and full adders.
4	Week 7-8: Embedded Systems ,Sensors and Interfacing	Embedded systems are specialized computing systems designed to perform specific functions within larger systems. Embedded systems are categorized based on their size, performance, and application domain. Embedded systems are widely used in consumer electronics, automotive, industrial automation etc. An embedded system comprises hardware components like microcontrollers or microprocessors, memory units, input/output devices, sensors, actuators, and software components such as firmware and application programs. Instruments like transducers convert physical quantities into electrical signals, sensors detect these signals for data acquisition, actuators respond to control signals to produce physical actions, while displays such as LEDs and 7-segment displays visualize information in embedded systems.
5	Week 9-10: Analog Communication Schemes and Digital Modulation Schemes	Modern communication systems involve an information source, which is converted by an input transducer, transmitted through a transmitter, propagated via a channel (hardwired or softwired), received by a receiver, and possibly subjected to multiplexing for efficient transmission. Modulation schemes like Amplitude Modulation (AM), Frequency Modulation (FM), and Phase Shift Keying (PSK) encode information onto carrier signals, enabling efficient transmission and reception of analog signals. Digital modulation schemes like Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), and Phase Shift Keying (PSK) encode digital data onto carrier signals for transmission, providing robustness

4. 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 sensors and instrumentation 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	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 deeper understanding of competencies

5. Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

6. Learning Objectives

S/L	**Learning Objectives**	**Description**
1	Understanding of power supplies,amplifiers,oscillators and operational amplifiers	Understanding D C power supply, types of rectifiers and operation of voltage regulators, oscillators and operational amplifiers and its applications
2	Understanding of Boolean algebra and combinational logic	To equip students with a basic foundation in electronic engineering required for comprehending logic design and combinational logic like half adder, full adder.
3	Understanding of embedded systems and its applications	To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of embedded systems.
4	Understanding of Analog Communication Schemes and Digital Modulation Schemes	To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of communication systems.

7. 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	Analyze 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	PO12
M23BESK104.1	3	-	-	-	-	-	-	-	-	2	-	-
M23BESK104.2	3	3	-	-	-	-	-	-	-	2	-	-
M23BESK104.3	3	3	-	-	-	-	-	-	-	-	-	-
M23BESK104.4	3	2	-	-	-	-	-	-	2	-	-	-
M23BESK104	**3**	**2.6**							**2**	**2**		

8. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	**Total**
Module 1					
Module 2					
Module 3					
Module 4					
Module 5					
Total					**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	**Total**
Module 1					
Module 2					
Module 3					
Module 4					
Module 5					
Total					**100**

Conditions for SEE Paper Setting:
Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks.

9. Future with this Subject

The "Introduction to Electronics Communication" course in the first year of the B.E program lays a strong foundation for several future courses in the undergraduate program. The contributions of this subject extend across various areas, enhancing the students' understanding and skills in the field of sensors and instrumentation. Here are some notable contributions:

- **EmergingTechnologies**: Future developments in electronics communication will likely be heavily influenced by emerging technologies such as 5G, Internet of Things (IoT), Artificial Intelligence (AI), and Quantum Communication. These technologies promise to revolutionize the way we communicate, offering faster speeds, lower latency, and greater connectivity.

 IoT Integration: The integration of IoT devices into communication networks will continue to grow, leading to a more interconnected world where everyday objects are smart and able to communicate with each other seamlessly.
 Wireless Power Transfer: Research into wireless power transfer technologies holds promise for wirelessly charging devices, which could eliminate the need for traditional power cables and revolutionize how we power our electronic devices.
 Satellite Communication: With the increasing demand for global connectivity, satellite communication systems will continue to evolve, offering high-speed internet access to remote regions and enabling new applications in areas such as disaster relief, agriculture, and environmental monitoring.
 Ethical and Regulatory Considerations: As communication technologies become more pervasive, there will be important discussions around ethics, privacy, and regulatory frameworks to ensure that these technologies are deployed responsibly and equitably.

1st Semester	Engineering Science Courses - I (ESC) INTRODUCTION TO MECHANICAL ENGINEERING	M23BESK104D

1. Prerequisites:

S/L	Proficiency	Prerequisites
1	Basic understanding of engineering disciplines	Familiarity with different engineering fields and their societal impact.
2	High school-level physics (work, power, energy, heat)	Foundational knowledge of physics concepts relevant to specific topics.
3	Workshop skills	Prior experience in a workshop setting would be beneficial.
4	Basic computer literacy	Familiarity with the concept of computer-controlled manufacturing and basic principles of 3D printing technology.
5	Visualization skills	Ability to interpret diagrams, schematics, and 3D models relevant to mechanical systems.
6	Basic understanding of chemistry and material properties	Ability to identify different types of engineering materials and their applications.

2. Competencies:

S/L	Competency	KSA Description
1	**Understanding the Role of Mechanical Engineering**	**Knowledge:** Different engineering disciplines and their applications. Societal impact of mechanical engineering advancements. **Skills:** Analyze real-world problems and identify potential mechanical engineering solutions. **Attitudes:** Curiosity and interest in the impact of engineering on society.
2	**Grasping Core Mechanical Engineering Principles**	**Knowledge:** Physics concepts (work, power, energy, heat, mechanics) **Skills:** Apply fundamental principles to solve basic mechanical engineering problems **Attitudes:** Analytical thinking and problem-solving skills.
3	**Understanding Machine Tools and Operations**	**Knowledge:** Working principles of common machine tools (lathe, drill, milling). Types of machining operations (turning, drilling, milling). **Skills:** Demonstrate a basic understanding of machine tool functionalities (no practical operation required). **Attitudes:** Openness to learning new technologies and appreciating the role of practical skills.
4	**Exposure to Advanced Manufacturing Systems**	**Knowledge:** Concept of computer-controlled manufacturing (CNC). Basic principles of 3D printing technology. **Skills:** Recognize the potential of advanced manufacturing techniques. **Attitudes:** Adaptability and willingness to embrace technological advancements.
5	**Understanding Energy Sources and Power Plants**	**Knowledge:** Different types of energy sources (fossil fuels, renewables). Working principles of various power plants (hydro, thermal, nuclear, solar, wind, tidal). **Skills:** Explain the basic functionalities of different power generation technologies. **Attitudes:** Environmental awareness and appreciation for sustainable energy solutions.
6	**Introduction to**	**Knowledge:**

	Internal Combustion Engines	Engine components and working principles (4-stroke petrol & diesel). **Skills:** Identify the key components of an internal combustion engine. **Attitudes:** Attention to detail and understanding of cause-and-effect relationships in mechanical systems.
7	**Understanding Refrigeration & Air Conditioning Systems**	**Knowledge:** Refrigeration principles and desirable refrigerant properties. Working principles of basic refrigeration and air conditioning systems. **Skills:** Explain the fundamental concepts behind these systems. **Attitudes:** Appreciation for the importance of thermal comfort and energy efficiency.
8	**Introduction to Joining Processes**	**Knowledge:** Definitions and classifications of common joining processes (soldering, brazing, welding). **Skills:** Recognize different joining techniques and their applications. **Attitudes:** Safety awareness and appreciation for proper tool and technique selection.
9	**Understanding Future Mobility Technologies**	**Knowledge:** Components of electric and hybrid vehicles. Advantages and disadvantages compared to traditional vehicles. **Skills:** Analyze the potential of future mobility solutions. **Attitudes:** Sustainability mindset and interest in technological innovation.

3. **Syllabus:**

INTRODUCTION TO MECHANICAL ENGINEERING SEMESTER – I			
Course Code	**M23BESKM104/204D**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(2:2:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours Theory**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course objectives: This course will enable students to:

- Explain the role of mechanical engineering in society, including the impact of various engineering disciplines, and identify potential mechanical solutions to real-world problems.
- Apply core physics concepts (work, power, energy, heat, mechanics) to solve basic mechanical engineering problems and understand the working principles of common machine tools (lathe, drill, mill) and different machining operations.
- Recognize the potential of advanced manufacturing techniques like CNC and 3D printing, explain different energy sources and the working principles of various power plants, and identify the components and basic working principles of internal combustion engines.
- Understand refrigeration principles, refrigerant properties, and the basic operation of air conditioning and refrigeration system.
- Recognize the definitions and classifications of common joining processes and analyze future mobility solutions (electric/hybrid vehicles) and their advantages/disadvantages.
- Explain the concepts of mechatronics and robotics (open/closed-loop systems, robot anatomy, applications), demonstrating a foundational understanding of these interdisciplinary fields.

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 Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels, 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, reaming. Working of Milling Machine, Milling operations:

plane 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, 3D printing.
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 weldingprocess, 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. **Automation in industry**: Definition, types – Fixed, programmable and flexible automation, basic elements with block diagrams, advantages. **Introduction to IOT**: Definition and Characteristics, Physical design, protocols, Logical design of IoT, Functional blocks, and communication models.
Textbooks: 1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008 2. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012
Reference Books: 1. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010. 2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rd Ed., 2003. 3. Internal Combustion Engines, V. Ganesan, Tata McGraw Hill Education; 4th edition, 2017 5. Dr SRN Reddy, Rachit Thukral and Manasi Mishra, " Introduction to Internet of Things: A Practical Approach", ETI Labs
Weblinks and Video Lectures (e-Resources): ➢ https://rakhoh.com/en/applications-and-advantages-of-steam-in-manufacturing- and process industry ➢ Videos | Makino (For Machine Tool Operation)

4. **Syllabus Timeline:**

S/L	Syllabus Timeline	Description
1	Week 1-2: Introduction to Mechanical Engineering, Energy Resources.	• Introduction to Mechanical Engineering and Role of Mechanical Engineers in Industry and Society. • Energy resources effective utilization along with advantages and dis advantages.
2	Week 3-4: Machine Tool Operations, Introduction to Advanced Manufacturing Systems	• Introduction to various types of Mechanical Tools. • Machine Tools operations (Lathe and Drilling Machine) • Machine tool Operations(Milling Machine) • CNC, Advantages and Disadvantages of CNC • 3D Printing
3	Week 5-6: Introduction to IC Engines, Insight into Future Mobility	• Introduction to IC Engines, 4 – Stroke Petrol Engine. • 4- Stroke Diesel Engine. • Introduction to Electric vehicles. • Hybrid vehicles: Types of Hybrid vehicles • Advantages and Dis advantages of Electric and Hybrid Vehicle.
4	Week 7-8: Engineering	• Introduction to Engineering Materials. • Types and applications of engineering materials.

	Materials, Joining Processes	• Introduction to Joining Processes(Soldering, Brazing, Welding) • Welding, Classifications of welding. • Arc welding, Gas welding, TIG welding.
5	Week 9-10: Introduction to Mechatronics and Robotics, IOT	• Introduction to Mechatronics, open loop and closed loop systems. • Introduction to Robotics and its Anatomy. • Applications of Robots in material handling, processing and assembly and inspection. • Introduction to IOT • Functional blocks and communication models.
6	Week 11-12:	Revision of the subject and visits to department laboratories related to subject.

5. **Teaching-Learning Process Strategies:**

S/L	TLP Strategies:	Description
1	Lectures & Presentations	Deliver core concepts and foundational knowledge. - Utilize multimedia (images, diagrams, 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	Multiple Representations	Introduce topics in various representations to reinforce competencies
6	Project-Based Learning	Encourage research and design thinking through project-based learning activities
7	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
8	Educational Technology	Utilize online learning platforms, simulations, and interactive software to supplement classroom learning. Provide opportunities for self-paced learning and personalized learning experiences.

6. Assessment Details (both CIE and SEE) :

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives:

S/L	Learning Objectives	Description
1.	Explain the fundamental	Students will be able to clearly define and explain the core

	principles of mechanics (work, power, energy, heat)	concepts of mechanics, including work, power, energy, and heat. This includes understanding the relationships between these concepts and how they apply to basic mechanical systems.
2.	Differentiate between various types of energy sources (fossil fuels, renewables)	Students will be able to identify and distinguish between different energy sources, such as traditional fossil fuels (coal, oil, natural gas) and renewable energy sources (solar, wind, hydro).
3.	Analyze the working principles of different power generation technologies (hydro, thermal, nuclear, solar, wind, tidal).	Students will be able to break down and explain the fundamental operating principles of various power generation technologies. This includes understanding the energy conversion processes involved in each type of power plant.
4.	Identify the key components of internal combustion engines (4-stroke petrol & diesel).	Students will be able to recognize and name the essential components of internal combustion engines, differentiating between those found in petrol and diesel engines.
5.	Explain the basic working principles of internal combustion engines.	Students will be able to describe the fundamental operating cycle of a 4-stroke internal combustion engine, including the intake, compression, combustion, and exhaust strokes.
9.	Analyze the potential of future mobility solutions (electric/hybrid vehicles)	Students will be able to critically examine the potential benefits and drawbacks of future mobility solutions like electric and hybrid vehicles compared to traditional internal combustion engine vehicles. This may involve considerations of environmental impact, energy efficiency, and infrastructure requirements.
10.	Describe the concepts of mechatronics and robotics (open/closed-loop systems, robot anatomy)	Students will be able to explain the basic principles of mechatronics and robotics, including the integration of mechanical, electrical, and control systems. This includes understanding the concept of open-loop and closed-loop systems, as well as the various components that make up a robot's anatomy.
11	Understand the concept of physical design in IoT.	Students will learn about the definition, characteristics, and different design aspects (physical and logical) of IoT systems. They will explore communication protocols, functional blocks, and communication models used in IoT, enabling them to understand the basic building blocks of these interconnected systems.

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

Course Outcomes (COs)

CO's	DESCRIPTION OF THE OUTCOMES
M23BESKM104D.1	**Interpret** the impact of Mechanical Engineering on various industries and society, including emerging trends in various sectors. **Acquire knowledge on** Energy sources& Power plants along with their advantages and dis advantages.
M23BESKM104D.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.
M23BESKM104D.3	Compare and contrast 4-stroke Petrol and Diesel engines through its working principles. **Analyze** future mobility challenges with Electric & Hybrid Vehicles
M23BESKM104D.4	**Apply** knowledge of joining process advantages and limitations to select the most suitable method for specific materials and applications.
M23BESKM104D.5	**Design** a basic mechatronic system for open/closed-loop systems, IOT Models explaining its automation role.

CO's	PO No											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
M23BESKM104D.1	-	3	-	-	-	-	-	-	-	-	-	-
M23BESKM104D.2	3	-	-	-	-	-	-	-	-	-	-	-
M23BESKM104D.3	-	3	-	-	-	-	-	-	-	-	-	-
M23BESKM104D.4	3	-	-	-	-	-	-	-	-	-	-	-

M23BESKM104D.5	3	-	-	-	-	-	-	-	-	-	-	-
M23BESKM104D	3	3	-	-	-	-	-	-	-	-	-	-

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	**20%**					**20**
Module 2		**20%**				**20**
Module 3			**20%**			**20**
Module 4				**20%**		**20**
Module 5					**20%**	**20**
Total	**10**	**10**	**10**	**10**	**10**	**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	**20%**					**20**
Module 2		**20%**				**20**
Module 3			**20%**			**20**
Module 4				**20%**		**20**
Module 5					**20%**	**2**
Total	**20**	**20**	**20**	**20**	**20**	**100**

10. Future with this Subject

The future of mechanical engineering is brimming with exciting possibilities fueled by advancements in technology, a growing emphasis on sustainability, and the increasing need for automation and efficiency. Here are some key trends that will shape the landscape of mechanical engineering in the years to come:

1. Integration of Advanced Technologies:

- **Robotics and Automation:** Mechanical engineers will play a crucial role in designing, developing, and implementing advanced robots across various industries. Collaborative robots (cobots) working alongside humans will become commonplace.
- **Artificial Intelligence (AI) & Machine Learning (ML):** AI and machine learning will be integrated into mechanical systems for predictive maintenance, process optimization, and autonomous decision-making, leading to smarter machines.
- **Internet of Things (IoT):** Mechanical systems will become increasingly interconnected through the IoT, enabling real-time data collection, remote monitoring, and improved control over operations.

2. Focus on Sustainability:

- **Renewable Energy Systems:** Mechanical engineers will be instrumental in designing and developing efficient renewable energy technologies like solar, wind, and geothermal power plants.
- **Sustainable Materials and Manufacturing:** Developing and utilizing sustainable materials with lower environmental impact will be a major focus. Additive manufacturing (3D printing) will play a significant role in reducing waste and creating complex parts.
- **Energy Efficiency:** Designing mechanical systems with optimized energy consumption and minimal environmental footprint will be a priority.

3. Advancements in Materials Science:

- **New Materials with Unique Properties:** The development of new materials with superior strength, lightweight properties, and heat resistance will enable the creation of next-generation machines and structures.
- **Biomimicry:** Drawing inspiration from nature's design principles will lead to the development of innovative materials and functionalities in mechanical systems.

1st Semester	Engineering Science Courses - I (ESC) Introduction to C programming	M23BESCK104E

1. Prerequisites (A minimum of five prerequisites may be written)

S/L	Proficiency	Prerequisites
1	Understanding of Basic Programming Concepts	Familiarity with fundamental programming concepts such as variables, data types, operators, control structures (like loops and conditional statements), functions, and basic algorithms is essential.
2	Knowledge of Mathematics	Single-Variable Calculus: Mastery of differentiation and integration in one dimension. Linear Algebra: Understanding of vectors, matrices, determinants, and linear transformations. Basic Series Knowledge: Familiarity with sequences and series, convergence, and divergence.
3	Understanding of Computer Memory	C programming involves direct manipulation of memory addresses and pointers, so a basic understanding of how computers allocate memory and how pointers work is crucial.
4	Command Line Basics	While not strictly necessary, familiarity with navigating and executing commands in a command-line interface (CLI) can be helpful, especially for compiling and running C programs outside of IDEs.
5	Basic Understanding of Operating Systems	Understanding how operating systems manage processes, memory, and file systems can provide context for understanding how C programs interact with the underlying system.
6	Problem-Solving Skills	Programming involves solving problems logically and systematically. Practicing problem-solving skills through small coding exercises or puzzles can be beneficial.

2. Competencies:

S/L	Competency	KSA Description
1	Ability to Use Development Tools	Be comfortable using a text editor or an integrated development environment (IDE) for writing, compiling, and debugging C programs. Familiarize yourself with compiling C programs using a compiler like GCC or Clang.
2	Command Line Proficiency	Understanding how to navigate and execute commands in a command-line interface (CLI) can be helpful, as it's often used for compiling and running C programs.
3	Logical Thinking and Attention to Detail	C programming requires careful attention to syntax and logical structure. Being detail-oriented and able to think logically through problems is essential.
4	Memory Management	Have a basic understanding of how memory management works in C, especially concepts like stack and heap memory allocation, pointers, and memory addresses.
5	Persistence and Patience	Learning C programming, like any new skill, requires persistence and patience. Be prepared to encounter challenges and take the time to understand concepts thoroughly.

3. Syllabus:

Introduction to C Programming			
Course Code	**M23BESCK104/204E**	CIE Marks	**50**
Number of Lecture Hours/Week(L:T:P: S)	**(3:0:2)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours Theory + 8-10 Lab slots**	Total Marks	**100**
Credits	**04**	Exam Hours	**03**

Course objectives: This course will enable students to:

- Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.
- Apply programming constructs of C language to solve the real world problem
- Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting.
- Explore user-defined data structures like structures, unions and pointers in implementing solutions
- Design and Develop Solutions to problems using modular programming constructs
- using functions

Module -1: Introduction to C

Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C.

Textbook: Chapter 1.1-1.9, 2.1-2.2, 8.1 – 8.6, 9.1-9.14

Module -2:Operators and looping in C

Operators in C, Type conversion and typecasting. Decision control and Looping statements: Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.

Textbook: Chapter 9.15-9.16, 10.1-10.6

Module -3:Functions and Arrays

Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions.

Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions,

Textbook: Chapter 11.1-11.13, 12.1-12.6

Module -4: Arrays and Strings

Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays. Applications of arrays and introduction to strings: Applications of arrays, case study with sorting techniques.

Introduction to strings: Reading strings, writing strings, summary of functions used to read and write characters. Suppressing input using a Scanset.

Textbook: Chapter 12.7-12.12

Module -5: Strings, Pointers and Structures

Strings: String taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings.

Pointers: Understanding the Computer's Memory, Introduction to Pointers, Declaring Pointer Variables

Structures: Introduction to structures

Textbook: Chapter 13.1-13.6, 14.1-14.3,15.1

PRACTICAL COMPONENT

1.	C Program to find Mechanical Energy of a particle using E = mgh+1/2 mv2.
2.	C Program to convert Kilometers into Meters and Centimeters.
3.	C Program To Check the Given Character is Lowercase or Uppercase or Special Character.
4.	Program to balance the given Chemical Equation values x, y, p, q of a simple chemical equation of the type: The task is to find the values of constants b1, b2, b3 such that the equation is balanced on both sides and it must be the reduced form.
5.	ImplementMatrixmultiplicationandvalidatetherulesofmultiplication.
6.	Computesin(x)/cos(x)usingTaylorseriesapproximation.Compareyour result withthebuiltinlibraryfunction.Print boththeresultswithappropriateinferences.

7.	SortthegivensetofNnumbersusingBubblesort.
8.	Writefunctionstoimplementstringoperationssuchascompare,concatenate,stringlength.Convince the parameter passing techniques.
9.	Implementstructurestoread,writeandcomputeaveragemarksandthestudents scoring aboveandbelowtheaveragemarksforaclass of N students.
10.	Developaprogramusingpointerstocomputethesum, meanandstandarddeviationofallelements stored inanarrayofNrealnumbers.

Textbooks:

1. Computer fundamentals and programming in c, "ReemaThareja", Oxford University, Second edition, 2017.

Reference Books:

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.

4. Syllabus Timeline

S/L	Syllabus Timeline (No. of weeks should be as you have in the semester)	Description (Write the proposed syllabus coverage in detail with maximum of 5 lines)
1	Week 1-2: Calculus	Introduction to computers, input and output devices, Designing efficient programs. Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C.
2	Week 3-4: Series Expansion and Multivariable Calculus	Operators in C, Type conversion and typecasting. Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.
3	Week 5-6: Ordinary Differential Equations (ODEs) of First Order	Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, Recursive functions. Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions,
4	Week 7-8: Modular Arithmatic	Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, Multidimensional arrays. Applications of arrays, case study with sorting techniques. Reading strings, writing strings, Summary of functions used to read and write characters. Suppressing input using a Scanset.
5	Week 9-10: Linear Algebra	String taxonomy, operations on strings, Miscellaneous string and character functions, Arrays of strings. Understanding the Computer's Memory, Introduction to Pointers, Declaring Pointer Variables Introduction to structures
6	Week 11-12:IntegrationandPractical Applications	Apply learned concepts and competencies to real-world scenarios.Hands-onpractice

5. 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 Verilog 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	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 deeper understanding of competencies
9	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

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

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. **Learning Objectives**

S/L	Learning Objectives	Description
1	Understanding Basic Syntax and Control Structures	Learn how to declare variables, use different data types (integers, floats, characters), and understand their scope. Master control structures like loops (for, while) and conditional statements (if, switch) to control program flow.
2	Working with Functions and Modular Programming	Define and use functions effectively, understanding their role in modular programming. Learn about function prototypes, header files, and organizing code into reusable modules for better code management.
3	Memory Management and Pointers	Understand memory allocation (stack vs heap) and deallocation using malloc, calloc, realloc, and free functions. Master pointers and their importance in C programming, including pointer arithmetic, dynamic memory allocation, and managing memory addresses.

4	Arrays, Strings, and File Handling	Learn how to declare and manipulate arrays and strings in C, including understanding the relationship between arrays and pointers. Explore file handling techniques using functions like fopen, fclose, fread, fwrite, and understand how to read from and write to files.
5	Understanding Structures and Unions	Understand the concept of structures and unions, how they are declared, defined, and used in C programming. Learn about nested structures, structure pointers, and their applications in organizing and managing data efficiently.

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

Course Outcomes (COs)

COs	Description
M23BESCK104E.1	Apply the basic knowledge of computer, computer hardware, functionalities of a computer and principles of C programming.
M23BESCK104E.2	Apply programming constructs of C language to solve the real world problem
M23BESCK104E.3	Apply the design concept of functions, Arrays and Strings and implement applications
M23BESCK104E.4	Analyze user-defined data structures like structures and pointers in Implementing solutions.
M23BESCK104E.5	Design and Develop Solutions to problems and Evaluate the resultanddocumentthecompleteexperimentalprocess.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
M23BESCK104E.1	**3**	**-**										
M23BESCK104E.2	**3**											
M23BESCK104E.3	**3**											
M23BESCK104E.4	**-**	**3**										
M23BESCK104E.5	**-**		**3**									
M23BESCK104E	**3**	**3**	**3**									

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

Studying C programming can open up various opportunities and avenues in the field of computer science and software development. Here's how learning C can benefit your future:

Foundation in Programming: C is often considered a foundational language in computer science and programming. It provides a solid understanding of fundamental concepts like memory

management, pointers, and low-level manipulation of data, which are crucial in understanding how computers work at a deeper level.

Understanding of Systems Programming: C is widely used for system-level programming, such as operating systems, embedded systems, device drivers, and other performance-critical applications. Understanding C gives you the ability to work closer to hardware and optimize performance-sensitive code.

Portability and Efficiency: C programs can be highly portable across different platforms and operating systems, making it a versatile language for cross-platform development. Additionally, C's efficiency in terms of speed and memory usage makes it suitable for applications where performance is critical.

Gateway to Other Languages: Learning C provides a strong foundation for learning other languages, especially those derived from or influenced by C (such as C++, Java, C#, and many others). Many modern languages borrow syntax and concepts from C, so mastering C can ease the learning curve for other languages.

Career Opportunities: Proficiency in C programming opens up various career paths in industries ranging from software development to system programming, embedded systems, game development, and more. Many companies value candidates who have a strong understanding of C due to its versatility and performance benefits.

Contribution to Open Source Projects: Many open-source projects and libraries are written in C or have bindings to C. Contributing to these projects can enhance your skills, build a portfolio, and connect you with a broader community of developers.

Continued Relevance: Despite being over four decades old, C remains relevant and widely used in critical software applications, ensuring that skills in C programming will continue to be in demand.

To maximize the benefits of learning C programming, consider applying your skills through personal projects, internships, or contributing to open-source projects. This practical experience will deepen your understanding and make you more attractive to potential employers or collaborators in the software development industry.

1st Semester	Emerging Technolgy Courses - I (ETC) GreenBuildings	M23BETK105A

1. Prerequisites

S/L		Prerequisites
1	**GreenBuildingMaterials.**	Knowledge of construction materials observedin day-to-daylife.
2	**Cost-effectiveConstruction Technologies.**	Knowledgeofconstructionobservedinday-to-daylife.
3	**Sustainability.**	Knowledgeofresourcesweconsumeinday-to-daylife.
4	**GreenDesign andPrinciples.**	Basicunderstandingaboutgreenbuilding materialsandtechnologies.
5	**WasteManagement.**	Knowledgeofwastesgeneratedobservedin day-to-daylife.
6	**GreenBuildingRating.**	Knowledge of basics of green building features.

2. Competencies

S/L	Competency	KSADescription
1	**Green BuildingMaterials.**	**Knowledge** Understandingeach materialand itsimpact on environment. **Skills** Abilitytodiscretizeconventional andgreen materials. **Attitudes** Appreciationfortheimportanceofadaptinggreenmaterialsinconstruction.
2	**Cost-effectiveConstruction.**	**Knowledge** Knowledge of step by step by procedure of cost-effective constructionanduseofmaterials. **Skills:** Abilityto learn cost-effectiveconstruction techniques. **Attitudes:** Appreciationfor thelearningof constructiontechniques.
3	**Green BuildingConsultant.**	**Knowledge** Knowledgeofmaterialsandconstructiontechniquesleadingtogreenenvironment. **Skills** Designingandconstructingthebuildingwithrespecttogreenfeatures. **Attitudes:** Valuingtheimportanceofgreenbuildings.
4	**Waste Management.**	**Knowledge:** Understandingthedifferent waste generated inbuildingsand handling thosewaste withoutdumpinginto landfill. **Skills:** Abilityto learnandadaptwastemanagementprinciples. **Attitudes:** Opennesstolearningof wastemanagement.
5	**Green BuildingPrinciples andDesign.**	**Knowledge:** Knowledgeof greenbuildingmaterials,techniquesandfeatures. **Skills:** Abilitytodo adapt greenprinciplesanddesigngreenbuilding. **Attitudes:** Appreciationfortheversatilityofdesignofgreenbuildingascomparedto conventional.

3. Syllabus

GREENBUILDINGS **SEMESTER – I/II**			
Course Code	M23BETK105/205A	CIEMarks	**50**
Numberof LectureHours/Week(L:T:P:S)	**(3:0:0)**	SEEMarks	**50**
TotalNumberof LectureHours	**40 hours**	TotalMarks	**100**
Credits	**03**	ExamHours	**03**

Module -1

Introductiontotheconceptofcost-effectiveconstruction:

- Differenttypesofmaterials,theiravailability,requirements/propertiesandapplication – Stones,LateriteBlocks,BurntBricks, ConcreteBlocks, Stabilized Mud Blocks,Lime PozzolanaCement,GypsumBoard,FiberReinforcedCementComponents,Fiber ReinforcedPolymerComposite,Bamboo.
- Recyclingofbuilding materials–Bricks,Concrete, Steel,Plastics.

Environmentalissuesrelatedtoquarryingofbuildingmaterials.

Module -2

EnvironmentfriendlyandcostBuildingTechnologies

Alternatesforwallconstruction -FlemishBond,RatTrapBond.

- Arches,Panels,CavityWall,FerroCementandFerroConcreteconstructions.
- Differentprecastmembersusingthesematerials-WallandRoofPanels,Beams, Columns,DoorandWindowframes, Watertanks,SepticTanks.
- Alternateroofingsystems -FillerSlab,CompositeBeam andPanelRoof.
- Pre-engineeredand readyto usebuildingelements.woodproducts,SteelandPlastic.

Contributionsofagencies-Costford-Nirmithi Kendra–Habitat

Module-3

GlobalWarming

- Definition,CausesandEffect,Contributionof BuildingstowardsGlobalWarming,
- CarbonFootprint – GlobalEffortsto reduce carbonEmissions.
- GreenBuildings–Definition,Features,Necessity,Environmentalbenefit,Economicalbenefits,Health and Socialbenefits, Major Energyefficientareas forbuildings.
- EmbodiedEnergyin Materials.
- GreenMaterials-ComparisonofInitialcostofGreenV/sConventionalBuilding-

LifecyclecostofBuildings.

Module-4

GreenBuildingratingSystems–BREEAM,LEED,GREENSTAR,GRIHA(Green RatingforIntegratedHabitatAssessment)andIGBCfornewbuildings–Purpose-Key highlights-PointSystemwithDifferentialweightage.

GreenDesign–Definition,Principlesofsustainabledevelopmentinbuildingdesign, CharacteristicsofSustainableBuildings,sustainablymanagedMaterials. IntegratedLifecycledesignofMaterialsandStructures(Conceptsonly)

Module-5

UtilityofSolarEnergyinBuildings

UtilityofSolarenergyinbuildingsconcepts-SolarPassiveCoolingandHeatingof Buildings, LowEnergyCooling,CasestudiesofSolarPassiveCooledandHeatedBuildings.

GreenCompositesforBuildings

ConceptsofGreenComposites,WaterUtilizationinBuildings,LowEnergyApproaches toWaterManagement,ManagementofSolidWastes,ManagementofSullageWaterand Sewage,UrbanEnvironmentandGreenBuildings.GreenCoverandBuiltEnvironment.

Text Books

1. HarharaIyerG,***GreenBuildingFundamentals***,NotionPress
2. Dr.Adv.HarshulSavla,***GreenBuilding:Principles&Practices***.Notionpress.
3. ShailendraK Shukla,***GreenBuildingTechnologies***,AneBooksPvt.Ltd.

ReferenceBooks

1. JimmyC.M.Kao,Wen-PeiSung, RanChen,***GreenBuilding,MaterialsandCivilEngineering,*** 1st edition,CRCPress.
2. RossSpiegel,DruMeadows,***GreenBuildingMaterials: AGuidetoProductSelectionandSpecification***,
3. SamKubba,***Handbookon greenbuildingdesign and construction,*** BHpublications.

Web links

1. https://www.youtube.com/watch?v=THgQF8zHBW8
2. https://www.youtube.com/watch?v=DRO_rIkywxQ

4. SyllabusTimeline

S/L	Syllabus Timeline	Description
1	Week1-2	Studentswilllearnaboutvariousmaterialsproductionprocess,properties andapplicationswithrespecttocost-effectiveconstruction.
2	Week3-4	Studentswilllearnaboutvariousenvironmentallyfriendlyandcost-effectivebuildingtechnologies.
3	Week5-6	Studentswilllearnaboutglobalwarminganditseffectsonbuildings,carbonfootprintsanditsmitigation,Embodiedenergyandlifecyclecost ofbuildings.
4	Week7-8	Studentswilllearnaboutgreenbuildingratingsystemanddesign.
5	Week9-10:	Studentswilllearnabouttheutilityofsolarenergyandgreencomposites forbuildings.

5. Teaching-LearningProcessStrategies

S/L	TLPStrategies	Description
1	LectureMethod	Utilizevariousteachingmethodswithinthelectureformatto reinforcecompetencies.
2	Video/Animation	Incorporatevisualaidslikevideos/animationstoenhance understandingof concepts.
3	CollaborativeLearning	Encouragecollaborativelearningforimprovedcompetency application.
4	HigherOrderThinking (HOTS)Questions:	PoseHOTSquestionstostimulatecriticalthinkingrelatedto eachcompetency.
5	Problem-BasedLearning (PBL)	ImplementPBLtoenhanceanalyticalskillsandpractical applicationofcompetencies.
6	Real-WorldApplication	Discusspracticalapplicationstoconnecttheoreticalconcepts withreal-world competencies.
7	FlippedClassTechnique	Utilizeaflippedclassapproach,providingmaterialsbefore classtofacilitatedeeperunderstandingofcompetencies.

6. AssessmentDetails (bothCIE andSEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. LearningObjectives

S/L	Learning Objectives	Description
1	Understandingfundamentals ofconcreteandits Characterization.	Studentswillgraspthefundamentalconceptsofconcrete,includingmaterialcharacterization ofeachingredient,manufacturingprocessofingredient and its effect onperformanceof concrete.
2	Proficiency inproductiona nd handlingo fconcrete.	Studentswillbecomeproficientinproductionandhandlingofconcretetoassessfreshand hardened propertiesofconcrete.
3	Designingof Concretemix	Studentswilllearntodesign concretemixproportion tobeusedinvarious applications.
4	Proficiencyin specialconcrete.	Studentswillbecomeproficientinvarioustypesofspecialconcrete which theycomeacross inpresent scenarioof industrialapplications.
5	Ethicaland Professional	Studentswillunderstandtheethicalandprofessionalresponsibilities associatedwithmaterialcharacterizationofeachingredientofconcrete,
6	Responsibility.	andproductionandhandlingofconcreteadheringtoindustrystandards andbestpractices.

8. CourseOutcomes(COs)andMappingwithPOs/PSOsCourseOutcomes(COs)

COs	Description
M23BETK105A.1	**Apply**theknowledgeofscienceandengineeringfundamentalstostudyenvironmental issuesinbuildingmaterialsandenvironmentallyfriendly/alternativebuildingmaterialsforcost effectiveand energyefficient construction.
M23BETK105A.2	**Apply**theknowledgeofengineeringfundamentalstostudyenvironmentallyfriendlyandcost-effectivebuildingtechnologiesin wallandroofingsystem.
M23BETK105A.3	**Illustrate**theconceptofglobalwarmingduetodifferentmaterialsandbuildingsin construction.
M23BETK105A.4	**Exemplify** theconceptofgreenbuildingratingsystemsusedin buildings.
M23BETK105A.5	**Illustrate**thealternatesourceofenergyandeffectivewater&solidwastemanagement usedinbuildingstomeetsustainableenvironment.

CO-PO-PSOMapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M23BETK105A.1	**3**						**2**					
M23BETK105A.2	**3**						**2**					
M23BETK105A.3	**3**					**2**	**2**					
M23BETK105A.4	**3**					**2**	**2**					
M23BETK105A.5	**3**					**2**	**2**					

M23BETK105A	**3**					**2**	**2**					

9. AssessmentPlan

ContinuousInternalEvaluation(CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module1	10					10
Module2		10				10
Module3			10			10
Module4				10		10
Module5					10	10
Total	**10**	**10**	**10**	**10**	**10**	**50**

SemesterEndExamination(SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module1	20					20
Module2		20				20
Module3			20			20
Module4				20		20
Module5					20	20
Total	**20**	**20**	**20**	**20**	**20**	**100**

ConditionsforSEEPaperSetting:
Each module of SEE question paper should be allocated with questions for 20% of the total SEEmarks.

10. FuturewiththisSubject.
The "Green Buildings" course in the first/second semester of the B.E program lays a strongfoundation for several future courses in the undergraduate program. The contributions of thissubject extend across various areas, enhancing the students' understanding and skills in the fieldofconcrete. Here aresome notable contributions:

- **Materials of construction:** The knowledge gained in green building course with respect tomaterialsis aprerequisite for materials of construction.
- **Alternative Building Materials:** The knowledge gained in green building course with respect tomaterialsand cost-effectivetechnologies isaprerequisite formaterials ofconstruction.
- **ConstructionSkillLab**:Theknowledgegainedingreenbuildingcoursewithrespecttomaterialsand cost-effectivetechnologies isaprerequisite for constructionskill lab.
- **Concrete Technology**: The knowledge gained in green building course with respect to materialsandcost-effectivetechnologies is aprerequisite forconcrete technologycourse.
- **Project Work and Research:** The hands-on experience gained through assignments, problem-solving, experiments and project work using concrete technology concept prepares students formore extensive projects in their later years. It equips them with the skills needed for research inthefield ofconcretetechnology.

1st Semester	Emerging Technology Courses - I(ETC) Introduction to Nanotechnology	M23BETK105B

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Engineering principles	Basic understanding of engineering concepts like design, fabrication, and characterization can be helpful.
2	Basic Chemistry	**Atomic Structure:** Understanding atoms, molecules, and chemical bonds. **Chemical Reactions:** Knowledge of how substances interact and change. **Organic Chemistry:** Familiarity with carbon-based molecules, which are often used in nanotechnology.
3	Basic Physics	**Classical Mechanics:** Basics of motion, forces, and energy. **Electromagnetism:** Understanding electric and magnetic fields and their interactions with matter. **Quantum Mechanics:** Basic principles, as nanotechnology often deals with phenomena at the atomic and molecular levels.
4	Mathematics	**Statistics:** Important for data analysis and understanding probabilistic behaviors at the nanoscale.
5	Fundamentals of Material Science and Engineering	**Solid State Physics:** Crystal structures, defects in solids, and electronic properties of materials. **Thermodynamics:**Basic principles including energy, entropy, and the laws of thermodynamics. **Material Properties:** Mechanical, electrical, optical, and thermal properties of materials.

2. Competencies

S/L	Competency	KSA Description
1	**Nanomaterials**	**Knowledge:** Basic concepts of nanotechnology (nanoscale, properties, structures), Synthesis and fabrication methods (bottom-up, top-down) **Skills:** Identify applications of nanomaterials in engineering fields, Explain the societal impact of nanotechnology (benefits, risks, ethics), Use basic terminology related to nanomaterials **Attitudes:** Curiosity and interest in emerging technologies, Awareness of safety considerations in nanotechnology, Openness to interdisciplinary approaches
2	**CharacterizationofNanomaterials**	**Knowledge:** Knowledge of the principles and techniques used to characterize nanomaterials, such as scanning electron microscopy (SEM), transmission electron microscopy (TEM), and atomic force microscopy (AFM). **Skills:** Ability to interpret data obtained from characterization techniques to determine the size, shape, composition, and surface properties of nanomaterials. **Attitudes:** Curiosity and a desire to learn about new characterization techniques and their applications in nanotechnology.
3	**CarbonBasedMaterials**	**Knowledge:** Understanding of different types of carbon-based materials (e.g., graphene, diamond, polymers) and their properties (e.g., electrical conductivity, mechanical strength), Knowledge of synthesis methods for carbon-based materials, Awareness of applications of carbon-based materials in various fields **Skills:** Ability to analyze and interpret data related to carbon-based materials (e.g., spectroscopy results), Skill in working with

		laboratory equipment used for characterization of carbon-based materials, Ability to troubleshoot problems related to the synthesis or processing of carbon-based materials **Attitudes:** Curiosity and interest in learning about new advancements in carbon-based materials research, Attention to detail and accuracy when working with carbon-based materials, Commitment to safety protocols when handling potentially hazardous materials
4	**Energystorageand conversion**	**Knowledge:** Understanding of Properties of nanomaterials for energy storage (e.g., high surface area, porosity), Different nanomaterials for battery electrodes (e.g., carbon nanotubes, lithium-ion), Principles of energy conversion (e.g., photovoltaics, fuel cells), Nanofabrication techniques (e.g., chemical vapor deposition. **Skills:** Ability to Design and develop nanostructured materials for battery electrodes, Simulate and model energy storage and conversion processes, Fabricate and characterize nanodevices for energy applications, Troubleshoot and optimize energy storage and conversion systems, Collaborate with researchers from other disciplines (e.g., materials science, chemistry) **Attitudes:** Curiosity and a passion for innovation, Critical thinking and problem-solving skills, Attention to detail and accuracy, Strong work ethic and ability to meet deadlines, Effective communication and collaboration skills
5	**Applicationsof Nanotechnology**	**Knowledge:** Understanding of the principles behind various nanotechnology applications. **Skills:** Ability to identify suitable nanomaterials for specific applications, Skill in designing and developing nanotechnology-based solutions. **Attitudes:** Positive attitude towards the potential of nanotechnology to solve real-world problems, Critical thinking skills to evaluate the risks and benefits of nanotechnology applications

3. Syllabus

Introduction to Nanotechnology **SEMESTER – I/II**			
Course Code	**M23BETK105/205B**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	3:0:0:0	SEE Marks	**50**
Total Number of Lecture Hours	40	Total Marks	**100**
Credits	3	Exam Hours	**03**

Courseobjectives

- Toprovideacomprehensiveoverviewofsynthesisandcharacterizationofnanoparticles,nanocomposites andhierarchical materials withnanoscalefeatures.
- Toprovidetheengineeringstudentswithnecessarybackgroundforunderstandingvariousnanomaterials characterizationtechniques.
- Todevelopanunderstandingofthebasisofthechoiceofmaterialfordeviceapplications.
- Togiveaninsightintocompletesystemswherenanotechnologycanbeusedtoimproveoureverydaylife.
- To describe the historical development and the future potential of nanotechnology.

Module -1

IntroductiontoNanomaterials

Nanotechnology, Frontier of future-an overview, Length Scales, Variation of physical properties from bulk to

thinfilmstonanomaterials,Confinementofelectronin0D,1D,2Dand3Dsystems,SurfacetoVolumeRatio,SynthesisofNanomaterials:Bottom-Upapproach:ChemicalRoutesforSynthesisofnanomaterials-Sol-gel,Precipitation,SolutionCombustionsynthesis,Hydrothermal,SILAR,ChemicalBathDeposition.Top-Down approach-Ballmillingtechnique,Sputtering,LaserAblation.
Module -2
CharacterizationofNanomaterials Basic principles and instrumentations of Electron Microscopy –Transmission Electron Microscope, ScanningElectron Microscope, Scanning Probes- Scanning Tunneling microscope, Atomic Force Microscope –differentimaging modes,comparisonofSEM andTEM,AFMand STM,AFMand SEM.BasicprinciplesofworkingofX-raydiffraction,derivationofDebye-Scherrerequation,numericalonDebye, Scherrerequation,OpticalSpectroscopy-InstrumentationandapplicationofIR,UV/VIS(Bandgapmeasurement).
Module -3
CarbonBasedMaterials Introduction,Synthesis,Properties(electrical,ElectronicandMechanical),andApplicationsofGraphene,SWCNT,MWCNT,FullerenesandotherCarbonMaterials:Carbonnanocomposites, nano-fibers,nano-discs,nano-diamonds.
Module -4
NanotechnologyinEnergystorageandconversion Solar cells: First generation, second generation and third generation solar cells: Construction and working of DyesensitizedandQuantumdotsensitizedsolar cells. Batteries:NanotechnologyinLithiumionbattery-working,Requirementsofanodicandcathodicmaterials,classification based on ion storage mechanisms, limitations of graphite anodes, Advances in Cathodic materials,Anodicmaterials,Separators Fuel Cells: Introduction, construction, working of fuel cells and nanotechnology in hydrogen storage and protonexchangemembranes.
Module -5
ApplicationsofNanotechnology NanotechApplicationsandRecentBreakthroughs:Introduction,SignificantImpactofNanotechnologyandNanomaterial,MedicineandHealthcareApplications,BiologicalandBiochemicalApplications(Nanobiotechnology), Electronic Applications (Nano electronics), Computing Applications (Nano computers), ChemicalApplications (Nano chemistry), Optical Applications (Nano photonics), Agriculture and Food Applications, RecentMajorBreakthroughsin Nanotechnology.
SuggestedLearningResources: **Books** 1. NanoMaterials–A.K.Bandyopadhyay/NewAgePublishers 2. Nanocrystals: Synthesis, Properties and Applications – C.N.R. Rao, P. John Thomas and G. U. Kulkarni, SpringerSeriesinMaterialsScience 3. NanoEssentials-T.Pradeep/TMH 4. PeterJ.F.Harris,Carbonnanotubescience:synthesis,properties,andapplications.CambridgeUniversityPress, 2011 5. M.A.Shah,K.A.Shah, "Nanotechnology:TheScienceofSmall",WileyIndia,ISBN13:9788126538683. **ReferenceBooks** 1. IntroductiontoNanotechnology,C.P.PooleandF.J.Owens,Wiley,2003 2. UnderstandingNanotechnology,ScientificAmerican,2002 3. Nanotechnology,M.RatnerandD.Ratner,PrenticeHall,2003 4. Nanotechnology,M.Wildon,K.Kannagara,G.Smith,M.SimmonsandB.Raguse,CRCPressBocaRaton,2002

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2	**IntroductiontoNanomaterials:** Nanotechnology, Frontier of future-an overview, Length Scales, Variation of physical properties from bulk to thinfilmstonanomaterials,Confinementofelectronin0D,1D,2Dand3Dsystems,SurfacetoVolumeRatio,SynthesisofNanomaterials:Bottom-Upapproach:ChemicalRoutesforSynthesisofnanomaterials-Sol-gel,Precipitation.
2	Week 3-4	SolutionCombustionsynthesis,Hydrothermal,SILAR,ChemicalBathDeposition.Top-Down approach-Ballmillingtechnique,Sputtering,LaserAblation.**CharacterizationofNanomaterials:** Basic principles and instrumentations of Electron Microscopy –Transmission Electron

		Microscope, ScanningElectron Microscope, Scanning Probes- Scanning Tunneling microscope, Atomic Force Microscope –differentimaging modes,
3	Week 5-6	ComparisonofSEM andTEM,AFMand STM,AFMand SEM. BasicprinciplesofworkingofX-raydiffraction,derivationofDebye-Scherrerequation,numericalonDebye Scherrerequation,OpticalSpectroscopy-InstrumentationandapplicationofIR,UV/VIS(Bandgapmeasurement).
4	Week 7-8	**CarbonBasedMaterials:** Introduction,Synthesis,Properties(electrical,ElectronicandMechanical),andApplicationsofGraphene,SWCNT,MWCNT,FullerenesandotherCarbonMaterials:Carbonnanocomposites,nano-fibers,nano-discs,nano-diamonds.**NanotechnologyinEnergystorageandconversion:** Solar cells: First generation, second generation and third generation solar cells: Construction and working of DyesensitizedandQuantumdotsensitizedsolar cells.
5	Week 9-10	**Batteries:**NanotechnologyinLithiumionbattery-working,Requirementsofanodicandcathodicmaterials,classification based on ion storage mechanisms, limitations of graphite anodes, Advances in Cathodic materials,Anodicmaterials,Separators **Fuel Cells:**Introduction, construction, working of fuel cells and nanotechnology in hydrogen storage and protonexchangemembranes
6	Week 11-12	**ApplicationsofNanotechnology:** NanotechApplicationsandRecentBreakthroughs:Introduction,SignificantImpactofNanotechnologyandNanomaterial,MedicineandHealthcareApplications,BiologicalandBiochemicalApplications(Nanobiotechnology), Electronic Applications (Nano electronics), Computing Applications (Nano computers), ChemicalApplications (Nano chemistry), Optical Applications (Nano photonics), Agriculture and Food Applications, RecentMajorBreakthroughsin Nanotechnology.

5. 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 nano materials 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	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.

6. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/ L	Learning Objectives	Description
1	Nano materials	To provide a comprehensive overview of synthesis and characterization ofnanoparticles, nanocomposites and hierarchical materials with nanoscale features.
2	Characterization techniques	To provide the necessary background for understanding various nanomaterials characterization techniques
3	Properties and Applications	Compare and contrast the properties of bulk materials with their counterparts at the nanoscale. Identify potential applications of nanotechnology in one specific engineering field
4	Types of nanomaterials	Todevelopanunderstandingofthebasisofthechoiceofmaterialfordeviceapplications
5	Applications of nanomaterials	Togiveaninsightintocompletesystemswherenanotechnologycanbeusedtoimproveoureverydaylife

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

Course Outcomes (COs): Students will be able to

COs	Description
M23BETK105B.1	**Make use of** the fundamental concepts of nanotechnology tosynthesizethenanoparticlesbyvarious techniques.
M23BETK105B.2	**Illustrate**the workingofbasicinstrumentsusedincharacterizationofnanoparticles.
M23BETK105B.3	**Apply** the concepts of nanotechnology in various engineering discipline.
M23BETK105B.4	**Interpret** the unique properties of carbon and its various allotropes like diamond, graphite andgraphene.
M23BETK105B.5	**Analyze** the relationship between material properties at the nanoscale and their energy storage and conversion capabilities.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BETK105B.1	**3**											
M23BETK105B.2	**3**											
M23BETK105B.3	**3**											
M23BETK105B.4	**3**											
M23BETK105B.5		**3**										
M23BETK105B	**3**	**3**										

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	**10**					**10**
Module 2		**10**				**10**
Module 3			**10**			**10**
Module 4				**10**		**10**
Module 5					**10**	**10**
Total	**10**	**10**	**10**	**10**	**10**	**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	**20**					**20**
Module 2		**20**				**20**
Module 3			**20**			**20**
Module 4				**20**		**20**
Module 5					**20**	**20**
Total	**20**	**20**	**20**	**20**	**20**	**100**

10. Future with this Subject

Studying "Introduction to Nanotechnology" opens up a multitude of promising career paths and opportunities for students due to the multidisciplinary nature and expansive applications of nanotechnology. An introduction to nanomaterials is a springboard to a field with a very promising future. Nanotechnology is revolutionizing many areas, from medicine and electronics to energy and environmental science. This means there's a constant demand for people who understand how to design, develop, and use these materials. Nanomaterials have unique properties that make them applicable in a wide range of industries. A student with this background could find opportunities in sectors like aerospace, pharmaceuticals, or renewable energy.There's a constant push to develop new nanomaterials and improve existing ones. A student with a strong foundation could pursue research careers in universities, government labs, or private companies. As the field matures, there will likely be a growing need for specialists in specific areas of nanomaterials. An introductory course can open doors to further studies in areas like nanoelectronics, nanomedicine, or nanocomposites.

1st Semester	Emerging Technology Courses - I (ETC) RENEWABLE ENERGY SOURCES	M23BETK105C

1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Basic Physics	Understanding of energy, power, and force. Knowledge of thermodynamics, particularly the laws of energy conservation and conversion.
2.	Basic Chemistry	Understanding of chemical reactions and processes. Understanding the materials and reactions involved in energy storage, bioenergy, and fuel cells.
3.	Basic Biology	Basics of plant biology and ecology for bioenergy.
4.	Environmental Science	Basic understanding of Ecology, Pollution &Environmental Impact and Sustainability.
5.	Conventional Sources	Basic knowledge of fossil fuels, coal, hydro & nuclear.

2. Competencies

S/L	Competency	KSA Description
1.	**Energy Sources & its availability**	**Knowledge:** • Understanding knowledge of different energy sources. • Understanding the India & Global energy scenario. **Skills:** Ability to analyze alternative solutions to overcome the problems of conventional energy sources. **Attitudes:** Recognizing the significances of energy sources availabity.
2.	**Design and Implementation**	**Knowledge:** • Knowledge of system integration and the ability to work with hybrid energy systems. • Understanding of energy storage solutions and their integration with renewable sources. **Skills:** • Ability to design and implement renewable energy systems such as solar, wind, hydro, and biomass energy systems. • Identifying and solving technical issues in renewable energy systems. **Attitudes:** Perform economic and environmental impact analyses of renewable energy solutions.
3.	**Innovative Thinking**	**Knowledge:** Proficiency in making informed decisions based on data analysis, technical feasibility, economic viability, and environmental impact. **Skills:** Ability to develop creative solutions to challenges in the renewable energy sector. **Attitudes:** Openness to think creative ideas for improvisation for renewable sources.
4.	**Ethical and Sustainable Practices**	**Knowledge:** • Understanding of ethical issues related to energy production and consumption. • Understanding of sustainability principles and their importance in the energy sector. **Skills:** Adaptability to evolving industry trends and emerging challenges. **Attitudes:** Commitment to promoting the awareness of the ethical implications of energy choices and their impact on the environment and society.

3. Syllabus

RENEWABLE ENERGY SOURCES SEMESTER – I/II			
Course Code	M23BETK105/205C	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(3:0:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course objectives:

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

Module -1

Introduction: Principles of renewable energy; energy and sustainable development, fundamentals and social implications. worldwide renewable energy availability, renewable energy availability in India, brief descriptions on solar energy, wind energy, tidal energy, wave energy, ocean thermal energy, biomass energy, geothermal energy, oil shale. Introduction to Internet of energy (IOE).

Module -2

Solar Energy: Fundamentals; Solar Radiation; Solar radiation Measurements- Pyrheliometers, Pyrometer, 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- single, double and muliblade system. 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, 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,ZeroenergyConcepts.Benefits of hydrogen energy, hydrogen production technologies (electrolysis method only).

Text Books:

1. Nonconventional Energy sources, G D Rai, Khanna Publication, Fourth Edition,
2. Energy Technology, S.Rao and Dr. B.B. Parulekar, Khanna Publication.Solarenergy, SubhasPSukhatme, TataMcGrawHill, 2ndEdition,1996.

Reference Books:

1. Principles of Energy conversion, A. W. Culp Jr.,, McGraw Hill, 1996
2. Non-Convention EnergyResources, Shobh Nath Singh, Pearson, 2018

Links

1. https://www.youtube.com/@mitmysore-mechanicalengine8107
2. https://www.youtube.com/watch?v=mh51mAUexK4&list=PLwdnzlV3ogoXUifhvYB65lLJCZ74o_fAk

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2: Introduction and Availability of Energy Sources	Introduction to energy sources, Classification of Energy Sources, Sustainable development, socialimplications,worldwide renewable energy availability, renewable energy availability in India, brief descriptions on energy alternatives. Introduction to Internet of energy (IOE).

2	Week 3-4: Fundamentals of Solar Radiation &Solar electric power generation	Solar radiation, Terrestrial & Extra-terrestrial radiation, Solar radiation Measurements- Pyrheliometers, Pyrometer, Sunshine Recorder.Solar Thermal systems: Flat plate collector; Solar distillation; Solar pond electric power plant.
3	Week 5-6: 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- single, double and muliblade system. Vertical axis- Savonius and darrieus types.
4	Week 7-8: Biomass Energy	Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies-fixed dome; Urban waste to energy conversion; Biomass gasification (Downdraft)
5	Week 9-10: Tidal Power & OTEC	Tides and waves as energy suppliers and their mechanics; fundamental characteristics of tidal power, harnessing tidal energy, advantages and limitations.Principle of working, OTEC power stations in the world, problems associated with OTEC.
6	Week 11-12: Geothermal Energy & Green Energy	Construction & working of Geothermal Energy. Introduction to Fuel cells: Classification of fuel cells – H2; Operating principles, ZeroenergyConcepts.Benefits of hydrogen energy, hydrogen production technologies (electrolysis method only), hydrogen energy storage, applications of hydrogen energy, problem associated with hydrogen energy.

5. 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 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.

6. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation (CIE):

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description
1	Basics of Renewable Energy	Students will learn to define renewable energy and distinguish it from non-renewable sources & identify various renewable energy sources, including solar, wind, hydroelectric, biomass, geothermal, and tidal energy.
2	Analyzing Resource Availability:	Students will learnto assess the global distribution and availability of renewable energy resources & identify factors influencing the spatial and temporal variability of renewable energy sources, such as sunlight intensity, wind speed, water flow, biomass productivity, geothermal gradients, and tidal patterns.
3	Working Principles of RES	Students will learn the construction & working of solar, wind, Tidal, OTEC, Geothermal & hydrogen energy.
4	Project-Based Learning	Through mini projects & seminar, students will learn about the team work, ppt presentation, and writing report and communication skills also.
5	Ethical and Professional Responsibility	Students will understand the ethical and professional responsibilities associated Renewable Energy Sources and their importance.

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

Course Outcomes (COs)

COs	Description
M23BETK105C.1	Make use of the basic physics of energy conversion to identify the environmental aspects of renewable energy resources in comparison with various conventional energy systems, their prospects and limitations.
M23BETK105C.2	Explain Concept of Solar radiation & the working of solar radiation measuring devices.
M23BETK105C.3	Illustrate the methods of energy conversion using the concept of wind energy and bio mass energy concepts.
M23BETK105C.4	Interpret the different energy generation technologies by identifying the key operating principles of ocean energy.
M23BETK105C.5	Explain the components and operation of geothermal power plant and Hydrogen Energy.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BETK105C.1	**3**	-	-	-	-	-	-	-	-	-	-	-
M23BETK105C.2	**3**	-	-	-	-	-	-	-	-	-	-	-
M23BETK105C.3	**3**	-	-	-	-	-	-	-	-	-	-	-
M23BETK105C.4	**3**	-	-	-	-	-	-	-	-	-	-	-
M23BETK105C.5	**3**	-	-	-	-	-	-	-	-	-	-	-
M23BETK105C	**3**											

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	**10**					**10**
Module 2		**10**				**10**
Module 3			**10**			**10**
Module 4				**10**		**10**
Module 5					**10**	**10**
Total	**10**	**10**	**10**	**10**	**10**	**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	**20**					**20**
Module 2		**20**				**20**
Module 3			**20**			**20**
Module 4				**20**		**20**
Module 5					**20**	**20**

Total	**20**	**20**	**20**	**20**	**20**	**100**

10. Future with this Subject

The trend in renewable energy sources is characterized by significant growth and increasing adoption worldwide.Renewable energy capacity, particularly solar and wind, has been experiencing rapid growth globally. This expansion is driven by falling costs, technological advancements, supportive policies, and increasing environmental concerns.

Identifying Technology Advancements:

Investigate emerging technologies and innovations in renewable energy generation, storage, and distribution. Assess the potential impact of technological advancements on the cost-effectiveness and efficiency of renewable energy systems.

Addressing Challenges and Barriers

Identify technological barriers and limitations hindering the widespread adoption of renewable energy. Explore research and development efforts aimed at overcoming technical challenges and improving renewable energy technologies.

Assessing Environmental Benefits:

Investigate the environmental benefits of renewable energy, including reductions in air and water pollution, land use impacts, and ecosystem preservation.

Analyze the potential for renewable energy to contribute to biodiversity conservation and ecological sustainability.

Encouraging Research and Development:

Identify areas for further research and innovation in renewable energy technology, policy, and market design. Explore interdisciplinary approaches and collaborations to address complex challenges in the renewable energy sector.

1st Semester	Emerging Technology Courses - I (ETC) WasteManagement	M23BETK105D

1. Prerequisites

S/L	Proficiency	Prerequisites
1	**Waste Management.**	Knowledge of types of waste in day today life..
2	**Handling and Disposal of Waste.**	Knowledge of different types of waste and its impact.
3	**Sustainability.**	Knowledge of resources we consume in day- to-day life.
4	**RegulatoryCompliancesandPolicy DevelopmentPrinciples.**	Basic understanding aboutwaste management principles.
5	**HealthandSafety**	Knowledgeofimpactofwastetoourhealth.

2. Syllabus

WasteManagement SEMESTER –I/II			
Course Code	M23BETK105/205D	CIEMarks	**50**
NumberofLectureHours/Week(L:T:P:S)	**(3:0:0)**	SEE Marks	**50**
TotalNumberofLectureHours	**40 hours**	TotalMarks	**100**
Credits	**03**	ExamHours	**03**

Module-1

Introductiontosolidwastemanagement

Classification of solid wastes (source and type based), solid waste management (SWM), elements of SWM,ESSWM(environmentallysoundsolidwastemanagement)andEST(environmentallysound

technologies),factorsaffectingSWM,Indianscenario,progressinMSW(municipalsolidwaste) ManagementinIndia.Indianandglobal scenarioofe-waste,

Module-2

WasteGenerationAspects

Wastestreamassessment(WSA),wastegenerationandcomposition,wastecharacteristics(physical and chemical), health and environmental effects (public health and environmental), comparative assessment of waste generation and composition of developing and developed nations, a case study results from an Indian city, handouts on solid waste compositions. E-waste generation.

Module-3

COLLECTION,STORAGE,TRANSPORTANDDISPOSALOFWASTES

WasteCollection,StorageandTransport:Collectioncomponents,storage-containers/collection vehicles,collectionoperation,transferstation,wastecollectionsystemdesign,recordkeeping, control,inventoryandmonitoring,implementingcollectionandtransfersystem,acasestudy.Waste Disposal:keyissuesinwastedisposal,disposaloptionsandselectioncriteria,sanitarylandfill, landfillgasemission,leachateformation,environmentaleffectsoflandfill,landfilloperationissues,a casestudy.

Module-4

WASTE PROCESSING TECHNIQUES & SOURCE REDUCTION, PRODUCTRE COVERY & RECYCLING

Purposeofprocessing,mechanicalvolumeandsizereduction,componentseparation,dryingand dewatering.SourceReduction,ProductRecoveryandRecycling:basics,purpose,implementation monitoringandevaluationofsourcereduction,significanceofrecycling,planningofarecycling programme,recyclingprogrammeelements,commonlyrecycledmaterialsandprocesses,acase study.

Module-5

HAZARDOUSWASTEMANAGEMENTANDTREATMENT

Identification and classification of hazardous waste, hazardous waste treatment, pollution prevention and waste minimization, hazardous wastes management in India. E-waste recycling.

TextBooks

1. Tchobaanoglous, G.,Theisen, H.,andSamuel AVigil,Integrated Solid WasteManagement,McGraw-Hill Publishers, 1993.
2. Bilitewski B., HardHe G., MarekK., Weissbach A., and Boeddicker H., Waste Management, Springer,1994.

ReferenceBooks

1. White,F.R., FrankeP.R.,,&HindleM., Integratedsolidwaste management:a lifecycleinventory. Mc Dougall,P. John Wiley & Sons. 2001
2. Nicholas,P.,&Cheremisinoff,P.D.,Handbook ofsolid wastemanagementandwasteminimization technologies, Imprint of Elsevier Science. 2005

Weblinks

- https://nptel.ac.in/courses/105103205
- https://www.youtube.com/watch?v=k0ktJRoRcOA
- https://nptel.ac.in/courses/103/107/103107125/
- https://onlinecourses.nptel.ac.in/noc22_ce76/preview
- https://onlinecourses.swayam2.ac.in/cec20_ge13/preview

3. SyllabusTimeline

S/L	Syllabus Timeline	Description
1	Week1-2	Studentswilllearnaboutintroductiontosolidwastemanagement.
2	Week3-4	Studentswilllearnaboutwastegenerationaspects.
3	Week5-6	Students will learn about Collection, Storage, Transport and Disposal of Wastes.
4	Week7-8	StudentswilllearnaboutWasteProcessingTechniques&SourceReduction, Product Recovery & Recycling.
5	Week9-10:	StudentswilllearnaboutHazardous WasteManagementAndTreatment

4. Teaching-LearningProcessStrategies

S/L	TLPStrategies	Description
1	LectureMethod	Utilizevariousteachingmethodswithinthelectureformatto reinforcecompetencies.
2	Video/Animation	Incorporatevisualaidslikevideos/animationstoenhance understandingofconcepts.
3	CollaborativeLearning	Encouragecollaborativelearningforimprovedcompetency application.
4	HigherOrderThinking (HOTS)Questions:	PoseHOTSquestionstostimulatecriticalthinkingrelatedto eachcompetency.
5	Problem-BasedLearning (PBL)	ImplementPBLtoenhanceanalyticalskillsandpractical applicationofcompetencies.
6	Real-WorldApplication	Discusspracticalapplicationstoconnecttheoreticalconcepts withreal-worldcompetencies.
7	FlippedClassTechnique	Utilizeaflippedclassapproach,providingmaterialsbefore classtofacilitatedeeperunderstandingofcompetencies.

5. Assessment Details (bothCIEandSEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

6. LearningObjectives

S/L	Learning Objectives	Description
1	Understanding fundamentalsof WasteManagement	Studentswillgraspthefundamentalconceptsofwastemanagement.
2	Proficiencyin handlingand disposal ofwaste.	Studentswillbecomeproficientinhandlinganddisposalofdifferenttypes of waste.
3	Designingofmodeltohandle waste.	Studentswilllearntodesigningmodeltohandle waste.
4	Proficiencyin Hazardouswaste.	Studentswillbecomeproficientinvarioustypesofspecialconcretewhich they come across in present scenario of industrial applications.
5	Ethical and Professional Responsibility.	Students will understand the ethical and professional responsibilities associated with material characterization of each ingredient of concrete, andproductionandhandlingofconcreteadheringtoindustrystandardsAndbestpractices.

7. CourseOutcomes(COs)andMappingwithPOs/ PSOs Course Outcomes (COs)

COs	Description
M23BETK105D.1	Applythebasicsofsolidwastemanagementtowardssustainabledevelopment
M23BETK105D.2	Applytechnologiestoprocesswasteanddisposethesame.
M23BETK105D.3	Designworkingmodelstoconvertwastetoenergy
M23BETK105D.4	Identifyandclassifyhazardouswasteandmanagethehazard

CO-PO-PSOMapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M23BETK105D.1	**3**						**2**					
M23BETK105D.2	**3**						**2**					
M23BETK105D.3			**2**			**2**	**2**					
M23BETK105D.4		**2**				**2**	**2**					
M23BETK105D	3	**2**	2			**2**	**2**					

8. AssessmentPlan

ContinuousInternalEvaluation(CIE)

	CO1	CO2	CO3	CO4	**Total**
Module1	10				10
Module2	10				10
Module3		10			10
Module4			10		10

Module5				10	10
Total	**20**	**10**	**10**	**10**	**50**

SemesterEndExamination(SEE)

	CO1	CO2	CO3	CO4	**Total**
Module1	20				20
Module2	20				20
Module3		20			20
Module4			20		20
Module5				20	20
Total	**40**	**20**	**20**	**20**	**100**

ConditionsforSEEPaperSetting:
EachmoduleofSEEquestionpaper shouldbeallocatedwithquestionsfor20%ofthe totalSEE marks.

9. FuturewiththisSubject.

The "Waste Management" course in the first/second semester of the B.E program lays a strong foundation for several future coursesintheundergraduate program of civil engineeringandalso other programme students will learn about this course and its impact on environment so that he will becomeresponsible citizen in the society to protect mother earth.

1st Semester	Emerging Technology Courses - I (ETC) Introduction to Internet of Things	M23BETK105E

1. Prerequisites (A minimum of five prerequisites may be written)

S/L	Proficiency	Prerequisites
1	Basics of Networking	Understanding of networking types Familiarity with fundamental layered networking models
2	Emergence of IOT	Knowledge of evolution of IoT, independence technology, network components and network strategy.
3	Sensors and Actuators	Differentiation of sensor and Actuators, characteristics associated with the sensors and the actuators, associated with multifaceted.
4	IoT Processing Topologies and Types	Basic understanding of importance of processing, topology, design and selection consideration.
5	Cloud Computing	Ability to analyze , Virtualization, Cloud Models, Service-Level Agreement andImplementation, and their services
6	Agricultural IoT	Knowledge relate to the applicability of IoT in real scenarios
7	Paradigms, Challenges, and the Future	Assess the various evolving aspects and paradigms of IoT , Understand the most prominent challenges encountered during the design and development of IoT solutions, Understand the common hardware platforms, sensors, and actuators used in IoT,Describe the common analytical tools and machine learning algorithms used with IoT data

2. Competencies (A minimum of four competencies may be written)

S/L	Emergence	KSA Description
1	**Basics of Networking**	**Knowledge:** Understanding of networking types. Knowledge of layers and models. **Skills:** Ability to apply concepts of basic terminologies andtechnology and new concepts of IoT with the basics of networking. **Attitudes:** Appreciation for the importance of of IoT with the basics of networking and topology.
2	**Emergence of IoT**	**Knowledge:** Understanding of evolutionof IOT, independence technology. **Skills:** Relate new concepts with concepts learned earlier to make a smooth transition to IoT. **Attitudes:** Recognize the unique features of IoT which set it apart from other similar paradigms.
3	Sensors and Actuators	**Knowledge:** Understand the concept of salient features of transducers, differentiate between sensors and actuators, characterize sensors and distinguish between types of sensors. **Skills:** Multi-faceted considerations associated with sensing, characterize actuators and distinguish between types of actuators. **Attitudes:** Understand the concept of sensor- multi-faceted considerations associated with actuation
4	**Associated IoT Technologies** -Cloud Computing	**Knowledge:** Understand the concept of cloud computing and its features. **Skills:** Understand virtualization, different cloud models, and service-level agreements. (SLAs) Identify the salient features of various cloud computing models. **Attitudes:** Understand the concept of sensor-clouds

5	Agricultural IoT	**Knowledge:** Understanding the applicability of IoT in real scenarios. **Skills:** Relate to the appropriate use of various IoT technologies through real-life use cases on IoT-based leaf area index assessment and an IoT-based irrigation system. **Attitudes:** Relate to the applicability of IoT in real scenarios.
6	**IoT case studies and future trends** -Paradigms, Challenges, and the Future	**Knowledge:** Understanding various evolving aspects and paradigms of IoT. **Skills:** Understand the most prominent challenges encountered during the design and development of IoT solutions. **Attitudes:** Research upcoming and emerging domains, which find significant applicability in IoT.
7	**Hands on IoT** Beginning IoT Hardware Projects	**Knowledge:** Understand the common hardware platforms, sensors, and actuators used in IoT. Assess the importance of each sensor or hardware in various applications. **Skills:** Using Arduino board and Raspberry Pi, installation and design. **Attitudes:** Assess the importance of each sensor or hardware in various applications

3. **Syllabus**

Introduction to Internet of Things(IOT) **SEMESTER – I**			
Course Code	**M23BETK105/205E**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(3:0:2)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours Theory**	Total Marks	**100**
Credits	**04**	Exam Hours	**03**

Course objectives: This course will enable students to:
CO1: Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.
CO2: Classify various sensing devices and actuator types.
CO3: Demonstrate the processing in IoT.
CO4: Apply Associated IoT Technologies.
CO5 :Analyze hands on IoT Applications

Module -1

Basics of Networking: Introduction, Network Types, Layered network models
Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components
Textbook 1: Chapter 1- 1.1 to 1.3; Chapter 4 – 4.1 to 4.4

Module -2

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

Module -3

IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. Textbook 1: Chapter 6 – 6.1 to 6.5

Module -4

ASSOCIATED IOT TECHNOLOGIES
Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service.

IOT CASE STUDIES **Agricultural IoT** – Introduction and Case Studies Textbook 1: Chapter 10– 10.1 to 10.6; Chapter 12- 12.1-12.2
Module -5
IOT CASE STUDIES AND FUTURE TRENDS AND IOT HANDS-ON **Paradigms, Challenges, and the Future**: Introduction, Evolution of New IoT Paradigms, Challenges Associated with IoT. **Beginning IoT Hardware Projects** : Introduction to Arduino Boards, **IoT Analytics:** Introduction Textbook 1: Chapter 15– 15.1-15.3; Chapter 16- 16.1; Chapter 17- 17.1
Text Books: Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) 1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021. **Reference:** 2. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press. 3. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014. 4. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

4. **Syllabus Timeline**

S/L	Syllabus Timeline	Description
1	Week 1-2: **Basics of Networking, Emergence of IoT**	**Basics of Networking, Emergence of IoT**
2	Week 3-4: **IoT Sensing and Actuation**	**IoT Sensing and Actuation**
3	Week 5-6: **IoT Processing Topologies and Types**:	**IoT Processing Topologies and Types**:
4	Week 7-8: **Cloud Computing ,Agricultural IoT**	**Cloud Computing ,Agricultural IoT**
5	Week 9-10: **Paradigms, Challenges, and the Future**	**Paradigms, Challenges, and the Future**
6	Week 11-12 **Beginning IoT Hardware Projects**	**Beginning IoT Hardware Projects**

5. **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 Verilog 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	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.

8	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

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

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. **Learning Objectives**

S/L	**Learning Objectives**	**Description**
1	Understanding Basics of Networking	Students will grasp the fundamental concepts networking types familiarity with fundamental layered networking models.
2	Designing **Emergence of IoT**	Students will ability to apply concepts of basic terminologies andtechnology and new concepts of IoT with the basics of networking.
3	Proficiency in sensors and actuators	Students will become proficient in Differentiation of sensor and Actuators, characteristics associated with the sensors and the actuators, associated with multifaceted
4	Collaboration and Communication Skills	Students will work collaboratively in teams on cloud computing and agricultural IoT and ability to communicate effectively.
5	Project-Based Learning	Through hands-on projects, students will apply their knowledge ofArduino Boards and Raspberry pi

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

Course Outcomes (COs)

COs	**Description**
M23BETK105E.1	Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.
M23BETK105E.2	Classify various sensing devices and actuator types.
M23BETK105E.3	Demonstrate the processing in IoT.
M23BETK105E.4	Apply Associated IoT Technologies.
M23BETK105E.5	Analyze hands on IoT Applications

CO-PO-PSO Mapping

COs/POs	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**	**PO**

	1	2	3	4	5	6	7	8	9	10	11	12
M23BETK105E.1		**3**										
M23BETK105E.2		**3**										
M23BETK105E.3		**3**										
M23BETK105E.4			**3**									
M23BETK105E.5			**3**									
M23BETK105E		**3**	**3**									

9. **Assessment Plan**

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. **Future with this Subject**

The “Introduction to Internet of Things" course in the ……semester of the B.E program lays a strong foundation for several future courses in the undergraduate program. The contributions of this subject extend across various areas, enhancing the students' understanding and skills in the field of digital systems. Here are some notable contributions:

- **Cloud Computing:** The knowledge gained in this course, Understand the concept of cloud computing and its features and understand virtualization, different cloud models, and service-level agreements (SLAs). Students can delve deeper into topics such as Identify the salient features of various cloud computing models • Understand the concept of sensor-clouds.
- **Introduction to Arduino Boards and Raspberry Pi**.Understand the common hardware platforms, sensors, and actuators used in IoT , Assess the importance of each sensor or hardware in various applications, Understand the code structure required to operate these hardware and sensors /actuators connected to them , Relate the IoT hardware and sensors according to the requirements of their applications.
- **Machine learning**: Describe the common analytical tools and machine learning algorithms used with IoT data assess the importance and applicability of each algorithm , understand the operating principle of each of these analytical methods.

1st Semester	Emerging Technology Courses - I (ETC) Introduction to Cyber Security	M23BETK105F

1. Prerequisites

S/L	Proficiency	Prerequisites
1	**Computer Basics**	Understanding how computers work, including hardware components like CPU, memory, storage, and input/output devices
2	**Operating Systems**	Familiarity with popular operating systems like Windows, macOS, and Linux, including basic file management and navigation.
3	**Networking**	Basic concepts of how networks operate, including IP addressing, DNS, routing, and protocols like TCP/IP.
4	**Programming**	Basic knowledge of programming concepts can be helpful, though it's not always a strict requirement. Understanding concepts like variables, loops, conditionals, and functions can aid in understanding certain aspects of cybersecurity.
5	**Mathematics**	While not always necessary, a basic understanding of mathematics, particularly concepts like binary, hexadecimal, and boolean algebra, can be helpful.

2. Competencies

S/L	Competency	KSA Description
1	**Cybercrime and Information Security**	***Knowledge:*** 1. **Understanding Cybercrime**: o Definition of cybercrime and its various manifestations (e.g., hacking, malware, social engineering). o Knowledge of the motives behind cybercriminal activities (e.g., financial gain, political motives, espionage). 2. **Cyber Threat Landscape**: o Awareness of common cyber threats and attack vectors (e.g., phishing, ransomware, insider threats). o Understanding of emerging cyber threats and trends (e.g., AI-driven attacks, supply chain vulnerabilities). 3. **Impact on Information Security**: o Understanding how cybercrime compromises information security (confidentiality, integrity, availability). o Knowledge of the consequences of cybercrime on individuals, organizations, and society (financial loss, reputational damage, regulatory penalties). 4. **Legal and Regulatory Framework**: o Familiarity with relevant cybersecurity laws, regulations, and standards (e.g., GDPR, HIPAA, PCI-DSS). o Understanding of the legal implications of cybercrime and the responsibilities of organizations in protecting data and mitigating risks. ***Skills:*** 1. **Cybersecurity Practices**: o Ability to implement cybersecurity best practices to protect against cyber threats (e.g., network security, endpoint protection, access control). o Skill in configuring and maintaining security tools and technologies (firewalls, intrusion detection/prevention systems, antivirus software). 2. **Incident Response and Management**: o Proficiency in incident detection, analysis, and response to cybersecurity incidents. o Ability to formulate and execute incident response plans, including containment, eradication, and recovery measures. 3. **Risk Assessment and Management**: o Skill in conducting risk assessments to identify vulnerabilities

		and assess potential impacts of cyber threats. o Competence in developing and implementing risk mitigation strategies and controls to reduce cyber risks. 4. **Security Awareness and Training**: o Capability to raise awareness among stakeholders about cybersecurity risks and best practices. o Skill in delivering cybersecurity training programs to educate users and enhance their vigilance against social engineering and phishing attacks. ***Attitudes:*** 1. **Ethical Responsibility**: o Commitment to ethical behavior and compliance with legal and regulatory requirements in cybersecurity practices. o Respect for privacy rights and data protection principles in handling sensitive information. 2. **Continuous Learning and Adaptability**: o Willingness to stay updated with evolving cyber threats, technologies, and best practices in cybersecurity. o Readiness to adapt strategies and defenses in response to new and emerging cyber threats. 3. **Collaboration and Teamwork**: o Openness to collaborate with colleagues, stakeholders, and cybersecurity professionals to enhance organizational security posture. o Ability to work effectively in cross-functional teams to address cybersecurity challenges and incidents. 4. **Resilience and Problem-Solving**: o Resilience in responding to cybersecurity incidents and mitigating their impact on organizational operations. o Problem-solving skills to analyze complex cybersecurity issues and develop effective solutions under pressure.

3. **Syllabus**

Course Code	**M23BETK105/205F**	CIE Marks
Teaching Hours/Week (L:T:P: S)		SEE Marks
Total Hours of Pedagogy	40	Total Marks
Credits	03	Exam Hours

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. **Chalk and Talk**
2. **PPT presentation**
3. **Animation based videos**
4. **Interactive learning**

Module 1

Introduction to Cybercrime: Introduction, Cybercrime:Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws.
Text 1: 1.1, 1.2, 1.4, 1.5, 1.7, 1.8.

Module 2

Cyber Offenses: Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cyber cafe & cybercrimes, The fuel for cybercrime, Attack Vector
Text 1: 2.1 to 2.7 (Except 2.2.4)

Module 3

Tools and Methods used in Cybercrime: Introduction**,** Introduction, Proxy Servers and Anonymizers, Phishing,
Password Cracking, Key Loggers and Spy-ways, Virus and Worms, Trozen Horses and Backdoors, Steganography, Attacks on Wireless networks.
Text 1: 4.1 to 4.8, 4.12.1, 4.12.3.

Module 4

Phishing and Identity Theft: Introduction, methods of phishing, phishing, phishing techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft. Text 1: 5.1, 5.2, 5.3.1, 5.3.2, 5.3.3.
Module 5 **Understanding Computer Forensics:** Introduction, Historical Background of Cyber forensics, Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts. Text 1: 7.1 to 7.4, 7.7, 7.8
Suggested Learning Resources: **Books:** 1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018)
Web links and Video Lectures (e-Resources): 1. https://www.youtube.com/watch?v=yC_hFm0BX28&list=PLxApjaSnQGi6Jm7LLSxvmNQjS_rt9swsu 2. https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJCktzIO4DtI4_ 3. https://www.youtube.com/watch?v=6wi5DI6du-4&list=PL_uaeekrhGzJlB8XQBxU3z__hDwT95xlk 4. https://www.youtube.com/watch?v=KqSqyKwVuA8.

4. **Syllabus Timeline**

S/L	Syllabus Timeline	Description
1	Week 1-2:	**Introduction to Cybercrime**:
2	Week 3-4:	**Cyber Offenses**
3	Week 5-6:	**Tools and Methods used in Cybercrime**
4	Week 7-8:	**Phishing and Identity Theft**
5	Week 9-10:	**Understanding Computer Forensics:**
6	Week 11-12:	Digital Forensic Life cycle, Chain of Custody Concepts.

5. **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 cybersecurity 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	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 deeper understanding of competencies
9	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

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

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. **Learning Objectives**

S/L	**Learning Objectives**	**Description**
1	**Foundational Understanding**	• Define cybersecurity and its significance in protecting digital assets, data, and systems from cyber threats. • Explain the principles of confidentiality, integrity, and availability (CIA) in the context of cybersecurity.
2	**Cyber Threat Landscape**	• Identify common types of cyber threats and attack vectors, such as malware, phishing, ransomware, and social engineering. • Understand the impact of cyber threats on individuals, organizations, and society.
3	Security Principles and Concepts	• Describe essential cybersecurity principles and concepts, including defense-in-depth, least privilege, and resilience. • Explain the importance of risk management and mitigation strategies in cybersecurity.
4	Cybersecurity Technologies and Tools	• Explore fundamental cybersecurity technologies and tools used to protect networks, systems, and data. • Discuss the role of firewalls, antivirus software, intrusion detection/prevention systems (IDS/IPS), and encryption in cybersecurity defense.
5	Legal and Ethical Considerations	• Discuss legal and regulatory requirements related to cybersecurity, including data protection laws (e.g., GDPR, CCPA). • Understand ethical considerations in cybersecurity practices, including privacy rights and responsible use of technology.
6	Cybersecurity Awareness and Education	• Highlight the importance of cybersecurity awareness among users and stakeholders. • Discuss strategies for promoting a cybersecurity-aware culture within organizations and communities.

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

Course Outcomes (COs)

COs	Description
M23BETK105F.1	Explain the cybercrime terminologies.
M23BETK105F.2	Describe cyber offenses and botnets.
M23BETK105F.3	Illustrate tools and methods used in cybercrime.
M23BETK105F.4	Demonstrate the need of phishing and identity theft.
M23BETK105F.5	Analyze the need of computer forensics.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BETK105F.1	**3**											
M23BETK105F.2	**3**											
M23BETK105F.3					**3**							
M23BETK105F.4		**3**										
M23BETK105F.5	**3**											
M23BETK105F	**3**	**3**			**3**							

9. **Assessment Plan**

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. **Future with this Subject**

The contributions of this subject extend across various areas, enhancing the students' understanding and skills in the field of digital systems. Here are some notable contributions:

1. **Artificial Intelligence and Machine Learning**:
- **Trend**: Increasing use of AI and ML for cybersecurity applications such as threat detection, anomaly detection, and behavioral analytics.
- **Impact**: Enhances the ability to identify and respond to cyber threats in real-time, automates repetitive tasks, and improves overall security posture.
2. **Internet of Things (IoT) Security**:
- **Trend**: Growth in IoT devices and networks necessitates improved security measures to protect against vulnerabilities and potential cyber attacks.
- **Impact**: Focus on securing IoT ecosystems, including device authentication, encryption, and monitoring for anomalous behavior.
3. **Cloud Security**:**Trend**: Continued migration of data and applications to cloud environments requires robust security controls and frameworks.
- **Impact**: Emphasis on cloud-native security solutions, data encryption, identity and access management (IAM), and compliance with data protection regulations.
4. **Zero Trust Architecture**:

- **Trend**: Shift towards Zero Trust security models that verify every user and device attempting to access resources, regardless of their location.
- **Impact**: Enhances security posture by minimizing the attack surface, implementing strict access controls, and continuously monitoring network activity

5. **Quantum Computing and Cryptography**:

- **Trend**: Development of quantum computing poses challenges to traditional cryptographic methods, driving research into quantum-resistant algorithms.
- **Impact**: Need for quantum-safe encryption to protect sensitive data from potential quantum-enabled attacks in the future.

1st Semester	Programming Language Courses - I (PLC) INTRODUCTION TO WEB PROGRAMMING	M23BPLCK105A

1. Prerequisites

S/L	Proficiency	Prerequisites
1	**HTML (HyperText Markup Language):**	**Purpose:** HTML forms the structure and content of web pages. **Skills Needed:** Understanding of HTML tags, elements, attributes, and how they create the basic structure of web pages.
2	**CSS (Cascading Style Sheets):**	**Purpose:** CSS is used for styling HTML elements, controlling their layout, appearance, and responsiveness. **Skills Needed:** Proficiency in CSS selectors, properties, positioning, responsive design principles, and CSS frameworks (e.g., Bootstrap).
3	**JavaScript**	**Purpose:** JavaScript adds interactivity to web pages, allowing dynamic behavior such as user interactions, form validation, and asynchronous communication. **Skills Needed:** Knowledge of JavaScript syntax, DOM manipulation, event handling, AJAX (Asynchronous JavaScript and XML), and ES6+ features.
4	**Web Accessibility**	**Purpose:** Ensuring web content is accessible to all users, including those with disabilities. **Skills Needed:** Familiarity with accessibility guidelines (, and testing tools for accessibility compliance.
5	**Server-Side Languages and Frameworks**	**Purpose:** Handling server-side logic, database interactions, and generating dynamic content. **Skills Needed:** Proficiency in at least one server-side language and its associated frameworks.
6	**Web APIs (Application Programming Interfaces)**	**Purpose:** Integrating with external services, accessing data from third-party sources, and enabling communication between different software systems. **Skills Needed:** Knowledge of RESTful APIs, HTTP methods and authentication methods

2. Competencies

S/L	Competency	KSA Description
1	**Proficiency in Front-End Technologies**	**HTML:** Ability to create semantically correct markup for web pages. **CSS:** Skill in styling and layout, including responsive design principles. **JavaScript:** Mastery in DOM manipulation, event handling, and asynchronous programming.
2	**Understanding of Back-End Development**	**Server-Side Languages:** Competence in languages like Python, Ruby, PHP, or Node.js for server logic. **Frameworks:** Proficiency in popular frameworks such as Django, Ruby on Rails, Laravel, or Express.js for efficient development.
3	**Performance Optimization**	**Front-End Optimization:** Knowledge of techniques for improving loading times and rendering performance of web pages. **Back-End Optimization:** Skill in optimizing database queries and server-side code for scalability and efficiency.
4	**Continuous Learning and Adaptability**	**Technology Trends:** Keeping up-to-date with the latest trends and advancements in web development. **Problem-Solving:** Strong analytical and problem-solving skills to tackle complex technical challenges.

3.Syllabus

Introduction to Web Programming SEMESTER – I			
Course Code	**M23BPLCK105/205A**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(3:0:2:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours Theory + 8-10 Lab slots**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course objectives:

This course will enable students to:

CO 1. Apply the knowledge of fundamental concepts of HTML, XHTML, CSS and JavaScript

CO 2. Identify complex engineering problems and providing suitable solutions using HTML5 and JavaScript

CO 3. Analyze various attributes, values and types of CSS to design Web components.

CO 4. Investigate the core constructs and event handling mechanisms of JavaScript and CSS for providing valid solutions.

Module -1

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

Module -2

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

Module -3

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

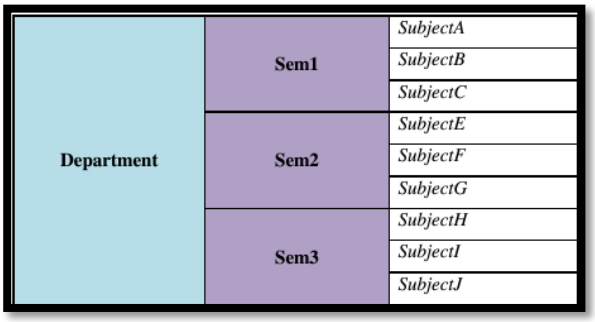
Module -4

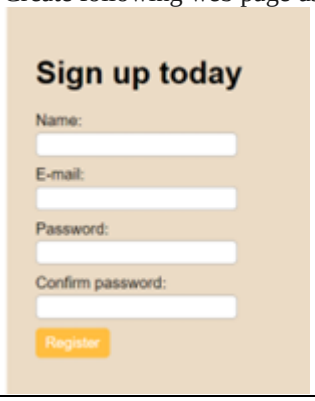
Tables and CSS, Links and Images:Table Elements, Formatting a Data Table: Borders, Alignment, and Padding, CSS Structural PseudoClass Selectors, thead and tbody Elements, Cell Spanning, Web Accessibility, CSS display Property with Table Values, a Element, Relative URLs, Navigation Within a Web Page, CSS for Links, Bitmap Image Formats: GIF, JPEG, PNG, img Element, Responsive Images, Positioning Images, Shortcut Icon, iframe Element . TextBook2: 5.2 to 5.8, 6.2, 6.3, 6.6., 6.7, 6.9, 6.10, 6.12, 7.2 to 7.4

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, Forms and How They're Processed: 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

PRACTICAL COMPONENT

10. **1**	Create an XHTML page using tags to accomplish the following: (i) A paragraph containing text "All that glitters is not gold". Bold face and italicize this text (ii) Create equation: $x=1/3(y12+z12$ (iii) Put a background image to a page and demonstrate all attributes of background image (iv) Create unordered list of 5 fruits and ordered list of 3 flowers
2	Create following table using XHTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary. 
3	Use HTML5 for performing following tasks: (i) Draw a square using HTML5 SVG , fill the square with green color and make 6px brown stroke width (ii) Write the following mathematical expression by using HTML5 MathML. d=x2-y2 (iii) Redirecting current page to another page after 5 seconds using HTML5 meta tag

4	Demonstrate the following HTML5 Semantic tags- <article>, <aside>, <details>, <figcaption>, <figure>, <footer>, <header>, <main>, <mark>, <section> for a webpage that gives information about travel experience
5	Create a class called income, and make it a background color of #0ff. Create a class called expenses, and make it a background color of #f0f. Create a class called profit, and make it a background color of #f00. Throughout the document, any text that mentions income, expenses, or profit, attach the appropriate class to that piece of text. Further create following line of text in the same document: The current price is 50₹ and new price is 40₹.
6	Change the tag li to have the following properties: (1)A display status of inline (2)A medium, double-lined, black border(3) No list style type Add the following properties to the style for li:(4) Margin of 5px (5)Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px to the left .Also demonstrate list style type with user defined image logos
7	Create following web page using HTML and CSS with tabular layout 
8.	Create following calculator interface with HTML and CSS 
9.	Write a Java Script program that on clicking a button, displays scrolling text which moves from left to right with a small delay.
1. **10.**	Create a webpage containing 3 overlapping images using HTML, CSS and JS. Further when the mouse is over any image, it should be on the top and fully displayed.

Text Books:

TextBook-1: HTML & CSS: The Complete Reference Thomas A. Powell, , Fifth Edition, Tata McGraw Hill,

TextBook-2: WEB PROGRAMMING with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, First Edition

4.Syllabus Timeline

S/L	Syllabus Timeline	Description
1	**Week 1-2:**Traditional HTML and XHTML	**Competency**: Basic Concepts of HTML and XHTML **Knowledge** :Structure of HTML **Skills**: Applying the basic concepts through execution.
2	**Week 3-4:**HTML5	**Competency**: Document structure of HTML **Knowledge**: Basics tags of HTML an new tags of HTML5 **Skills:** Implementing the HTML5 tags.
3	**Week 5-6:**Cascading Style Sheets (CSS)	**Competency:** Basic concepts of Cascading style sheets. **Knowledge**: different CSS styles applied to different components.

		Skills: Designing and implementing CSS on HTML.
4	**Week 7-8:**Tables and CSS, Links and Images	**Competency:**Understanding creation of Tables, Links and Images. **Knowledge:** Importance of CSS on links and Tables. **Skills:** Applying the concept Create HTML5 document with CSS ,Links and different table tags..
5	**Week 9-10:**Introduction to JavaScript	**Competency:** Basic concepts of JavaScript **Knowledge**: Understanding structure of JavaScript with HTML5 **Skills**: Implementing HTML4 using JavaScript.

5.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 Verilog 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	**Pair Programming**	Incorporate pair programming sessions where students collaborate in pairs to solve coding tasks or work on projects together.
7	**Case Studies and Best Practices**	Analyzing code snippets, architectural decisions, and design patterns employed in these projects to help students understand how Scala is applied in practice
8	**Problem-Solving Sessions**	Organize problem-solving sessions where students can work together to solve coding challenges and overcome programming obstacles

6.Assessment Details (both CIE and SEE)
Continuous Internal Evaluation (CIE):
The minimum CIE marks requirement is 40% of maximum marks in each component.

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

Final CIE Marks = (A) + (B)
Average internal assessment shall be the best two test marks.

Semester End Examination:
Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

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 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.

7.Learning Objectives

S/L	Learning Objectives	Description
1	**Understanding Web Technologies:**	**Objective:** Explain the foundational technologies of web development including HTML, CSS, and JavaScript. **Skills:** Write semantic HTML markup, apply CSS for styling and layout, and implement JavaScript for interactivity and dynamic content.
2	**Implementing Client-Side Programming**	**Objective:** Apply JavaScript frameworks (e.g., React, Angular, Vue.js) to build interactive user interfaces and enhance user experience. **Skills:** Use frameworks/libraries for state management, component-based architecture, and handling asynchronous operations
3	**Optimizing Web Performance**	**Objective:** Optimize web application performance by minimizing load times, reducing server response times, and improving overall user experience. **Skills:** Perform front-end optimization (e.g., minification, lazy loading), optimize database queries, use caching mechanisms (e.g., CDN, browser caching), and monitor performance metrics.
4	**Continuous Learning and Adaptation**	**Objective:** Stay updated with emerging web technologies, industry trends, and best practices to continuously improve skills and adapt to evolving demands. **Skills:** Participate in online communities, attend workshops/conferences, and explore new tools/frameworks to enhance proficiency and innovate in web development.

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

Course Outcomes (COs)

COs	Description
M23BPLCK105A.1	Apply the knowledge of fundamental concepts of HTML, XHTML, CSS and JavaScript
M23BPLCK105A.2	Identify complex engineering problems and providing suitable solutions using HTML5 and JavaScript
M23BPLCK105A.3	Analyze various attributes, values and types of CSS to design Web components
M23BPLCK105A.4	Investigate the core constructs and event handling mechanisms of JavaScript and CSS for providing valid solutions.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BPLCK105A.1	**3**											
M23BPLCK105A.2		**3**										
M23BPLCK105A.3			**3**									
M23BPLCK105A.4				**3**								
M23BPLCK105A	**3**	**3**	**3**	**3**								

9.Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	**Total**
All Experiments	**10**	**10**	**10**	**20**	**50**
Total					**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	**Total**
All Experiments	**20**	**20**	**30**	**30**	**100**
Total					**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10.Future with this Subject

The future of web programming is promising and continues to evolve rapidly with advancements in technology and changing user expectations. Here are several key aspects that highlight the future of web programming:

1.Progressive Web Applications (PWAs):

PWAs combine the best features of web and mobile applications, offering fast loading times, offline capabilities, and native-like user experiences. They are expected to become more prevalent as technology improves.

2.Single Page Applications (SPAs):

SPAs provide seamless user experiences by dynamically updating content without reloading the entire page. Frameworks like React, Angular, and Vue.js continue to dominate this space, with ongoing improvements in performance and developer experience.

3.Serverless Architecture:

Serverless computing allows developers to focus on writing code without managing servers. Services like AWS Lambda, Azure Functions, and Google Cloud Functions enable scalable and cost-effective solutions, driving the adoption of serverless architectures in web applications.

4.Web Assembly (Wasm):

Wasm enables running high-performance languages like C, C++, and Rust in web browsers, expanding the capabilities of web applications beyond traditional JavaScript limitations. It facilitates tasks such as gaming, multimedia processing, and complex computations directly in the browser.

5.AI and Machine Learning Integration:

AI and machine learning technologies are increasingly integrated into web applications for personalized user experiences, predictive analytics, and automation. JavaScript libraries and frameworks like TensorFlow.js and Brain.js enable developers to leverage AI capabilities in the browser.

6.Blockchain and Web3:

Blockchain technology and decentralized applications (dApps) are reshaping the web landscape with concepts like Web3. They offer enhanced security, transparency, and new economic models, influencing areas such as finance, supply chain management, and digital identity verification.

7.Responsive and Adaptive Design:

As the number of devices accessing the web grows, responsive and adaptive design principles remain crucial. Techniques such as CSS Grid, Flexbox, and responsive frameworks ensure that web applications deliver consistent user experiences across various screen sizes and devices.

8.Accessibility and Inclusive Design:

There is a growing emphasis on accessibility in web development, ensuring that web applications are usable by people with disabilities. Integrating accessible design practices and tools like screen readers, keyboard navigation, and ARIA roles will continue to be essential.

9.Cybersecurity and Privacy:

With increasing concerns over data privacy and security breaches, web developers must prioritize implementing robust security measures. This includes HTTPS encryption, secure authentication mechanisms, input validation, and regular security audits to protect user data and prevent vulnerabilities.

10.Continuous Learning and Adaptation:

Web developers need to embrace continuous learning to keep up with technological advancements, frameworks, and best practices. This involves staying engaged with developer communities, attending conferences, and exploring new tools and methodologies to stay competitive in the evolving field of web programming**.**

1st Semester	Programming Language Courses - I (PLC) Introduction to Python Programming	M23BPLCK105B

1. Prerequisites

S/L		Prerequisites
1	**Basic Computer Skills**	Familiarity with using computers, navigating files systems, and basic software operations.
2	**Fundamental Programming Concepts**	Understanding of basic programming concepts such as variables, data types, loops, conditionals, functions, and basic algorithms. This can be from any programming language.
3	**Problem-Solving Skills**	Ability to analyze problems and formulate logical steps to solve them.
4	**Mathematical and Logical Thinking**	Basic understanding of arithmetic operations, boolean logic, and problem-solving techniques.
5	**English Proficiency**	Since many learning resources and documentation are in English, a basic understanding of English is beneficial.

2. Competencies

S/L	Competency	KSA Description
1	**Syntax and Semantics**	Understanding the basic syntax rules and language constructs of Python, such as variables, data types, operators, and control structures (loops, conditionals).
2	**Data Structures**	Proficiency in working with Python's built-in data structures like lists, tuples, dictionaries, sets, and understanding when to use each.
3	**Functions and Modules**	Ability to define and use functions effectively, including understanding function parameters, return values, and scope. Knowledge of importing and using modules to organize and reuse code.
4	**Object-Oriented Programming(OOP)**	Understanding of OOP concepts such as classes, objects, inheritance, polymorphism, and encapsulation. Proficiency in creating and using classes and objects in Python.
5	**File Handling**	Ability to read from and write to files using Python's file handling mechanisms, including text and binary files.
6	**Exception Handling**	Skill in handling errors and exceptions gracefully in Python programs using try-except blocks.
7	**Algorithmic Thinking**	Ability to apply algorithmic principles to solve computational problems efficiently using Python.
8	**Documentation and Code Organization**	Skill in writing clear, concise, and well-documented Python code. Understanding of code organization best practices, including naming conventions, comments, and documentation standards.

3. Syllabus

Introduction to Python Programming **SEMESTER – I/II**			
Course Code	**BPLCK105B/205B**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	2:0:2:0	SEE Marks	**50**
Total Number of Lecture Hours	40 hours	Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course objectives: This course will enable students to:

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

Module-1 (08 hrs)

Python Basics: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, andString Data Types, String Concatenation and Replication, Storing Values in Variables, Your FirstProgram, 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 withsys.exit(), **Functions:** def Statements with Parameters, Return Values and return Statements,TheNone 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 (08 hrs)

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 (08 hrs)

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/WritingProcess, Saving Variables with the shelve Module,Saving Variables with the pprint.format() Function
Textbook 1: Chapters 6 , 8

Module-4 (08 hrs)

Organizing Files: The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module
Debugging: Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE‟sDebugger.
Textbook 1: Chapters 9-10

Module-5 (08 hrs)

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,Theinit method, The __str__ method, Operator overloading, Type-baseddispatch, Polymorphism, Interface and implementation,
Textbook 2: Chapters 15 – 17

Programming Exercises:

1. a. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
b. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.
2. a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
b. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).
3. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
4. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.
5. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]
6. Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(),readlines(), and write()].
7. Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.
8. Write a function named DivExp which takes TWO parameters a, b and returns a value c (c=a/b). Write suitable assertion for a>0 in function DivExp and raise an exception for when b=0. Develop a suitable program which reads two values from the console and calls a function DivExp.
9. Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class ‘Complex’ to represent the complex number. Develop a program to read N (N >=2) complex numbers and to compute the addition of N complex numbers.
10. Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use __init__() method to initialize name, USN and the lists to store marks and total, Use getMarks() method to read marks into the list, and display() method to display the score card

details.]
Suggested Learning Resources: **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)
Course outcomes (Course Skill Set): At the end of the course the student will be able to: ● Use advanced functions and productivity tools to assist in developing worksheets. ● Manipulate data lists using Outline and PivotTables. ● Use Consolidation to summarise and report results from multiple worksheets. ● Apply Macros and Autofilter to solve the given real world scenario.

4. Syllabus Timeline

S/L	Syllabus Timeline (No. of weeks should be as you have in the semester)	Description (Write the proposed syllabus coverage in detail with maximum of 5 lines)
1	Week 1-2: **Python BasicsFlow controlLab -1a** **Lab-1b**	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 .Boolean Values, Comparison Operators,Boolean Operators,Mixing Boolean and Comparison Operators, Elements of Flow Control,Program Execution
2	Week 3-4: **Flow controlFunctions ListsLab -2a** **Lab- 2bLab-3**	Flow Control Statements, Importing Modules,Ending a Program Early withsys.exit(), 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 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,
3	Week 5-6: **Dictionaries and Structuring Data Manipulating Strings** **Lab -4Lab-5**	The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things,Working with Strings, Useful String Methods, Working with Strings, Useful String Methods
4	Week 7-8: **Reading and Writing FilesOrganizing Files** **Lab -6Lab-7**	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, The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module
5	Week 9-10: **Debugging Classes and objects** **Lab -8Lab-9**	Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE"s Debugger Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying,
6	Week 11-12: **Classes and functions** **Classes and methods** **Lab-10**	Time, Pure functions, Modifiers, Prototyping versus planning, Object-oriented features, Printing objects, Another example, A more complicated example,Theinit method, The __str__ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation,

5. Teaching-Learning Process Strategies

S/L	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 (Read-Eval-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**	Assign projects that require students to apply Python to solve practical problems. This approach reinforces understanding, encourages creativity, and prepares students for real-world coding scenarios.
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	**Continuous Learning**	Python is a rapidly evolving language with new features and libraries regularly introduced. Encourage students to stay updated through online resources, tutorials, and participation in Python communities.

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

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description
1	**Understanding Basic Programming Constructs**	• Define and use variables, constants, and data types in Python. • Apply basic operations (arithmetic, comparison, logical) in Python.
2	**Control Structures**	• Implement conditional statements (if, elif, else) and understand their purpose. • Utilize loops (for, while) for repetitive tasks and iteration.

3	**Functions and Modular Programming**	. • Define and call functions in Python. • Understand function parameters, return values, and scope. • Organize code into modules and understand their role in code organization and reusability.
4	**Data Structures**	• Understand and use fundamental data structures in Python such as lists, tuples, dictionaries, and sets. • Implement operations on these data structures (e.g., indexing, slicing, adding, removing items).
5	**Object-Oriented Programming (OOP)**	• Define classes and objects in Python. • Implement encapsulation, inheritance, and polymorphism in Python classes. • Understand the benefits of OOP and when to use it.
6	**Error Handling**:	• Recognize common types of errors and exceptions in Python. • Use try-except blocks to handle exceptions gracefully.

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

Course Outcomes (COs)

COs	Description
M23BPLCK105B.1	Apply the fundamentals of Python programming to solve complex problems.
M23BPLCK105B.2	Analysedifferent data structures, concepts of string manipulation used in python programming
M23BPLCK105B.3	Interpret the concepts of object oriented programming using Python
M23BPLCK105B.4	Develop Solutions to the real world problems using python and justify through formal reasoning with completeexperimentaldocumentation.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BPLCK105B.1	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
M23BPLCK105B.2	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
M23BPLCK105B.3	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
M23BPLCK105B.4			**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
M23BPLCK105B	**3**	**3**	**2**	**3**	**2**							

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						

Total						**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

Python's future looks promising across various domains and industries due to its versatility, ease of use, and strong community support. Here are ten aspects that highlight Python's future prospects:

1. **Data Science and Machine Learning**: Python is the dominant language in data science and machine learning due to libraries like NumPy, Pandas, SciPy, and scikit-learn. Its simplicity and powerful libraries make it ideal for data manipulation, analysis, and building machine learning models.
2. **Artificial Intelligence (AI) and Deep Learning**: Python, especially with frameworks like TensorFlow, PyTorch, and Keras, is widely used for AI and deep learning applications. Its flexibility and ease of integration with other technologies make it a preferred choice for developing AI solutions.
3. **Web Development**: Python frameworks like Django and Flask are popular for web development. They offer robust features, security, and scalability, making Python a strong contender for building web applications and APIs.
4. **Scientific Computing**: Python's libraries such as SciPy, Matplotlib, and SymPy make it valuable for scientific computing tasks such as simulations, numerical computing, and visualization.
5. **Automation and Scripting**: Python's simplicity and extensive standard library make it ideal for automation tasks, system administration, and scripting. It is used in DevOps for configuration management and deployment automation.
6. **Education**: Python's readability and simplicity make it an excellent language for teaching programming fundamentals. It is widely used in educational institutions worldwide to introduce students to coding.
7. **IoT (Internet of Things)**: Python's lightweight footprint and support for microcontrollers make it suitable for IoT development. Libraries like MicroPython and CircuitPython simplify programming for IoT devices.
8. **Finance and Fintech**: Python is widely used in finance for quantitative analysis, risk management, algorithmic trading, and building financial models. Its libraries like pandas and NumPy are particularly valuable in financial analytics.
9. **Game Development**: Python, with libraries like Pygame and Panda3D, is used for developing 2D and 3D games. Its simplicity and rapid development capabilities make it popular among game developers.
10. **Cross-platform Compatibility**: Python's cross-platform compatibility allows developers to write code once and deploy it across multiple platforms, including Windows, macOS, Linux, and mobile platforms (via frameworks like Kivy and BeeWare

1st Semester	Programming Language Courses - I (PLC) Basics of JAVA Programming	M23BPLCK105C

1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Basic Programming Constructs	Knowledge of fundamental programming concepts such as variables, data types, control structures (if statements, loops), and functions/methods.
2.	Logic and Problem-Solving Skills	Ability to think logically and solve problems systematically.
3.	Mathematical Operations	Basic arithmetic operations and understanding of basic algebra.
4.	Using a Text Editor or IDE	Comfort with text editors (e.g., Notepad++, Sublime Text) or Integrated Development Environments (IDEs) like IntelliJ IDEA, Eclipse, or NetBeans.
5.	Problem-Solving Skills	Ability to analyze problems, break them down into smaller components, and devise solutions. Shell scripting often involves solving various problems efficiently.

2. Competencies

S/L	Competency	KSA Description
1.	**Proficiency in Command Line Interface**	**Knowledge:** Understand the fundamental of Command line Interface when writing Java program using Linux terminal **Skills:** ● Efficient file manipulation, text processing, and system administrations. **Attitudes:** ● Be comfortable with command line interface
2.	**Syntax and Semantics**	**Knowledge:** ● Understanding Java syntax and semantics, including data types, operators, control structures, and exception handling. **Skills:** Writing Java program to solve various problems using the learned skills **Attitudes:** Confident in writing Java Program.
3.	**Object-Oriented Programming**	**Knowledge:** Deep knowledge of OOP principles and their application in Java, including classes, objects, inheritance, polymorphism, encapsulation, and abstraction. **Skills:** ● Increase problem analysis and developing program. **Attitudes:** ● Confident in using OOP principles when developing program.
4.	**Algorithm Design**	**Knowledge:** ● Ability to design and implement algorithms to solve complex problems. **Skills:** ● Ability convert algorithm into program. **Attitudes:** ● Comfortable in writing java program to solve complex problems.

3. Syllabus

Basic of JAVA Programming SEMESTER – I			
Course Code	M23BPLK105/205C	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(2:0:2)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**
Course Learning objectives: ● Learn fundamental features of object oriented language and JAVA ● Set up Java JDK environment to create, debug and run simple Java programs.			

- Learn object oriented concepts using programming examples.
- Study the concepts of importing of packages and exception handling mechanism.

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, A Few Words About Strings.
Text book 1: Ch 2, Ch 3

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.
Text book 1: Ch 4, Ch 5

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.
Text book 1: Ch 6, Ch 7 (7.1-7.9)

Module -4

Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.
Text book 1: Ch 8

Module -5

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. Text book 1: Ch 9, Ch 10

Text Book(s)

1. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.

Web link:

- https://onlinecourses.nptel.ac.in/noc22_cs47/preview

Programming Assignments

1. Write a JAVA program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a, b, c and use the quadratic formula.
2. Write a JAVAprogram for multiplication of two arrays.
3. Demonstrate the following operations and sign extension with Java programs (i) << (ii) >> (iii) >>>
4. Write aJAVA program to sort list of elements in ascending and descending order
5. Create a JAVA class called Student with the following details as variables within it.

USN
NAME
BRANCH
PHONE
PERCENTAGE

Write a JAVA program to create n Student objects and print the USN, Name, Branch, Phone, and percentage of these objects with suitable headings.

6. Write a JAVA program demonstrating Method overloading and Constructor overloading.
7. Design a super class called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a JAVA program to read and display at least 3 staff objects of all three categories.
8. Demonstrate dynamic dispatch using abstract class in JAVA.
9. Create two packages P1 and P2. In package P1, create class A, class B inherited from A, class C . In package P2, create class D inherited from class A in package P1 and class E. Demonstrate working of

access modifiers (private, public, protected, default) in all these classes using JAVA. 10. Write a JAVA program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. Also demonstrate working of ArrayIndexOutOfBoundException.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2: **An Overview of Java**	**Understand:** Principles of object oriented programming, Java programming concepts. **Acquire the Knowledge** of OOP's concepts and basics of Java Program (Data Types, Variables, arrays, etc.) Including the implementation of Java program for the learned concepts.
2	Week 3-4: **Operators**	**Impart the knowledge of** various operators used in Java program. Also understand the process of type conversion etc. Including the implementation of Java program for the learned concepts.
3	Week 5-6: **Introducing Classes**	Understand the one of the important principles of Java program that is class and class structure. Including the implementation of Java program for the learned concepts.
4	Week 7-8: **Inheritance**	**Acquire the Knowledge:** Inheritance and different types of inheritance. Implementation of inheritance. Including the implementation of Java program for the learned concepts.
5	Week 9-10: **Packages and Interfaces**	**Understand the importance of** package and interface. Implement the packages and interfaces.
6	Week 11-12: **Integration and Practical Applications**	Apply learned concepts and competencies to real-world scenarios. Hands-on practice with programming assignments.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Live Demonstration	Develop and run Java programs in the classroom.
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	Programming Assignments	Assign programming tasks to improve the practical skills.

6. Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding Programming Fundamentals	**Syntax and Structure**: Learn the basic syntax and structure of Java programs, including data types, variables, operators, control flow statements (if, else, switch), and loops (for, while, do-while).
2	Mastering Object-Oriented Programming (OOP)	**Core OOP Concepts**: Grasp the fundamental principles of OOP, such as classes, objects, inheritance, polymorphism, encapsulation, and abstraction.
3	Developing Problem-Solving Skills	**Algorithm Development**: Develop the ability to break down problems into smaller, manageable tasks and create algorithms to solve them.
4	Building Simple Applications	**Hands-On Practice:** Apply your knowledge to build simple applications, reinforcing what you've learned and gaining practical experience.

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

Course Outcomes (COs)

COs	Description
M23BPLCK105C.1	Understand and apply the fundamental concepts and object oriented concepts in JAVA programming.
M23BPLCK105C.2	Analyze working of various operators and control statements in JAVA
M23BPLCK105C.3	Develop simple programs based on classes, polymorphism and inheritance.
M23BPLCK105C.4	Develop a java program to importing packages and exception handling mechanism.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BPLCK105C.1	**3**	**-**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
M23BPLCK105C.2	**-**	**3**	**-**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
M23BPLCK105C.3	**-**	**-**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
M23BPLCK105C.4	**-**	**-**	**3**	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**2**
M23BPLCK105C	**3**	**3**	**3**		**3**							**2**

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**

Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**100**

Conditions for SEE Paper Setting:
Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject
The "Basics of Java Programming" course in the first semester of the B.E (Computer Science & Engineering Branches) program places an important role for learning several future courses in the undergraduate program. This subject is very important in learning subjects such as Analysis and Design of Algorithm, Data Structures, Python programming, etc.

Here are some notable contributions:

- **Cloud Platforms:** Understand how to deploy Java applications to cloud platforms like AWS, Google Cloud Platform, or Azure.
- **Big Data Technologies:** Explore big data technologies such as Hadoop, Spark, and Kafka, and how to integrate them with Java applications.
- **Android Development:** Study Android development to build mobile applications using Java.
- **Advanced Data Structures:** Study advanced data structures like trees (binary trees, AVL trees, red-black trees), graphs, and heaps.
- **Algorithms:** Learn about more complex algorithms, including sorting algorithms (quick sort, merge sort), search algorithms (binary search, depth-first search, breadth-first search), and dynamic programming.

1st Semester	Programming Language Courses - I (PLC) Introduction to C++ Programming	M23BPLCK105D

1. Prerequisites

S/L	Proficiency	Prerequisites
1	**Basic Computer Skills**	Familiarity of different Operating Systems and the basic knowledge of command line usage is very needful.
2	**Knowledge of Integrated Development Environment**	Requires the basic skills to use various tools like text editor, compiler, linker and C++ IDE.
3	**Problem Solving Skills**	Knowledge of the Algorithmic thinking and Logical thinking needed.
4	**Mathematics**	Proficiency in Mathematics required to find the roots of quadratic equation, Trigonometric Functions etc,.
5	**Basics of C Programming**	Fundamental understanding of C is essential for object-oriented programming. This includes syntax, data types, variables, control structures, functions, and pointers
6	**Previous Coursework**	Completion of introductory courses in principles of programming in C related field.

2. Competencies

S/L	Competency	KSA Description
1	**Introduction to Object Oriented Concepts**	**Knowledge:** Importance of Object Orientation Concepts. Understanding of the basics of Object Orientation Programming. **Skills:** Ability to apply Object Orientation Concepts to create objects using appropriate structure. **Attitudes:** Appreciation to understand the importance of object orientation perspective and implement the same at basic level.
2	**Basic of Programming**	**Knowledge:** Understanding of basic elements of programming specific to C++ Language. Basics of C++ program execution. **Skills:** Designing basic C++ program using basic elements of programming language. Creating and executing simple C++ programs. **Attitudes:** Appreciation for the role of C++ programming elements and its execution.
3	**C++ Classes and its methods**	**Knowledge:** Understanding how classes are defined with data members and methods. **Skills:** Designing of classes for real world objects. Defining appropriate attributes and methods for classes. **Attitudes:** Valuing the importance of classes and its methods in line with real-world objects.
4	**Reusability of Classes and Methods**	**Knowledge:** Understanding the importance of code reusability through classes and methods reusability. **Skills:** Applying concepts of object orientation with classes and methods. Describing the actually importance of reusability through implementations. **Attitudes:** Openness to learning and using object orientation concepts to achieve code reusability.
5	**Exceptions and**	**Knowledge:**

	Handling the Exceptions	Understanding of issues with exceptions. **Skills:** Implementing how to handle the exceptions through appropriate C++ programming construct. **Attitudes:** Appreciation for the way exception is handled and making the execution of program in control.

3. Syllabus structure

S/L	Syllabus structure	KS Description
1.	Module 1: Introduction to object Oriented Programming	**Competency**: Basic C++ Programming **Knowledge**: C++ Programming basic constructs. **Skills**: Applying basic programming constructs in C++ execution environment
2	Module 2: Basic data types and Decision and Control Structures	**Competency**: C++ Looping Constructs and Classes **Knowledge**: Basics of C++ Classes with looping constructs. **Skills:** Designing and Implementing Classes in C++ and Looping constructs.
3	Module 3: Classes and Objects and Constructor and Destructors	**Competency:** Class with Constructor and Destructor. **Knowledge**: Basics of C++ Classes with constructors and destructours. **Skills**: Designing and implementing class methods through Constructor and Destructors.
4	Module 4: Operator Overloading Inheritance,	**Competency:** Operator overloading andInheritance with Packages and Interfaces **Knowledge:** Importance of Inheritance, Use of Packages and Interfaces. **Skills:** Applying the concept of Inheritance with Classes, creating package and importing the same with interfaces.
5	Module 5: Polymorphism Exception,, Handling,	**Competency:**Polymorphism,Exceptions, and Exception-handling **Knowledge**: Understanding plymorphism Exception, handling exceptions **Skills**: Implementing exception handlers.

4. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Image/Video/Animation	Incorporate visual aids like image/videos/animations to enhance understanding of programming constructs.
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	Programming-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	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
8	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

5. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	**Week 1-2:**Introduction to object Oriented Programming and Tokens	**Competency**: Basic C++ Programming **Knowledge** :C++Programming Tokens. **Skills**: Applying basic programming tokens in C++ execution environment.
2	**Week 3-4:** Basic data types and Decision and Control Structures	**Competency**: Looping Constructs and C++ Classes **Knowledge**: Basics of C++ Classes with looping constructs. **Skills:** Designing and Implementing Classes in C++ and Looping constructs.
3	**Week 5-6:** Classes and Objects and Constructor and Destructors,	**Competency:** Class with Constructor and Destructors. **Knowledge**: Using Constructor and Destructors memory is allocated and de-allocated **Skills**: Designing and implementing Constructors.
4	**Week 7-8:** Operator Overloading and Inheritance,	**Competency:** operator overloading and Inheritance with Packages and Interfaces **Knowledge:** Importance of Inheritance, Use of Packages and Interfaces. **Skills:** Applying the concept of Inheritance with Classes, creating package and importing the same with interfaces.
5	**Week 9-10:**Polymorphism and Exceptions-Handling.	**Competency:**Polymorphism**,**Exceptions, Exception-handling. **Knowledge**: Understanding Exception, handling exceptions **Skills**: Implementing exception handlers.

6. Syllabus

INTRODUCTION TO C++ PROGRAMMING SEMESTER – I			
Course Code	**M23BPLK105/205D**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(3:0:2:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours Theory + 8-10 Lab slots**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course objectives:

Module -1

Introduction to object Oriented Programming: OOP Paradigm, Basic concepts of OOP,Beginning with C++, Applications of C++, A simple C++ programs, Structure of C++ Program.
Tokens: Character sets and Symbols, Keywords, C++ Identifiers, Variables and Constants, Dynamic Initialization of variables, Reference variables, Operators.

Module -2

Basic data types: Data types in C++, User defined data types, Storage classes, , Type cast Operators**.**
Decision and 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: Classes in C, class declaration, declaring objects, Define member functions, call by reference, return by reference, inline functions, default arguments, Function Overloading
Constructor and Destructors : Constructors, Parameterized constructors, Multiple Constructors in a class, Constructors with default arguments, Dynamic initialization of Objects, 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 ineritance, Hybrid Inheritance, Abstract classes, constructors in derived class, Member classes..

Module -5

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

List of Programs for Practice

1	Design a C++ program to perform simple calculator.
2	An election is contested by five candidates. The candidates are numbered 1 to 5 and a voting is done by marking the candidate number in a ballot paper. Write a C++ program to read the ballot and count the votes cast for each candidate using an array variable count. In case, a number read is outside the range 1 to 5 the ballot should be considered as a 'spoilt ballot', and the program should also count the number of spoilt ballots.
3	Develop a C++ program to sort the elements in ascending and descending order
4	Develop a C++ program to demonstrate function overloading for the following prototypes. add(int a, int b) add(double a, double b)
5	Develop a C++ program using Operator Overloading for overloading Unary minus operator.
6	Develop a C++ program to implement Multiple inheritance for performing arithmetic operation of two numbers.
7	Develop a C++ program using Constructor in Derived classes to initialize alpha, beta and gamma and display corresponding values.
8	Develop a C++ program to swap two integer numbers.
9	Develop a function which throws a division by zero exception and catch it in catch block. Write a C++ program to demonstrate usage of try, catch and throw to handle exception.
10	Develop a C++ program that handles array out of bounds exception using C++.

Text Books:

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++.

7. Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

8. Learning Objectives

S/L	**Learning Objectives**	**Description**
1	Understanding fundamentals of C++ Programming Constructs	Students will grasp the fundamental concepts of C++ Programming, including basic constructs.
2	Executing Simple C++ Programs	Students will learn to design and execute basic and simple C++ programs.
3	Programming-Based Learning	Through program execution-based learning, students will undergo the demonstration of C++ programming constructs working principles.
4	Proficiency in C++	Students will become proficient in understanding and applying the C++

	Specific Constructs	specific constructs to improve the efficiency of C++programming logics.
5	Ethical and Professional Responsibility	Students will understand the ethical and professional responsibilities associated with C++ Programming, including respecting intellectual property rights, ensuring design reliability and security, and adhering to industry standards and best practices.

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

Course Outcomes (COs)

COs	Description
M23BPLCK105D.1	Understand and apply the basic programming constructs.
M23BPLCK105D.2	Apply the structure of classes and methods in C++ programming environment.
M23BPLCK105D.3	Analyze the different programming constructs of C++ and its effectiveness in improving the efficiency of C++ programs.
M23BPLCK105D.4	Implement appropriate C++ programming constructs to solve real-world problem sample scenarios.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BPLCK105D.1	**3**											
M23BPLCK105D.2	**3**											
M23BPLCK105D.3		**3**										
M23BPLCK105D.4			**3**									
M23BPLCK105D	**3**	**3**	**3**									

10. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	**Total**
Module 1					
Module 2					
Module 3					
Module 4					
Module 5					
Total					**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	**Total**
Module 1					
Module 2					
Module 3					
Module 4					
Module 5					
Total					**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

11. Future with this Subject

Evolution and Standardization: C++ continues to evolve with regular updates and new standards. The C++20 standard introduced significant new features such as modules, co routines, concepts, and improved concurrency support. Future standards, such as C++23 and beyond, are anticipated to further enhance the language, focusing on performance, simplicity, and safety. These updates ensure that C++ remains modern and relevant.

- **Educational Importance:** C++ continues to be a staple in computer science education. It teaches fundamental programming concepts, including memory management and system-level programming, which are essential for understanding more complex languages and systems
- **Systems and Embedded Programming:** C++ is foundational in systems programming, including operating systems, drivers, and embedded systems. Its ability to interact closely with hardware while maintaining a high level of performance makes it indispensable in these areas. The Internet of Things (IoT) and smart devices will further bolster the demand for C++ in embedded systems.
- **Artificial Intelligence and Machine Learning :**While Python dominates the AI and machine learning space, C++ is crucial for performance-critical components of ML frameworks like TensorFlow and PyTorch. It is used to optimize algorithms and enhance the efficiency of AI applications, especially in production environments.
- **Web Assembly:** With the rise of Web Assembly, C++ can be used to write high-performance code that runs in the browser. This opens new avenues for C++ in web development, enabling the development of complex web applications that require near-native performance..
- **Community and Ecosystem: The C++ community is vibrant and active, continually c**ontributing to its ecosystem with libraries, tools, and frameworks. This ongoing support ensures that C++ remains relevant and accessible for developers.

1st Semester	Humanities (HS) Professional Writing Skills in English	M23BPWSK106

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Knowledge of Basic English	Basic Grammar and Constructing sentences as studied from 1st to 12th std.

2. Competencies (A minimum of four competencies may be written)

S/L	Competency	KSA Description
1	**Basic Grammar**	**Knowledge:** Basic knowledge of English grammar. **Skills:** Building/Constructing Sentences . **Attitudes:** Appreciation for the English grammar and literature
2	**Vocabulary**	**Knowledge:** Understanding repository of words **Skills:** Building repository of English words to create effective sentence formation. **Attitudes:** Appreciation for use of strong vocabulary
3	**Essence of Communication**	**Knowledge:** Understanding primary and essential components of communication **Skills:** Designing presentation for an occasion and dealing a situation with effective communication **Attitudes:** Valuing the importance of Effective communication in strong and competitive situations
4	**Professionalism and Managing Emotional Intelligence**	**Knowledge:** Understanding importance of Professionalism and Emotional Intelligence **Skills:** Applying Professionalism to manage business & work. Controlling Emotional Intelligence to handle conflicts **Attitudes:** Achievement of goals through professionalism and ability to handle emotional Intelligence

3. Syllabus

PROESSIONAL WRITING SKILLS IN ENGLISH SEMESTER – II			
Course Code	M23BPWSK206/106	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(2:0:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**30 hours**	Total Marks	**100**
Credits	**01**	Exam Hours	**01**

Course objectives:

1. Students will advance their understanding of English grammar and vocabulary, focusing on common errors in usage, subject-verb agreement, and advanced vocabulary applications.
2. The course aims to improve technical reading and writing capabilities, including understanding technical reports and proposals, scientific writing processes, and professional communication for employment.
3. Participants will learn the essentials of professional communication, including group discussions, job interview strategies, intra- and interpersonal communication skills, and non-verbal cues.
4. Students will gain knowledge in work ethic, professionalism, business etiquette, and emotional intelligence, preparing them for a professional setting.
5. The course will focus on developing emotional intelligence, understanding its components, and applying strategies to enhance leadership and teamwork skills

Module -1

Identifying Common Errors in Writing and Speaking English :
Advanced English Grammar for Professionals with exercises, Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules with Exercises).
Common errors in Subject-verb agreement, Noun-pronoun agreement, Sequence of Tenses and errors identification in Tenses. Advanced English Vocabulary and its types with exercises – Verbal Analogies, Words Confused/Misused. Nature and Style of sensible writing :
Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Common Errors due to Indianism in English Communication, Creating Coherence and Cohesion, Sentence arrangements exercises, Practice of Sentence Corrections activities. Importance of Summarising and Paraphrasing.
Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words, Common errors in the use of Idioms and phrases, Gender, Singular & Plural. Redundancies & Clichés

Module -2

Technical Reading and Writing Practices :
Reading Process and Reading Strategies, Introduction to Technical writing process, Understanding of writing process, Effective Technical Reading and Writing Practices , Introduction to Technical Reports writing, Significance of Reports, Types of Reports.
Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process.
Grammar – Voice and Speech (Active and Passive Voices) and Reported Speech, Spotting Error Exercises, Sentence Improvement Exercises, Cloze Test and Theme Detection Exercises.
Professional Communication for Employment :
The Listening Comprehension, Importance of Listening Comprehension, Types of Listening, Understanding and Interpreting, Listening Barriers, Improving Listening Skills. Attributes of a good and poor listener.
Reading Skills and Reading Comprehension, Active and Passive Reading, Tips for effective reading.
Preparing for Job Application, Components of a Formal Letter, Formats and Types of official, employment, Business Letters, Resume vs Bio Data, Profile, CV and others, Types of resume, Writing effective resume for employment, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing, Memos (Types of Memos) and other recent communication types.

Module -3

Professional Communication at Workplace :
Group Discussions – Importance, Characteristics, Strategies of a Group Discussions. Group Discussions is a Tool for Selection. Employment/ Job Interviews - Importance, Characteristics, Strategies of a Employment/ Job Interviews. Intra and Interpersonal Communication Skills - Importance, Characteristics, Strategies of a Intra and Interpersonal Communication Skills. NonVerbal Communication Skills (Body Language) and its importance in GD and PI/JI/EI. Presentation skills and Formal Presentations by Students - Importance, Characteristics, Strategies of Presentation Skills. Dialogues in Various Situations (Activity based Practical Sessions in class by Students).
Business Etiquettes
> Greetings and Introductions in Business Settings
> Business Dining Etiquette
> Dress Code and Personal Grooming
> Electronic Etiquette: Phone, Email, and Social Media
> International Business Etiquette: Understanding Cultural Differences

Module -4

Work Ethic and Professionalism
> Defining Work Ethic: Traits and Characteristics
> The Importance of Reliability and Accountability
> Maintaining Confidentiality
> Building a Positive Professional Image
> Balancing Professionalism with Personal Authenticity

Module -5

Emotional Intelligence
> Defining Emotional Intelligence (EI)

>	The Five Components of EI (Daniel Goleman's Model)
>	Strategies to Boost Emotional Intelligence
>	Role of EI in Leadership and Teamwork
>	Overcoming Emotional Triggers

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3: Identifying Common Errors in Writing and Speaking English	Advanced English Grammar for Professionals, Common errors in Subject-verb agreement, Noun-pronoun agreement, Sequence of Tenses and errors identification in Tenses. Advanced English Vocabulary and its types with exercises – Verbal Analogies, Words Confused/Misused. Nature and Style of sensible writing ,Importance of Proper Punctuation, Essay writing, The Art of Condensation (Precise writing) and Techniques in Essay writing.
2	Week 4-6: Technical Reading and Writing Practices, Professional Communication for Employment	Reading Process and Reading Strategies, Introduction to Technical writing process, Technical Proposals. Scientific Writing Process, Grammar – Voice and Speech (Active and Passive Voices) and Reported Speech, Spotting Error. The Listening Comprehension,Reading Skills and Reading Comprehension,Preparing for Job Application, Letter writing , Resume Preparation
3	Week 7-9: Professional Communication at Workplace, Business Etiquettes	Group Discussions – Importance, Characteristics, Strategies of a Group Discussions,Employment/ Job Interviews - Importance, Characteristics, Strategies of a Employment/ Job Interviews. Intra and Interpersonal Communication Skills,Body Language Presentation skills and Formal Presentations by Students Business Etiquettes-Appearance grooming, Electronic etiquettes, International Business Etiquettes
4	Week 10-12: Work Ethic and Professionalism	Traits and Characteristics of work ethics, The Importance of Reliability and Accountability, Maintaining Confidentiality, Professional Image Balancing Professionalism with Personal Authenticity
5	One day Crash course:Emotional Intelligence	Definition, Daniel Goleman's model, Boosting and controlled Emotional Intelligence, Role of EI in Leadership and Teamwork

5.Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	Team handling and professional communication can be learnt better with activities such as Task management, project planning etc.
3	Collaborative Learning	Learning in team with small skits, role plays, group activities, debates etc
4	Writing exercises	Students will be engaged with writing exercises to acquire writing proficiency such as mail writing , report writing and letter writing.
5	Real-World Application	Situation based learning for Professional communication and Emotional Intelligence management

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

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

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

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding Basic Grammar of English	Students will acquire advanced knowledge of English Grammar
2	Sentence Construction	Students will learn to construct sentences used both in written and communicative English.
3	Presentation Skills	Students will learn presentation skill used in many forms .
4	Activity based learning for professional communication and Emotional Intelligence management	Learn through activity is a strong form of learning. Activities are created through Role plays, situation handling and work in team to make students learn Professional Communication, importance of ethics team handling and Emotional Intelligence management.
5	Writing skills	Exposure to writing skills with exercises on letter writing, report writing, resume preparation and Electronic communication

8. Course Outcomes (Cos) and Mapping with Pos/ PSOs

Course Outcomes (Cos)

Cos	Description
M23BPWSK106.1	**Students will be able to acquire proficiency in writingand oral skills in English through recap of basics, presentation techniques, email etiquettes, and understanding team skills.**
M23BPWSK106.2	**Students will be able learn professionalism and handling emotional intelligence**

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BPWSK106.1										**3**		
M23BPWSK106.2								**2**		**3**		
M23BPWSK106								**2**		**3**		

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	Total
Module 1	**10**	
Module 2	**10**	
Module 3	**10**	
Module 4	**10**	
Module 5	**10**	
Total		**50**

Semester End Examination (SEE)

	CO1	Total
Module 1	**20**	
Module 2	**20**	
Module 3	**20**	
Module 4	**20**	
Module 5	**20**	
Total		**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

- **Project presentation** : Students will be at ease with project presentation with effective Report and oral communication
- **Professionalism** :Students will understand importance of professionalism and will be able to adopt the same in their profession for career growth.
- **Succeeding in Corporate World:** Effective communication both in written and oral form, ability toprofessionally handle team and controlling emotional spikes are essential components of success in Corporate world. Students acquire these characteristics from this course.

1st Semester	Humanities (HS) Communicative English	M23BENGK106

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Knowledge of Basic English	Basic Grammar and Constructing sentences as studied from 1st to 12th std.

2. Competencies (A minimum of four competencies may be written)

S/L	Competency	KSA Description
1	**Basic Grammar**	**Knowledge:** Basic knowledge of English grammar. **Skills:** Building/Constructing Sentences . **Attitudes:** Appreciation for the English grammar and literature
2	**Vocabulary**	**Knowledge:** Understanding repository of words **Skills:** Building repository of English words to create effective sentence formation. **Attitudes:** Appreciation for use of strong vocabulary
3	**Essence of Communication**	**Knowledge:** Understanding primary and essential components of communication **Skills:** Designing presentation for an occasion and dealing a situation with effective communication **Attitudes:** Valuing the importance of Effective communication in strong and competitive situations
4	**Communication in Team**	**Knowledge:** Understanding importance of intra and inter personal communication **Skills:** Applying effective communication to achieve team's objective **Attitudes:** Achievement of goals through effective communication in a team

3. Syllabus

COMMUNICATIVE ENGLISH SEMESTER – I			
Course Code	M23BENGK106/206	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(2:0:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**30 hours**	Total Marks	**100**
Credits	**01**	Exam Hours	**01**

Course objectives:

1. Students will gain a foundational understanding of English grammar, including parts of speech, articles, prepositions, question tags, and vocabulary development strategies.
2. Participants will learn phonetic transcription, English pronunciation rules, stress, intonation, and common errors in pronunciation to enhance their spoken English clarity and effectiveness.
3. The course aims to equip students with advanced communication skills, focusing on oral presentations, public speaking, and the neutralization of mother tongue influence, preparing them for professional environments.
4. Students will learn the nuances of crafting effective emails, observing virtual communication etiquette, and employing best practices for engaging in virtual meetings across different platforms.
5. The curriculum emphasizes the importance of teamwork, detailing strategies for successful collaboration, conflict resolution, and celebrating team achievements, vital for workplace success.

Module -1
Basic English Communicative Grammar and Vocabulary PART - I : Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes, Strong and Weak forms of words, Introduction to Vocabulary, All Types of Vocabulary – Exercises on it. Introduction to Communicative English : Communicative English, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.**06 hrs**
Module -2
Introduction to Phonetics : Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure. Word Accent, Stress Shift and Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation. Basic English Communicative Grammar and Vocabulary PART - II : Words formation - Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.**06 hrs**
Module -3
Communication Skills for Employment :Information Transfer : Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions – Exercises. Presentation Skills > Planning and Structuring a Presentation > Effective Use of Visual Aids > Engaging the Audience: Techniques and Strategies > Overcoming Stage Fear > Evaluating Presentation Success**06 hrs**
Module -4
Email and Virtual Communication > Email Etiquette: Do's and Don'ts > Crafting Effective Emails: Clarity, Brevity, and Tone > Best Practices for Virtual Meetings (Zoom, Teams, etc.) > Virtual Communication Tools > Navigating Time Zones, Cultural Differences, and Other Challenges Assertiveness > Understanding the Difference: Assertiveness vs Aggressiveness > Benefits of Being Assertive > Techniques for Assertive Communication > Saying No Politely and Firmly > Assertiveness Role-Plays**06 hrs**
Module -5
Team Work and Collaboration > Characteristics of Effective Teams > Roles and Responsibilities within Teams > Strategies for Collaborative Work > Handling Team Conflicts > Celebrating Team Successes**06 hrs**

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3: Basic English Communicative Grammar and Vocabulary PART - I :	Grammar and Parts of Speech, Articles and Preposition,All Types of Vocabulary – Exercises on it, Introduction to communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.
2	Week 4-6: Introduction to	Phonetic Transcription, English Pronunciation, Pronunciation

	Phonetics, Basic English Communicative Grammar and Vocabulary PART - II	Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure.Common Errors in Pronunciation, Words formation - Prefixes and Suffixes, Contractions and Abbreviations on.
3	Week 7-9: Communication Skills for Employment, Presentation Skills	Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions. Planning and Structuring a Presentation,,Effective Use of Visual Aids, Engaging the Audience: Techniques and Strategies Overcoming Stage Fear,Evaluating Presentation Success
4	Week 10-12: Email and Virtual Communication	Email Etiquette: Do's and Don'ts,Crafting Effective Emails: Clarity, Brevity, and Tone,Best Practices for Virtual Meetings (Zoom, Teams, etc.)Virtual Communication Tools,Navigating Time Zones, Cultural Differences, and Other Challenges Assertiveness,Understanding the Difference: Assertiveness vsAggressiveness,Benefits of Being Assertive, Techniques for Assertive Communication
5	One day Crash course:Team Work and Collaboration	Characteristics of Effective Teams, Roles and Responsibilities within Teams, Strategies for Collaborative Work, Handling Team Conflicts

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	Communicative English can be learnt better with practice. Role plays, JAM, Impromptu at individual levels
3	Collaborative Learning	Learning in team with small skits, role plays, group activities, debates etc
4	Writing exercises	Email writing & responding requires both language and etiquette, students will be engaged with writing exercises to acquire this proficiency
7	Real-World Application	Discuss practical applications of Communicative English

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

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

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

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding Basic Grammar of English	Students will acquire or reinforce their knowledge of English Grammar
2	Sentence Construction	Students will learn to construct sentences used both in written and communicative English.
3	Presentation Skills	Students will learn different forms of presentation skills used in many situations.
4	Activity based learning	Learn through activity is a strong form of learning. Activities are created through Role plays, situation handling and work in team to make students learn

		communicative English practically.
5	Email communication	Email is a strong source of communication and very important in corporate and business word. Students acquire knowledge of this through email writing exercises

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

Course Outcomes (COs)

COs	Description
M23BPWSK106	**Students will be able to acquire proficiency in communicative English through recap of basics, presentation techniques, email etiquettes, and understanding team skills.**

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BPWSK106.1										**3**		
M23BPWSK106										**3**		

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	Total
Module 1	**10**	
Module 2	**10**	
Module 3	**10**	
Module 4	**10**	
Module 5	**10**	
Total		**50**

Semester End Examination (SEE)

	CO1	Total
Module 1	**20**	
Module 2	**20**	
Module 3	**20**	
Module 4	**20**	
Module 5	**20**	
Total		**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

- **Presenting Seminars**: Students will be at ease with all seminar presentation
- **Facing Employment process**: Good communicative English will enhance confidence and improve performance in Employment process
- **Succeeding in Corporate World:** Half battle is won with good communication in project and idea presentation. The communication proficiency acquired through this course will help students succeed in Corporate world.

1st Semester	Humanities (HS) Indian Constitution	M23BICOK107

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Knowledge of Basic Constitution	The basic structure of Indian Constitution.

2. Competencies

S/L	Competency	KSA Description
1	**Basic Constitution**	**Knowledge:** FundamentalRights(FR's),DPSP'sandFundamentalDuties(FD's)ofourconstitution.
2	**Articles**	**Knowledge:**All 395 articles and amendments
3	**Parliament system**	**Knowledge:**Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies
4	**General Law**	**Knowledge:** ElectionCommission,Elections&Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.

3. Syllabus

CourseTitle:	**IndianConstitution**		
CourseCode:	**M23BICOK107/207**	CIEMarks	50
CourseType(Theory/Practical/Integrated)		SEEMarks	50
		TotalMarks	100
TeachingHours/Week(L:T:P:S)	1:0:0:0	ExamHours	01Theory
TotalHoursofPedagogy	15hours	Credits	01

Courseobjectives:

Thecourse**INDIANCONSTITUTION(M23BICOK107/207)**willenablethestudents,

1. ToknowaboutthebasicstructureofIndianConstitution.
2. ToknowtheFundamentalRights(FR's),DPSP'sandFundamentalDuties(FD's)ofourconstitution.
3. ToknowaboutourUnionGovernment,politicalstructure&codes,procedures.
4. ToknowtheStateExecutive&ElectionssystemofIndia.
5. TolearntheAmendmentsandEmergencyProvisions,other importantprovisionsgivenbytheconstitution.

Teaching-LearningProcess

ThesearesampleStrategies, whichteachercanuseto acceleratetheattainmentof thevariouscourseoutcomes andmake Teaching –Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learningprocess.Thepedagogyshallinvolvethecombinationofdifferentmethodologieswhichsuitmoderntechnologicaltools.

(i) Directinstructionalmethod(Low/OldTechnology),(ii)Flippedclassrooms(High/advancedTechnological tools), (iii) Blendedlearning(Combinationofboth),(iv)Enquiryandevaluationbasedlearning, (v)Personalizedlearning, (vi)Problemsbased learningthroughdiscussion.

(ii) Apart from conventional lecture methods, various types of innovative teaching techniques through videos,animationfilmsmaybeadaptedsothatthedeliveredlessoncanprogressthestudentsIntheoretical appliedand practicalskills.

Module-1 (03hoursof pedagogy)

IndianConstitution: NecessityoftheConstitution,SocietiesbeforeandaftertheConstitutionadoption.IntroductiontotheIndianconstitution,MakingoftheConstitution, Roleofthe ConstituentAssembly.

Module-2 (03hours ofpedagogy)

SalientfeaturesofIndiaConstitution.PreambleofIndianConstitution&KeyconceptsofthePreamble.FundamentalRights(FR's)anditsRestrictionandlimitationsindifferentComplexSituations.building.

Module-3 (03hoursof pedagogy)
DirectivePrinciplesofStatePolicy(DPSP's)anditspresentrelevanceinIndiansociety.FundamentalDuties anditsScopeandsignificanceinNation,UnionExecutive:ParliamentarySystem,UnionExecutive– President,PrimeMinister,UnionCabinet.
Module-4 (03hoursofpedagogy)
Parliament-LSandRS,ParliamentaryCommittees,ImportantParliamentaryTerminologies.JudicialSystemofIndia,Supreme CourtofIndia andother Courts,Judicial ReviewsandJudicialActivism.
Module-5 (03hoursofpedagogy)
StateExecutiveandGoverner,CM,StateCabinet,Legislature-VS&VP,ElectionCommission,Elections&Electoral Process.Amendmentto Constitution,andImportantConstitutionalAmendmentstilltoday.EmergencyProvisions.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	**Module-1 03hours**	Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly.
2	**Module-2 03hours**	Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. building.
3	**Module-3 03hours**	Directive Principles of State Policy (DPSP's) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive : Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.
4	**Module-4 03hours**	Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism.
5	**Module-5 03hours**	State Executive and Governer, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	group discussion topics
3	Collaborative Learning	Visit the Government office and parliament
4	Writing exercises	Essay writing
7	Real-World Application	Discuss Elections & Electoral

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

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

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

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Contents related activities (Activity-based discussions)	
2	For active participation of students instruct the students to prepare Flowcharts and Handouts	
3	Organising Group wise discussions Connecting to placement activities	
4	Quizzes and Discussions	
5	Seminars and assignments	

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

Course Outcomes (COs)

COs	Description
M23BICOK107.1	Analyse the basic structure of Indian Constitution. Understand our State Executive & Elections system of India.
M23BICOK107.2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution. Remember the Amendments and Emergency Provisions, other important provisions given by the constitution

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M23BICOK107.1						**2**				**3**		
M23BICOK107.2						**2**				**3**		
M23BICOK107						**2**				**3**		

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1/CO2	Total
Module 1	**10**	
Module 2	**10**	
Module 3	**10**	
Module 4	**10**	
Module 5	**10**	
Total		**50**

Semester End Examination (SEE)

	CO1/CO2	Total
Module 1	**20**	
Module 2	**20**	
Module 3	**20**	
Module 4	**20**	
Module 5	**20**	
Total		**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

- **Presenting Seminars**: Students will be at ease with all seminar presentation
- **Facing Employment process**: If the student taken any civil service examination and their problem issue

1st Semester	Humanities (HS) Samskruthika Kannada	M23BKSKK107

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Knowledge of Kannada Lietrecher	Samskruthika Kannada

2. Competencies (A minimum of four competencies may be written)

S/L	Competency	KSA Description
1	**Revolution of Kannada**	**Knowledge:** .ಕರ್ನಾಟಕದಏಕೀಕರಣ: ಒಂದುಅಪೂರ್ವಚರಿತ್ರೆ - ಜಿವೆಂಕಟಸುಬ್ಬಯ್ಯ
2	**Novel writing**	**Knowledge:** ಮೆಗಾನೆಎಂಬಗಿರಿಜನಪರ್ವತ- ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ
3	**Learn Tradition and Culture**	**Knowledge:** ವಚನಗಳು:ಬಸವಣ್ಣ,ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮ್ಮಪ್ರಭು,ಆಯ್ದಕ್ಕಿಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿಲಕ್ಕಮ್ಮ.

3. Syllabus

ವಿಷಯ	ಸಾಂಸ್ಕೃತಿಕಕನ್ನಡ		
ವಿಷಯಸಂಖ್ಯೆ	**M23BKSKK107/207**		
ಗಂಟೆಗಳುವಾರಕ್ಕೆ	**1**	ಒಟ್ಟುಗಂಟೆಗಳು	15
ಚಾತುರ್ಮಾಸ	1/2	ವಿಭಾಗ	

ಕ್ರಸಂ	ಬೋಧನಾವಿಷಯ
1	**ಘಟಕ-1 ಲೇಖನಗಳು3 Hours** ಕರ್ನಾಟಕಸಂಸ್ಕೃತಿ - ಹಂಪನಾಗರಾಜಯ್ಯ
2	ಕರ್ನಾಟಕದಏಕೀಕರಣ: ಒಂದುಅಪೂರ್ವಚರಿತ್ರೆ - ಜಿವೆಂಕಟಸುಬ್ಬಯ್ಯ
3	ಆಡಳಿತಭಾಷೆಯಾಗಿಕನ್ನಡ - ಡಾ. ಎಲ್ತಿಮ್ಮೇಶಮತ್ತುವಿಕೇಶವಮೂರ್ತಿ
4	**ಘಟಕ-2 ಆಧುನಿಕಪೂರ್ವದಕಾವ್ಯಭಾಗ3 Hours** ವಚನಗಳು:ಬಸವಣ್ಣ,ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮ್ಮಪ್ರಭು,ಆಯ್ದಕ್ಕಿಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿಲಕ್ಕಮ್ಮ.
5	ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನುಫಲಇದರಿಂದಏನುಫಲ-ಪುರಂದರದಾಸರು
6	ತಲ್ಲಣಿಸದಿರುಕಂಡ್ಯತಾಳುಮನವೇ – ಕನಕದಾಸರು
7	ತತ್ವಪದಗಳುಸಾವಿರಕೊಡಗಳಸುಟ್ಟು - ಶಿಶುನಾಳಷರೀಫ
8	**ಘಟಕ – 3 ಆಧುನಿಕಕಾವ್ಯಭಾಗ3 Hours** ಡಿವಿಜಿರವರಮಂಕುತಿಮ್ಮನಕಗ್ಗದಿಂದಆಯ್ದಕೆಲವುಭಾಗಗಳು
9	ಕುರುಡುಕಾಂಚಾಣ - ದ.ರಾ. ಬೇಂದ್ರೆ
10	ಹೊಸಬಾಳಿನಗೀತೆ - ಕುವೆಂಪು
11	**ಘಟಕ – 4 ತಾಂತ್ರಿಕವ್ಯಕ್ತಿಗಳಪರಿಚಯ3 Hours** ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯವ್ಯಕ್ತಿಮತ್ತುಐತಿಹ್ಯಎ.ಎನ್.ಮೂರ್ತಿರಾವ್
12	ಕರಕುಶಲಕಲೆಗಳುಮತ್ತುಪರಂಪರೆಯವಿಜ್ಞಾನಕರಿಗೌಡಬೀಚನಹಳ್ಳಿ
13	**ಘಟಕ – 5 ಕಥೆಮತ್ತುಪ್ರವಾಸಕಥನ3 Hours** ಯುಗಾದಿ - ವಸುಧೇಂದ್ರ
14	ಮೆಗಾನೆಎಂಬಗಿರಿಜನಪರ್ವತ- ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	**Module-1 03hours**	**ಘಟಕ-1 ಲೇಖನಗಳು** ಕರ್ನಾಟಕಸಂಸ್ಕೃತಿ - ಹಂಪನಾಗರಾಜಯ್ಯ ಕರ್ನಾಟಕದಏಕೀಕರಣ: ಒಂದುಅಪೂರ್ವಚರಿತ್ರೆ - ಜಿವೆಂಕಟಸುಬ್ಬಯ್ಯ ಆಡಳಿತಭಾಷೆಯಾಗಿಕನ್ನಡ - ಡಾ. ಎಲ್ತಿಮ್ಮೇಶಮತ್ತುವಿಕೇಶವಮೂರ್ತಿ

2	**Module-2** **03hours**	**ಘಟಕ-2 ಆಧುನಿಕಪೂರ್ವದಕಾವ್ಯಭಾಗ** ವಚನಗಳು:ಬಸವಣ್ಣ,ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು,ಆಯ್ದಕ್ಕಿಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿಲಕ್ಕಮ್ಮ. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನುಫಲಇದರಿಂದಏನುಫಲ- ಪುರಂದರದಾಸರು ತತ್ಪದಗಳುಸಾವಿರಕೊಡಗಳಸುಟ್ಟು - ಶಿಶುನಾಳಷರೀಫ
3	**Module-3** **03hours**	**ಘಟಕ – 3 ಆಧುನಿಕಕಾವ್ಯಭಾಗ** ಡಿವಿಜಿರವರಮಂಕುತಿಮ್ಮನಕಗ್ಗದಿಂದಆಯ್ದಕೆಲವುಭಾಗಗಳು ಕುರುಡುಕಾಂಚಾಣ - ದ.ರಾ. ಬೇಂದ್ರೆ ಹೊಸಬಾಳಿನಗೀತೆ - ಕುವೆಂಪು
4	**Module-4** **03hours**	**ಘಟಕ – 4 ತಾಂತ್ರಿಕವ್ಯಕ್ತಿಗಳಪರಿಚಯ** ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯವ್ಯಕ್ತಿಮತ್ತುಐತಿಹ್ಯಎ.ಎನ್.ಮೂರ್ತಿರಾವ್ ಕರಕುಶಲಕಲೆಗಳುಮತ್ತುಪರಂಪರೆಯವಿಜ್ಞಾನಕರಿಗೌಡಬೀಚನಹಳ್ಳಿ.
5	**Module-5** **03hours**	**ಘಟಕ – 5 ಕಥೆಮತ್ತುಪ್ರವಾಸಕಥನ** ಯುಗಾದಿ–ವಸುಧೇಂದ್ರ ಮೆಗಾನೆಎಂಬಗಿರಿಜನಪರ್ವತ- ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	group discussion topics
3	Collaborative Learning	
4	Writing exercises	Essay writing
7	Real-World Application	

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

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

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

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Contents related activities (Activity-based discussions	
2	For active participation of students instruct the students to prepare Flowcharts and Handouts	
3	Organising Group wise discussions	
4	Quizzes and Discussions	
5	Seminars and assignments	

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

Course Outcomes (COs)

COs	Description
M23BKSKK107.1	ಕನ್ನಡ ಸಾಹಿತ್ಯಯ ಸಂಸ್ಕೃತಿ ನಾಡು ನುಡಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು
M23BKSKK107.2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯ,ಕಥೆ, ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯಮಾಡುವುದು
M23BKSKK107.3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.

CO-PO-PSO Mapping

COs/POs	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BKSKK107.1								**2**		**2**		
M23BKSKK107.2								**2**		**2**		
M23BKSKK107.3								**2**		**2**		
M23BKSKK107								**2**		**2**		

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1/CO2/ CO3	**Total**
Module 1	**10**	
Module 2	**10**	
Module 3	**10**	
Module 4	**10**	
Module 5	**10**	
Total		**50**

Semester End Examination (SEE)

	CO1/CO2/ CO3	**Total**
Module 1	**20**	
Module 2	**20**	
Module 3	**20**	
Module 4	**20**	
Module 5	**20**	
Total		**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

- **Presenting Seminars**: Students will be at ease with all seminar presentation
- **Facing Employment process**: If the student taken any civil service examination and their problem issue

1st Semester	Humanities (HS) ಬಳಕೆ ಕನ್ನಡ	M23BKBKK107

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Knowledge of Basic Kannada	ಬಳಕೆ ಕನ್ನಡ

2. Competencies (A minimum of four competencies may be written)

S/L	Competency	KSA Description
1	**Basic Grammar**	**Knowledge:** Methods to learn the Kannada language.
2	**Vocabulary**	**Knowledge:**nouns, dubitive
3	**Essence of Communication**	**Knowledge:** To learn the Kannada
4	**Communication in Team**	**Knowledge:** Right the ready the Kannada

3. Syllabus

Subject Name: ಬಳಕೆ ಕನ್ನಡ	
Sub Code: M23BKSKK107/207	**SEE Marks: 50**
Hours/week: 02 hr Theory/week	**CIE Marks : 50**
Total Hours: 15	**Exam : 01hr**
Semester :I/I1	**Credit : 1**

Module 13Hours	
Sl No	**ಪಠ್ಯ ವಿಭಜನೆ**
1	1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2	Easy learning of a Kannada Language: A few tips. Hints for correct and polite conservation, Listening and Speaking Activities
3	Key to Transcription.
4	ವೈಯಕ್ತಿಕಸರ್ವನಾಮಗಳು, ಸ್ವಾಮ್ಯಸೂಚಕರೂಪಗಳು, ಪ್ರಶ್ನಾರ್ಹಪದಗಳು- Personal Pronouns, Possessive Forms, Interrogative words
Module 2	**3Hours**
Sl No	**ಪಠ್ಯ ವಿಭಜನೆ**
4	ನಾಮಪದಗಳಸ್ವಾಮ್ಯಸೂಚಕರೂಪಗಳು, ಸಂಶಯಾಸ್ಪದಪ್ರಶ್ನೆಮತ್ತುಸಂಬಂಧಿತನಾಮಪದಗಳು Possessive forms of nouns, dubitive question and Relative nouns
5	ಗುಣಾತ್ಮಕ, ಪರಿಮಾಣಾತ್ಮಕಮತ್ತುಬಣ್ಣಗುಣವಾಚಕಗಳು, ಅಂಕಿಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals
6	**ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ(ಅ ಅದು ಅವು ಅಲ್ಲಿ)** Predictive Forms, Locative Case
Module 3	**3 Hours**
Sl. No.	**ಪಠ್ಯ ವಿಭಜನೆ**
7	ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು Dative Cases, and Numerals
8	ಸಂಖ್ಯಾಗುಣಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು Ordinal numerals and Plural markers
9	ದೋಷಯುಕ್ತ / ಋಣಾತ್ಮಕಕ್ರಿಯಾಪದಗಳುಮತ್ತು ಬಣ್ಣದವಿಶೇಷಣಗಳು Defective / Negative Verbs and Colour Adjectives
Module 4	**3 Hours**
Sl. No.	**ಪಠ್ಯ ವಿಭಜನೆ**
10	ಅಪ್ಪಣೆ ಒಪ್ಪಿಗೆ ನಿರ್ದೇಶನ ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences)
11	ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ಸ್ವತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು , Accusative Cases and Potential Forms used in General Communication
12	ಇರು ಮತ್ತು ಇರಲ್ಲ ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs
13	ಹೋಲಿಕೆ ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕಪದಗಳು Comparitive, Relationship, Identification and Negation Words
Module - 5	**03 Hours**

Sl. No.	ಪಠ್ಯ ವಿಭಜನೆ
13	ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳು ವಿವಿಧ ಪ್ರಕಾರಗಳು different types of forms of Tense, Time and Verbs
14	**ಭೂತಕಾಲದರಚನೆ, ಭವಿಷ್ಯಮತ್ತು ಕ್ರಿಯಾಪದರೂಪಗಳೊಂದಿಗೆಪ್ರಸ್ತುತಉದ್ವಿಗ್ನವಾಕ್ಯಗಳು**Formation of Past, Future and Present Tense Sentences with Verb Forms
15	ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು Kannada Vocabulary List Kannada Words in Conversation

4. Syllabus Timeline

S/L	Syllabus Timeline (No. of weeks should be as you have in the semester)	Description (Write the proposed syllabus coverage in detail with maximum of 5 lines)
1	**Module-1 03hours**	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. ವೈಯಕ್ತಿಕಸ್ವಾಮ್ಯ ಸೂಚಕ/ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು Personal Pronouns, Possessive Forms, Interrogative words
2	**Module-2 03hours**	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 ಅವುಅಲ್ಲಿ) Predictive Forms, Locative Case
3	**Module-3 03hours**	ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು Dative Cases and Numerals ,ಸಂಖ್ಯಾಗುಣಚಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು -Ordinal numerals and Plural markers ನ್ಯೂನ ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು Defective / Negative Verbs and Colour Adjectives
4	**Module-4 03hours**	ಅಪ್ಪಣೆ ಒಪ್ಪಿಗೆ ನಿರ್ದೇಶನ ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences) ,ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ಸ್ವತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು Accusative Cases and Potential Forms used in General Communication ಇರು ಮತ್ತು ಇರಲ್ಲ ಸಹಾಯಕ ಕ್ರಯಾಪದಗಳು ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs ಹೋಲಿಕೆ ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕಪದಗಳು Comparitive, Relationship, Identification and Negation Words
5	**Module-5 03hours**	ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳು ವಿವಿಧ ಪ್ರಕಾರಗಳು different types of forms of Tense, Time and Verbsಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಲೋಂದಿಗೆ ಭೂತ ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲವಾಕ್ಯ Formation of Past, Future and Present Tense Sentences with Verb Formsಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು Kannada Vocabulary List Kannada Words in Conversation

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	Conversational practices
3	Writing exercises	Writing practices

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

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

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

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Contents related activities (Activity-based discussions)	
2	For active participation of students instruct the students to prepare Flowcharts and Handouts	
3	Organizing Group wise discussions	
4	Quizzes and Discussions	
5	Seminars and assignments	

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

Course Outcomes (COs)

COs	Description
M23BKBKK107.1	To understand the necessity of learning of local language for comfortable life.
M23BKBKK107.2	To speak, read and write Kannada language as per requirement.
M23BKBKK107.3	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	PO12
M23BKBKK107.1								**2**		**2**		
M23BKBKK107.2								**2**		**2**		
M23BKBKK107.3								**2**		**2**		
M23BKBKK107								**2**		**2**		

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1/CO2/ CO3	Total
Module 1	**10**	
Module 2	**10**	
Module 3	**10**	
Module 4	**10**	
Module 5	**10**	
Total		**50**

Semester End Examination (SEE)

	CO1/CO2/ CO3	**Total**
Module 1	**20**	
Module 2	**20**	
Module 3	**20**	
Module 4	**20**	
Module 5	**20**	
Total		**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

- **Presenting Seminars**: Students will be at ease with all seminar presentation
- **Facing Employment process**: If the student taken any civil service examination and their problem issue

1st Semester	Ability Enhancement Course **Innovation and Design Thinking**	M23BIDTK158

1. Prerequisites

S/L	Proficiency	Prerequisites
1)	Basic Understanding of Design Principles (K)	Familiarity with basic concepts of design and engineering.
2)	Introductory Knowledge of Business Concepts(K)	Basic understanding of business models and market dynamics.
3)	Fundamental Knowledge of Problem-Solving Techniques(K)	Awareness of different problem-solving methodologies and frameworks.
4)	Analytical Thinking (S)	Ability to analyze problems and break them down into manageable components.
5)	Communication Skills (S)	Effective verbal and written communication skills.
6)	Basic Prototyping and Visualization (S)	Basic skills in creating simple prototypes or models.
7)	Open-Mindedness (A)	Willingness to consider new and diverse perspectives.
8)	Curiosity and Inquisitiveness (A)	Eagerness to learn and explore new ideas and concepts.
9)	Collaboration and Teamwork (A)	Positive attitude towards working in teams and valuing the contributions of others.
10)	Adaptability (A)	Willingness to adapt to changing conditions and incorporate new information into the design process.

2. Competencies

S/L	Competency	KSA Description
1	**Design Thinking Principles**	**Knowledge:** • Understanding of the key stages of the design thinking process: empathize, define, ideate, prototype, and test. • Knowledge of human-centered design principles. **Skills:** • Ability to apply design thinking stages to problem-solving. • Proficiency in user research and empathy mapping. **Attitudes:** • Openness to user-centered approaches and valuing user feedback. • Curiosity and willingness to explore diverse perspectives.
2	**Creative Ideation**	**Knowledge:** • Familiarity with ideation techniques such as brainstorming, mind mapping, and SCAMPER. **Skills:** • Ability to generate a wide range of ideas and solutions. • Proficiency in facilitating ideation sessions. **Attitudes:** • Willingness to embrace creativity and think outside the box. • Encouragement of divergent thinking and risk-taking in idea generation.
3	**Prototyping and Testing**	**Knowledge:** • Understanding of prototyping methods and tools. • Knowledge of iterative testing and feedback processes. **Skills:** • Ability to create low-fidelity and high-fidelity prototypes. • Proficiency in conducting user tests and gathering feedback. **Attitudes:** Acceptance of failure as a learning opportunity. • Persistence in iterating and refining prototypes based on feedback.
4	**User Empathy**	**Knowledge:** • Understanding of empathy and its role in the design process. **Skills:** • Ability to conduct user interviews and observations.

		• Proficiency in creating empathy maps and user personas. **Attitudes:** • Deep appreciation for user needs and experiences. • Commitment to designing solutions that prioritize user satisfaction and well-being.
5	**Strategic Thinking and Foresight**	**Knowledge:** • Understanding of strategic innovation and business model design. **Skills:** • Ability to apply strategic foresight and scenario planning. • Proficiency in developing and analyzing business models. **Attitudes:** • Strategic mindset with a focus on long-term impact. • Willingness to challenge the status quo and think strategically about innovation.
6	**Agile Methodologies**	**Knowledge:** • Familiarity with agile principles and methodologies. **Skills:** • Proficiency in iterative development and continuous improvement. **Attitudes:** • Flexibility and adaptability in dynamic environments. • Commitment to incremental progress and iterative learning.
7	**Communication and Storytelling**	**Knowledge:** • Understanding of effective communication and storytelling techniques. **Skills:** • Ability to craft compelling narratives and presentations. • Proficiency in visual communication and data visualization. **Attitudes:** • Confidence in sharing ideas and solutions. • Appreciation for the power of storytelling in influencing and inspiring others.
8	**Continuous Learning and Adaptability**	**Knowledge:** • Awareness of the importance of continuous learning and staying updated with industry trends. **Skills:** • Ability to self-assess and seek out learning opportunities. • Proficiency in adapting to new tools, technologies, and methodologies. **Attitudes:** • Commitment to lifelong learning and personal growth. • Openness to change and adaptability in fast-paced environments.

3. Syllabus

INNOVATION and DESIGN THINKING			
Course Code	**M23BIDTK158/258**	CIE Marks	**50**
Teaching Hours/Week (L: T:P: S)	**1:0:0**	SEE Marks	**50**
Total Hours of Pedagogy	**25**	Total Marks	**100**
Credits	**01**	Exam Hours	**01**
Module-1			
PROCESS OF DESIGN: Understanding Design thinking: Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping			
Module-2			
Tools for Design Thinking: Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space– Empathy for design – Collaboration in distributed Design			
Module-3			
Design Thinking in IT: Design Thinking to Business Process modeling – Agile in Virtual collaboration environment – Scenario based Prototyping			
Module-4			
DT For strategic innovations: Growth – Story telling representation – Strategic Foresight - Change – Sense			

Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.
Module-5
Design thinking workshop: Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test

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, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

References:

5. YousefHaikandTamerM.Shahin,"EngineeringDesignProcess",CengageLearning,SecondEdition,2011.
6. Book-SolvingProblemswithDesignThinking-TenStoriesofWhatWorks(ColumbiaBusinessSchoolPublishing)Hardcover–20Sep2013byJeanneLiedtka(Author),AndrewKing(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 BasedLearning(SuggestedActivitiesinClass)/PracticalBasedlearning

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

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2 Module 1	• Process of Design Introduction to design thinking, team-based design, theory, and practice in design thinking, MVP or prototyping.
2	Week 3-4 Module 2	• Tools for Design Thinking Real-time design interaction capture and analysis, efficient collaboration in digital space, empathy for design, collaboration in distributed design.
3	Week 5-6 Module 3	• Design Thinking in IT Business process modeling through design thinking, agile collaboration, scenario-based prototyping.
4	Week 7-8 Module 4	• Design Thinking for Strategic Innovations Growth, storytelling, strategic foresight, change, sense-making, value redefinition, competition, experience design, standardization, humanization, creative culture, rapid prototyping, business model design.
5	Week 9-10 Module 5	• Design Thinking Workshop Hands-on workshop covering empathizing, designing, ideating, prototyping, and testing.
6	Week 11-12	• Review and Presentations Review of key concepts and presentations by students, feedback sessions, and discussions on outcomes.

5. 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.

6. Assessment Details

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

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

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding Design Thinking Principles	Students will understand the fundamental concepts of design thinking, including empathy, ideation, prototyping, and testing.
2	Applying Design Thinking in Product Development	Students will apply design thinking principles to develop innovative solutions for product and service development.
3	Grasping Core Concepts of Innovation	Students will grasp the core concepts of innovation and its significance in the real world.
4	Implementing Innovation Methods	Students will implement various innovation methods and techniques in real-world scenarios.
5	Recognizing the Importance of Reverse Engineering	Students will understand the basics and importance of reverse engineering in product analysis and improvement.
6	Applying Reverse Engineering Techniques	Students will apply reverse engineering techniques to dissect and analyze products.
7	Enhancing Collaboration and Communication	Students will work collaboratively in teams on design projects, enhancing their ability to communicate effectively, share ideas, and solve problems collectively.
8	Cultivating Ethical and Professional Responsibility	Students will understand the ethical and professional responsibilities associated with innovation and design thinking, including respecting intellectual property rights and adhering to industry standards.

8. Course Outcomes and Mapping with Pos/ PSOs

CO's	DESCRIPTION OF THE OUTCOMES
M23BIDTK158.1	**Make use** the concept of design thinking to develop innovative solution for the problems identified.
M23BIDTK158.2	**Illustrate** the design ideas through various tools of Design Thinking
M23BIDTK158.3	**Interpret** the Design Thinking approach and model to real world situations
M23BIDTK158.4	**Apply** concepts of Agile software methodology, Business process modeling & scenario based prototyping with design thinking approach to provide solution in IT industries.
M23BIDTK158.5	**Analyze** the role of Design thinking approach in various Business challenges by considering strategic innovation.

CO No	PO No												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
M23BIDTK158.1	3													
M23BIDTK158.2	2													
M23BIDTK158.3	3													
M23BIDTK158.4	2													
M23BIDTK158.5		2												
M23BIDTK158	2.5	2												

9. Assessment Plan

IA

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	15%		5%			**20%**
Module 2	5%	10%			5%	**20%**
Module 3			10%	10%		**20%**
Module 4		5%		5%	10%	**20%**
Module 5		5%	5%	5%	5%	**20%**
Total	**20%**	**20%**	**20%**	**20%**	**20%**	**100%**

SEE

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	15%		5%			**20%**
Module 2	5%	10%			5%	**20%**
Module 3			10%	10%		**20%**
Module 4		5%		5%	10%	**20%**
Module 5		5%	5%	5%	5%	**20%**
Total	**20%**	**20%**	**20%**	**20%**	**20%**	**100%**

Conditions for SEE Paper Setting

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

10. Future with this Subject

Advanced Courses: This course serves as a foundation for advanced studies in design thinking, innovation, and engineering design.

Industry Applications: The skills and knowledge gained are applicable in various industries focusing on product development, service design, and business process improvements.

Research: Provides a basis for research in innovative design solutions and the implementation of design thinking methodologies.

1st Semester	Ability Enhancement Course **Scientific Foundations of Health**	**M23BSFHK158**

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Knowledge of Basic Health	Fitness and Positive Mindset

2. Competencies (A minimum of four competencies may be written)

S/L	Competency	KSA Description
1	**Balancing Health**	**Knowledge:** Health and behavior, health and society health and family, health and personality **Skills:** Changing health habits for good health **Attitudes:** Learn, create , and including healthy habits
2	**Balancing Diet and fitness**	**Knowledge:** Healthy diet plans, Nutrition guidelines, obesity and overweight disorders. Fitness components and exercise. **Skills:** Building healthy life style through maintainingDiet and fitness **Attitudes:** Learn exercise for fitness and healthy habits.
3	**Essence of healthy and caring relationships**	**Knowledge:** About communication skills, friendship and basic instincts of life changing health behaviors. **Skills:** Building communication skills, create value relationship through social Engineering **Attitudes:** Learning communication skill to maintain health and value relationship.
4	**Prevention and avoiding harmful habits and diseases**	**Knowledge:** Avoiding of addiction, Types of addiction, effects of addiction, Types of infections, Chronic illness. **Skills:** build health compromising behavior to avoid addiction and protect from the different from the infections **Attitudes:** Learn how to avoid addiction create habits to prevent and fight against infection and diseases.

3. Syllabus

CourseTitle:	**Scientific Foundations of Health**		
CourseCode:	**M23BSFHK158/258**	CIEMarks	50
CourseType(Theory/Practical/Integrated)	Theory	SEEMarks	50
		TotalMarks	100
TeachingHours/Week(L:T:P:S)	1:0:0:0	ExamHours	01Theory
TotalHoursofPedagogy	15hours	Credits	01

Courseobjectives:

ThecourseScientificFoundationsofHealth(M23BSFHK108/208)willenablethestudents,

1. ToknowaboutHealthandwellness(anditsBeliefs)&It'sbalanceforpositivemindset.
2. ToBuildthehealthylifestylesforgoodhealthfortheirbetter future.
3. ToCreateaHealthyandcaringrelationshipstomeettherequirementsofgood/social/positivelife.
4. TolearnaboutAvoidingrisksandharmfulhabitsintheircampusandoutsidethecampusfortheirbrightfuture
5. ToPreventandfightagainstharmfuldiseasesforgoodhealththroughpositivemindset

Teaching-LearningProcess ThesearesampleStrategies,whichteachercanusetoaccelerateheattainmentofthevariouscourseoutcomesand make Teaching –Learning more effective: Teachersshalladoptsuitablepedagogyforeffectiveteaching-learningprocess.Thepedagogyshallinvolvethe combination of different methodologies which suit modern technological tools. (i)Directinstructionalmethod(Low/OldTechnology),(ii)Flippedclassrooms(High/advancedTechnologica ltools), (iii)Blendedlearning(Combinationofboth),(iv)Enquiryandevaluationbasedlearning, (v)Personalizedlearning,(vi)Problemsbasedlearningthroughdiscussion,(vii)Followingthemethodofexped itionary learning Tools and techniques, (viii) Use of audio visual methods. Apartfromconventionallecturemethods,varioustypesofinnovativeteachingtechniquesthroughvideos,animati onfilms may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills.
Module-1 (03hoursofpedagogy)
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 (03hours of pedagogy
Buildingofhealthy 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 (03hoursofpedagogy)
CreationofHealthyandcaringrelationships: Buildingcommunicationskills,Friendsandfriendship-Education, thevalueof relationship and communicationskills,Relationshipsfor Better orworsening oflife,understandingof basic instincts of life (more than a biology), Changing health behavioursthrough social engineering.
Module-4 (03hoursofpedagogy)
Avoidingrisksandharmfulhabits: Characteristicsofhealthcompromisingbehaviors,Recognizingandavoidin gof 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 (03hoursofpedagogy)
Preventing&fightingagainstdiseasesforgoodhealth: Howtoprotectfromdifferenttypesofinfections,Howto reduce risks for good health, Reducing risks & coping with chronic conditions, Management of chronic illness for Qualityof life, Health & Wellness of youth :achallenge for upcoming future, Measuring of health & wealth status.

4. Syllabus Timeline

S/ L	Syllabus Timeline	Description
1	**Module-1 03hours**	**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.
2	**Module-2 03hours**	**Buildingofhealthy 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.
3	**Module-3 03hours**	**CreationofHealthyandcaringrelationships:**Buildingcommunicationskills,Friendsandfriendship-Education, thevalueof relationship and communicationskills,Relationshipsfor Better orworsening oflife,understandingof basic instincts of life (more than a biology), Changing health behavioursthrough social engineering.

4	**Module-4 03hours**	**Avoidingrisksandharmfulhabits:**Characteristicsofhealthcompromisingbehaviors,Recognizingandavoidingof 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.
5	**Module-5 03hours**	**Preventing&fightingagainstdiseasesforgoodhealth:**Howtoprotectfromdifferenttypesofinfections,Howto reduce risks for good health, Reducing risks & coping with chronic conditions, Management of chronic illness for Qualityof life, Health & Wellness of youth :achallenge for upcoming future, Measuring of health & wealth status.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	group discussion topics
3	Collaborative Learning	Ground activities
4	Writing exercises	Essay writing
7	Real-World Application	Discuss about health related fitness

6. Assessment Details (both CIE and SEE)

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

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

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Contents related activities (Activity-based discussions)	
2	For active participation of students instruct the students to prepare Flowcharts and Handouts	
3	Organising Group wise discussions Connecting to placement activities	
4	Quizzes and Discussions	
5	Seminars and assignments	

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

Course Outcomes (COs)

COs	Description
M23BSFHK158.1	Developthehealthylifestylesforgoodhealthfortheirbetterfuture.
M23BSFHK158.2	BuildaHealthyandcaringrelationshipstomeettherequirementsofgood/social/positive life.
M23BSFHK158.3	TolearnaboutAvoidingrisksandharmfulhabitsintheircampusand outsidethecampusfortheirbright future.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO8	PO 9	PO1 0	PO 11	PO1 2
M23BSFHK158.1						**3**						
M23BSFHK158.2							**3**					

M23BSFHK158.3								**3**				
M23BSFHK158						**3**	**3**	**3**				

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1/CO2	**Total**
Module 1	**10**	
Module 2	**10**	
Module 3	**10**	
Module 4	**10**	
Module 5	**10**	
Total		**50**

Semester End Examination (SEE)

	CO1/CO2	**Total**
Module 1	**20**	
Module 2	**20**	
Module 3	**20**	
Module 4	**20**	
Module 5	**20**	
Total		**100**

Conditions for SEE Paper Setting:
Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

- **Presenting Seminars**: Students will be at ease with all seminar presentation
- **Facing Employment process**: If the student taken any civil service examination and their problem issue

2nd Semester	Basic Science Course (BS) Mathematics-II for ME Stream	M23BMATM201

1. Prerequisites

S/L	Proficiency	Prerequisites
	Integral Calculus	Have a good understanding of basic algebra, trigonometry, and differential calculus. Familiarity with functions, limits, derivatives, and their properties will also be beneficial as integral calculus involves finding antiderivatives and calculating areas under curves.
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.
5	Previous Coursework	Completion of introductory courses in Mathematics or a related field.

2. Competencies

S/L	Competency	KSA Description
1	Integral Calculus	**Knowledge** **Area and volume calculations:** Integral calculus helps in calculating areas, volumes, and centroids of complex shapes, which is essential for designing components and analyzing structures in mechanical engineering. **Skills** Ability to apply integral calculus in optimization problems, particularly in machine learning (e.g., gradient descent). **Attitude** Curiosity and willingness to explore real-world applications of integral calculus.
2	Vector Calculus	**Knowledge** Gradient, divergence, and curl: Students will learn about gradient, divergence, and curl operators and their significance in vector calculus. These concepts are crucial for understanding fields such as temperature distribution, fluid flow, and stress analysis in mechanical systems. **Skills** vector calculus equips mechanical engineering students with advanced mathematical tools and concepts that are crucial for modeling, **Attitude** Analytical thinking and spatial reasoning to visualize and solve vector-related problems.
3	Partial Differential Equations	**Knowledge** Modeling Physical Phenomena, Applications In Heat Transfer And Fluid Dynamics: **Skills** Ability to manipulate and transform data in high-dimensional spaces, essential for data science and computer vision. **Attitude** Enthusiasm for continuous learning and application of linear algebra in emerging technologies like quantum computing.
4	Numerical	**Knowledge**

	Methods-I & II	Approximation techniques Root-finding methods, Linear algebra techniques, Numerical integration and differentiation: Ordinary differential equations **Skills** It helps to acquire practical skills and knowledge that are essential for solving complex engineering problems that may not have analytical solutions **Attitude** Methodical approach to testing and validating numerical algorithms for accuracy and efficiency.

3. Syllabus

Mathematics-II for ME Stream SEMESTER-II			
Course Code	**M23BMATM201**	CIE Marks	**50**
Number of Lecture Hours/Week (L: T: P: S)	**(2:2:2:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours Theory + 8-10 Lab slots**	Total Marks	**100**
Credits	**04**	Exam Hours	**03**

Course objectives: This course will enable students to:

4. Familiarize the importance of Integral calculus and Vector calculus.
5. Learn vector spaces and linear transformations.
6. Develop the knowledge of numerical methods and apply them to solve transcendental and differential equations.

Module -1: Integral Calculus

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.

Module -2:Vector Calculus

Introduction to Vector Calculus in Computer Science & Engineering. Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation, solenoidal and irrotational vector fields. Problems.

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

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.Derivation of one-dimensional heat equation and wave equation.

Module -4: Numerical Methods -1

Importance of numerical methods for discrete data in the field of computer science & engineering. 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

Introduction to various numerical techniques for handling Computer Science & Engineering

applications. 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.

Text Books:

1.B.S.Grewal:"HigherEngineeringMathematics",Khannapublishers,44th Ed.2021
2.E.Kreyszig:"AdvancedEngineeringMathematics",JohnWiley&Sons,10th Ed.(Reprint),2018

Reference Books

1.V.Ramana:"HigherEngineeringMathematics"McGraw-HillEducation,11th Ed.
2.SrimantaPal&SubodhC.Bhunia:"EngineeringMathematics"OxfordUniversityPress,3rd Reprint,2016.
3.N.PBaliandManishGoyal:"AtextbookofEngineeringMathematics"LaxmiPublications,Latestedition.
4.C.RayWylie,LouisC.Barrett:"AdvancedEngineeringMathematics"McGraw–HillBookCo.Newyork, Latested.
5.GuptaC.B,SingS.RandMukeshKumar:"EngineeringMathematicforSemesterIandII",Mc-GrawHill Education (India)Pvt.Ltd2015.
6.H.K.DassandEr.RajnishVerma:"HigherEngineeringMathematics"S.Chand Publication(2014).
7. **JamesStewart:"**Calculus"Cengagepublications,7edition, 4th Reprint 2019.

4. Syllabus Timeline

S/L	Syllabus Timeline (No. of weeks should be as you have in the semester)	Description (Write the proposed syllabus coverage in detail with maximum of 5 lines)
1	Week 1-2: Integral Calculus	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.
2	Week 3-4: Vector Calculus	Scalar and vector fields. Gradient, directional derivative, curl and divergence - physical interpretation. Solenoidal and irrotational vector fields. Problems. Curvilinear coordinates:Scale factors, base vectors, and Cylindrical Polar Coordinates. Spherical polar coordinates, Transformation between Cartesian and curvilinear systems, Orthogonality. Problems.
3	Week 5-6: Partial Differential Equations	Formation of PDE's by elimination of arbitrary constants and functions Solution of non-homogeneous PDE's Homogeneous PDEs involving derivatives with respect to one independent variable only. Homogeneous PDEs involving derivatives with respect to one independent variable only-problems Solution of Lagrange's linear PDE Solution of Lagrange's linear PDE-problems Derivation of one-dimensional heat equation Derivation of one-dimensional wave equation
4	Week 7-8: Numerical Methods -1	Solution of algebraic and transcendental equations - Regula-Falsi and Newton-Raphson methods, Problems. Finite differences, Interpolation using Newton's forward and backward difference formulae. Newton's divided difference formula Lagrange's interpolation formula. Problems. Numerical integration: Trapezoidal, Simpson's (1/3)rd and (3/8)th rules.

		Problems.
5	Week 9-10: Numerical Methods -2	Numerical solution of ordinary differential equations of first order and first degree - Taylor's series method. Problems Modified Euler's method Problems. Runge-Kutta method of fourth order. Problems. Milne's predictor-corrector formula. Problems.
6	Week 11-12:IntegrationandPractical Applications	Apply learned concepts and competencies to real-world scenarios.Hands-onpractice

5. 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 Verilog 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	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 deeper understanding of competencies
9	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

6. Assessment Details (both CIE and SEE)

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

Components		Number	Weightage	Max. Marks	Min. Marks
Theory (A)	Internal Assessment-Tests (A)	2*	**60%**	**15**	**06**
	Assignments/Quiz/Activity (B)	2	**40%**	**10**	**04**
	TotalMarks		**100%**	**25**	**10**

Components		Number	Weightage	Max. Marks	Min. Marks
Laboratory(B)	Record Writing	Continuous	**60%**	15	06
	Test at the end of the semester	1	**40%**	10	04
	Total Marks		**100%**	**25**	**10**

Final CIE Marks = (A) + (B)

Semester End Examination:
Theory SEE will be conducted as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)**

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description
1	Integral Calculus	Students will grasp the fundamental concepts ofintegration. Evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume.
2	Vector Calculus	Students will learn about scalar and vector fields, they will focuses on multidimensional integration and curvilinear coordinate systems.
3	Partial Differential Equations	Students will learn the use of the separation of variable technique to solve partial differential equations relating to heat conduction in solids and vibration of solids in multidimensional systems.
4	Numerical Methods	Numerical methods are utilized to study the dynamic behavior of mechanical systems subjected to time-varying loads. This includes analyzing vibrations, oscillations, and impact forces in mechanical components. Numerical techniques are also used to simulate the motion and interactions of multiple interconnected rigid or flexible bodies in mechanical systems. This is essential for designing robots, vehicles, and machinery.

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

Course Outcomes (COs)

COs	Description
M23BMATM201.1	Apply the concept of integral Calculus, Vector Calculus, Linear Algebra & Numerical Methods.
M23BMATM201.2	Demonstrate the idea of integral Calculus, Vector Calculus & Linear Algebra to solve the engineering application problems for CS stream.
M23BMATM201.3	Analyze the Engineering application problem through Numerical technique.
M23BMATM201.4	Using modern mathematical tools, prediction and modeling the complex engineering problems by MatLab or Python.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BMATM201.1	**3**	**-**										
M23BMATM201.2		**3**										
M23BMATM201.3		**3**										
M23BMATM201.4		**-**			**3**							
M23BMATM201	**3**	**3**			**3**							

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						

Module 4						
Module 5						
Total						**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**100**

Conditions for SEE Paper Setting:
Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

The "Mathematics-II for ME Stream "course in the first semester of the B.E program has strong foundation for several future courses in the undergraduate program. The contributions of this subject extend across various areas, enhancing the students' understanding and skills in the field of computer science. Here are some notable contributions:

Load distribution Engineers can use integral calculus to evaluate how a load is distributed across a beam by integrating the load's intensity over the beam's length.

KinematicsIntegral calculus is essential for studying kinematics, which involves the motion of mechanical systems, bodies, and points. It can help determine speeds and ratios, and can be used in the conceptual design of mechanical systems.

Surface area Integral calculus can be used to calculate the surface area of complex objects, which can help quantify frictional forces.

Pump design Integral calculus can be used to build pumps based on flow rate and head.

Vector calculus also facilitates the design of mechanical components, such as gears, linkages, and robotic systems, by analyzing forces, torques, and motion. 5. Control Systems and Signal Processing: Vector calculus plays a crucial role in control systems engineering and signal processing.A common use of differentials is in motor vehicles, to allow the wheels at each end of a drive axle to rotate at different speeds while cornering. Other uses include clocks and analog computers. Differentials can also provide a gear ratio between the input and output shafts

Computational Fluid Dynamics (CFD): CFD is a branch of numerical methods that deals with the simulation of fluid flow and heat transfer phenomena. In mechanical engineering, CFD is used to analyze and optimize the performance of various devices such as turbines, pumps, and heat exchangers.

Structural Analysis: Numerical methods are employed to analyze the structural behavior of mechanical components and systems under various loading conditions. This helps in determining the stresses, deformations, and failure modes of structures.

Multibody Dynamics: Numerical techniques are used to simulate the motion and interactions of multiple interconnected rigid or flexible bodies in mechanical systems. This is essential for designing robots, vehicles, and machinery.

Reliability Analysis: Numerical methods are used to assess the reliability and safety of mechanical systems by analyzing failure modes, probabilities, and risk factors.

Acoustics and Vibration Analysis: Numerical methods are employed to study the acoustic and vibration characteristics of mechanical systems. This is important for noise control, vibration isolation, and structural health monitoring.Overall, numerical methods are essential tools in the toolbox of mechanical engineers for modeling, simulating, and optimizing the behavior of mechanical systems in various applications.

2nd Semester	Basic Science Course (BS) Applied ChemistryforMechanical Engineering stream	M23BCHEM202

1. Prerequisites

S/L	Proficiency	Prerequisites
1	**Basic Chemistry**:	Understanding of chemical reactions, stoichiometry, and principles of bonding.
2	**Physics Fundamentals**:	Knowledge of energy forms, electricity, and basic principles of mechanics.
3	**Mathematical Proficiency**:	Ability to solve numerical problems involving energy calculations and data analysis.
4	**Materials Science Basics**:	Familiarity with properties of materials, including metals, polymers, and ceramics.
5	**Fundamentals of Thermodynamics**:	Understanding of energy conversions, phase equilibria, and thermodynamic principles.
6	**Electrochemistry Knowledge**:	Basic understanding of redox reactions, electrode potentials, and corrosion mechanisms.
7	**Analytical Skills**:	Familiarity with analytical techniques such as potentiometry, colorimetry, and pH measurements.
8	**Engineering Principles**:	Knowledge of engineering concepts related to materials properties, mechanics, and industrial processes.

2. Competencies

S/L	Competency	KSA Description
1	**Fuels, Green fuels, High energy fuels, Energy devices**	**Knowledge:** Understanding of calorific values, energy conversion processes, and renewable energy sources. **Skills:** Ability to calculate calorific values, analyze energy conversion efficiencies, and apply principles of energy storage. **Attitudes:** Awareness of the importance of sustainable energy practices and innovations in energy technologies.
2	**Corrosion, Corrosion Control, Metal Finishing**	**Knowledge:** Understanding of corrosion mechanisms, electrochemical processes, and methods for corrosion control. **Skills:** Competence in conducting corrosion tests, implementing protective measures, and interpreting corrosion data. **Attitudes:** Commitment to preserving material integrity through effective corrosion management practices.
3	**Polymers, Fibres, Plastics, Composites, Lubricants**	**Knowledge:** Familiarity with polymerization methods, properties of polymers, and applications of composite materials. **Skills:** Proficiency in analyzing polymer structures, evaluating material properties, and designing applications based on material characteristics. **Attitudes:** Appreciation for the versatility of polymers and composites in engineering solutions and sustainable manufacturing practices.
4	**Phase Rule, Analytical Techniques**	**Knowledge:** Understanding of phase equilibria, analytical techniques, and their applications in material characterization. **Skills:** Capability to interpret phase diagrams, conduct analytical measurements, and apply theoretical concepts to practical scenarios. **Attitudes:** Commitment to precision and accuracy in experimental work, with a curiosity

		for exploring material behaviors through analytical methods.
5	**Alloys, Ceramics, Nano Chemistry, Nano Materials**	**Knowledge:** Knowledge of alloy compositions, ceramic properties, and advancements in nanomaterials. **Skills:** Ability to assess material suitability for specific applications, conduct material testing, and innovate with emerging materials. **Attitudes:** Recognition of the critical role materials play in engineering advancements, with a proactive approach to exploring new material frontiers.

3. Syllabus

Applied ChemistryforMechanical Engineering stream(M23BCHEM102/202) SEMESTER – III			
Course Code	**M23BCHEM102/202**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**2:2:2:0**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hoursTheory+ 10 to 12 Lab slots**	Total Marks	**100**
Credits	**04**	Exam Hours	**03**

Course objectives:

- To enable students to acquire knowledge on principles of chemistry for engineering applications.
- To develop an intuitive understanding of chemistry by emphasizing the related branches of engineering.
- 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 using bomb calorimeter, numerical problems on GCV and NCV.
Greenfuels: Introduction, power alcohol, synthesis and applications of biodiesel.
High energy fuels: Production of hydrogen by electrolysis of water and itsadvantages.
Energy devices: Introduction, construction, working, and applications ofPhotovoltaiccells, Li-ion battery and methanol - oxygen fuel cell.
Self - learning: Plastic recycling to fuels and itsmonomers or other useful products.

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

Corrosion: Introduction, electro chemical theory of corrosion, types of corrosion- differentialmetal, differential aeration (waterline and pitting), stress corrosion (caustic embrittlement).
Corrosion control: Metal coating - galvanization, surface conversion coating-anodization andcathodic protection – sacrificial anode method. Corrosion testing by weight lossmethod. Corrosion penetration rate(CPR) – numerical problems.
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)**.**

Polymers: Introduction, methods of polymerization (Condensation and Free radical), molecularweight; number average and weightaverage, numerical problems. Synthesis, properties and industrial applications of poly vinyl chloride (PVC) 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 reinforcedcomposites(grapheme /carbonnano-tubesasfillers)andmetalmatrixpolymer composites.
Lubricants: Introduction, classification, properties and applications of lubricants.
Self-learning: Biodegradable polymer: Introduction, synthesis, properties andapplications of poly lactic acid (PLA).

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

Phaserule: Introduction,Definitionofterms:phase,components,degreeoffreedom,phase rule equation. Phasediagram: Two component-lead-silver system.

Analyticaltechniques:Introduction,principle,instrumentationofpotentiometricsensors; itsapplicationintheestimationofiron,Opticalsensors(colorimetry);itsapplication in the estimation of the copper, pH-sensor (Glass electrode); its application in the determination of pHof 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 ($CaTiO_3$).

Nanochemistry: Introduction, size-dependent properties of nano material (surface area, catalyticalandthermal),synthesisofnano particlesbysol-gel,andco-precipitationmethod.

Nanomaterials: Introduction,propertiesandengineeringapplicationsofcarbonnano tubes and graphene.

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

PRACTICAL MODULE

A–Demonstration (any two)offline/virtual:

A1. Synthesis of polyurethane .
A2. Preparation of urea formaldehyde resin A.
A3. Synthesis of iron oxidenanoparticles A.
A4 .Determination of acid value of bio fuel.

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 (Glasselectrode).
B4.Determination of rate of corrosion of mild steel by weight loss method.
B5. Estimation of total hardness of water by EDTA method.

C–Structured Enquiry (compulsorily any 4 to be conducted):

C1. Estimation of Copper present in electroplating effluent by optical sensor (colorimetry)
C2.Determination of Viscosity coefficient of lubricant (Ostwald's viscometer)
C3. Estimation of iron in TMT bar by diphenyl amine/external indicator method
C4.Estimation of Sodium present in soil/effluent sample using flame photometry
C5.Determination of Chemical Oxygen Demand (COD)of industrial waste water sample.

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.

Text Books:

Text Books:

1. Applied Chemistry for Mechanical Engineering and Allied Branches – C Manasa, Dr. Vrushabendra B, Dr. Srikantamuthy N - Astitva Prakashan.
2. Engineering Chemistry – Dr. Vinuth Mirle, Dr. Mohan Kumar – Iterative International Publishers.

Referrence Books:

1. Wiley Engineering Chemistry, Wiley India Pvt.Ltd. NewDelhi, 2013-2nd Edition.
2. Essentials of Physical Chemistry, Bahl &Tuli,S. Chand Publishing
3. Corrosion Engineering, M.G.Fontana, N.D.Greene, Mc Graw Hill Publications, 3rd NewYork, Edition,1996.
4. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, Mc Graw Hill, 2019.
5. "Handbook on Electroplating with Manufacture of Electrochemicals", ASIA PACIFIC BUSINESS PRESS Inc., 2017. Dr.H. Panda.
6. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, StanleyR. Crouch Seventh Edition, Cengage Learning, 2020.
7. Polymer Science, VR Gowariker, NV Viswanathan, Jayadev, Sreedhar, NewageInt. Publishers, 4th Edition, 2021.

8. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai &Co.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description (Write the proposed syllabus coverage in detail with maximum of 5 lines)
1	Week 1-2: **Energy; Source, Conversion and Storage**	Introduction for fuels, information about calorific value, determination of calorific value using bomb calorimeter, numerical problems on GCV and NCV. Introduction of green fuels, synthesis and applications of power alcohol and biodiesel. Production of hydrogen by electrolysis of water and its advantages. Introduction for energy devices, construction, working, and applications of photovoltaic cells, Li-ion battery and methanol - oxygen fuel cell.
2	Week 3-4: **Corrosion Science and Engineering**	Introduction, electro chemical theory of corrosion, types of corrosion- differential metal, differential aeration (waterline and pitting), stress corrosion (caustic embrittlement). Metal coating - galvanization, surface conversion coating-anodization and cathodic protection – sacrificial anode method. Corrosion testing by weight loss method. Corrosion penetration rate (CPR) – numerical problems. Introduction for metal finishing and theirtechnological importances. Electroplating: Introduction, Electroplating of chromium (hard and decorative). Electroless plating: Introduction, electroless plating of nickel.
3	Week 5-6: **Macro molecules for Engineering Applications**	Introduction, methods of polymerization (Condensation and Free radical), molecular weight; number average and weight average, numerical problems. Synthesis, properties and industrial applications of poly vinyl chloride (PVC) and polystyrene. Introduction, synthesis, properties and industrial applications of Kevlar and Polyester. **Plastics:** Introduction, synthesis, properties and industrial applications of poly (methylmethacr ylate) (PMMA) and Teflon. Introduction, properties and industrial applications of carbon –based reinforced composites (grapheme /carbon nano-tubes as fillers) and metal matrix polymer composites. Introduction, classification, properties and applications of lubricants.
4	Week 7-8: **Phase Rule and Analytical Techniques**	Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: Two component-lead-silver system. Introduction, principle, instrumentation of potentiometric sensors; 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.
5	Week 9-11: **Materials for Engineering Applications**	Introduction, classification, composition, properties and applications of Stainless Steel, Brass and Alnico. Introduction, classification based on chemical composition, properties and applications of perovskites ($CaTiO_3$). Introduction, size- dependent properties of nano material (surface area,catalytical and thermal), synthesis ofnano particles by sol-gel, and co-precipitation method. Introduction,properties and engineering applications of carbon nano tubes and graphene.
6	Week 12: **Revision**	Revision of previous question papers and discussion of practical experiments.

5. 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 the 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	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 deeper understanding of competencies
9	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

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

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

Components		Number	Weightage	Max. Marks	Min. Marks
Theory (A)	Internal Assessment-Tests (A)	2*	**60%**	**15**	**06**
	Assignments/Quiz/Activity (B)	2	**40%**	**10**	**04**
	TotalMarks		**100%**	**25**	**10**

Components		Number	Weightage	Max. Marks	Min. Marks
Laboratory(B)	Record Writing	Continuous	**60%**	15	06
	Test at the end of the semester	1	**40%**	10	04
	Total Marks		**100%**	**25**	**10**

Final CIE Marks = (A) + (B)

Semester End Examination:

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

Conduction of Practical Examination:

1. All experiments in part B or part C are to be included for practical examination..
2. One instrumental or volumetric experiment shall be set.
3. Different experiments shall be set under instrumental and a common experiment under volumetric.
4. Marks scored will be proportionally scaled down to 50 marks.

7. Learning Objectives

S/L	Learning Objectives	Description
1	**Energy Sources and Conversion**	Understand the characteristics of various energy sources and their efficient conversion methods.
2	**Corrosion**	Identify different types of corrosion mechanisms and apply appropriate

	Science	prevention techniques.
3	**Polymerization and Material Properties**	Explain the processes of polymerization and analyze the properties and applications of resulting materials.
4	**Phase Equilibria and Analytical Techniques**	Utilize phase rule principles to interpret phase diagrams and apply analytical techniques for material characterization.
5	**Materials for Engineering Applications**	Classify alloys, ceramics, and nanomaterials based on their properties and discuss their applications in engineering.
6	**Energy Devices and Systems**	Describe the construction, operation principles, and evaluate the performance of energy storage and conversion systems.
7	**Environmental and Sustainability Considerations**	Evaluate the environmental impact of energy technologies and materials, and discuss sustainable practices in their use.
8	**Problem-Solving and Critical Thinking**	Apply mathematical and analytical skills to solve problems related to energy efficiency, material properties, and corrosion rates.

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

Course Outcomes (COs)

COs	Description
M23BCHEM102.1/202.1	**Explore** different energy sources, their conversion, storage methods, and calculate fuel values, focusing on green fuels and energy devices
M23BCHEM102.2/202.2	**Examine** how corrosion occurs, identify different types, and apply methods for preventing and testing corrosion.
M23BCHEM102.3/202.3	**Investigate** the production, properties, and applications of polymers, fibers, and plastics used in engineering industries.
M23BCHEM102.4/202.4	**Interpret** the phase rule for material mixtures and utilize sensors to measure and analyze substances like metals and pH levels.
M23BCHEM102.5/202.5	**Assess** the properties and applications of alloys, ceramics, and nanomaterials in various engineering fields.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO1	**3**	**3**	**2**	**2**	**1**		**3**			**2**		**2**
CO2	**3**	**3**	**2**	**2**	**1**		**2**			**2**		**2**
CO3	**3**	**2**	**2**	**2**	**2**		**2**			**2**		**2**
CO4	**3**	**3**	**2**	**2**	**2**		**2**			**2**		**2**
CO5	**3**	**3**	**2**	**2**	**2**	**2**	**2**			**2**		**2**

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	**10**					**10**
Module 2		**10**				**10**
Module 3			**10**			**10**
Module 4				**10**		**10**
Module 5					**10**	**10**
Total	**10**	**10**	**10**	**10**	**10**	**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	**20**					**20**

Module 2		**20**				**20**
Module 3			**20**			**20**
Module 4				**20**		**20**
Module 5					**20**	**20**
Total	**20**	**20**	**20**	**20**	**20**	**100**

10. Future with this Subject:

Future opportunities for students mastering this syllabus include careers in renewable energy, advanced materials engineering, corrosion prevention, and energy storage systems. They can innovate in sustainable engineering solutions, engage in cutting-edge research and development, and provide technical consulting. With advanced degrees, they can pursue leadership roles in academia or industry, driving advancements in smart grids, nanotechnology, biodegradable materials, and hydrogen technology, ensuring a sustainable and technologically advanced future

- Renewable Energy Development: Pursue careers in renewable energy engineering, focusing on the development and optimization of solar, wind, and biofuel technologies.
- Advanced Materials Engineering: Innovate in materials science as a Materials Scientist or Nanotechnology Engineer, developing next-generation technologies for electronics, aerospace, and biomedicine.
- Corrosion Engineering: Specialize as a Corrosion Engineer to enhance the longevity and safety of structures in industries such as oil and gas, infrastructure, and marine engineering.
- Energy Storage Systems Advance energy storage technologies, including lithium-ion batteries and hydrogen fuel cells, crucial for electric vehicles and renewable energy grids.
- Sustainable Engineering Solutions**:** Design eco-friendly solutions and sustainable practices as an Environmental Engineer or Sustainability Consultant, addressing increasing environmental regulations.
- Research and Development (R&D)**:** Engage in continuous innovation and research in academia or industry, developing new materials, improving energy systems, and advancing corrosion prevention techniques.
- Technical Consulting: Provide expert advice on best practices, efficiency improvements, and technological advancements in energy systems, materials science, and corrosion engineering.
- Higher Education and Specialization: Pursue advanced degrees to gain deeper expertise, leading to leadership roles in research, development, and academia.

2nd Semester	Engineering Science Course **Computer Aided Engineering Drawing**	**M23BCEDK203**

1. Prerequisites

S/L	Proficiency	Prerequisites
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. Competencies

S/L	Competency	KSA Description
1	Understanding of Conventions and Drawing	**Knowledge:** Understanding the significance of engineering drawing, BIS conventions and the fundamentals of orthographic projections, including projections of points in the 1st and 3rd quadrants, as well as lines placed in the first quadrant. Knowledge of coordinate systems, reference planes (HP, VP, RPP, LPP), and the selection of drawing sheet size and scale. **Skill:** Proficiency in using CAD software and commands to accurately create orthographic projections of points, lines, and planes. Skill in utilizing drawing tools and techniques such as lines, polylines, squares, rectangles, polygons, circles, ellipses, text, move, copy, offset, mirror, rotate, trim, extend, break, chamfer, fillet, and curves. **Attitude:** Demonstrating attention to detail, patience, and creativity in accurately projecting points, lines, and planes in orthographic views. Willingness to learn and apply orthographic projection techniques effectively, as well as a proactive attitude towards solving problems and improving skills.
2	Orthographic Projections of Planes	**Knowledge:** Understanding of orthographic projection principles for planes including triangles, squares, rectangles, pentagons, hexagons, and circular laminae placed in the first quadrant using the change of position method. **Skill:** Proficiency in accurately creating orthographic projections of different planes, ensuring precise representation of geometric shapes and positions in the first quadrant. **Attitude:** Demonstrating attention to detail, patience, and creativity in accurately projecting planes in orthographic views, as well as a willingness to apply projection techniques to solve problems involving lines and planes.
3	Orthographic Projections of Solids	**Knowledge:** Understanding of orthographic projection principles for various right regular solids including prisms, pyramids, cones, cubes, and tetrahedrons. **Skill:** Proficiency in accurately creating orthographic projections of different solids, including the ability to project solids resting on the horizontal plane (HP) ensuring precise representation of geometric features. **Attitude:** Demonstrating attention to detail, patience, and diligence in accurately projecting solids in orthographic views, as well as a willingness to practice and improve projection skills for different types of solids.
4	Isometric Projection	**Knowledge:** Understanding of isometric scale, principles of isometric projection, and the ability to project various solids accurately in isometric view. **Skill:** Proficiency in creating isometric projections of different solids, converting between isometric and orthographic views, and solving problems involving isometric projections of simple objects or engineering components. **Attitude:** Openness to learning and adapting to new techniques and tools for drawing views using 3D environments, demonstrating patience and creativity in accurately representing objects in isometric projections.
5	Development of Lateral Surfaces	**Knowledge:** Understanding of the principles and methods for developing lateral surfaces of various solids, including right regular prisms, cylinders, pyramids, and cones, as well as their frustums and truncations. **Skill:** Proficiency in accurately developing lateral surfaces of different solids, solving problems involving the development of lateral surfaces like funnels and trays, and creating transition pieces connecting circular ducts and rectangular ducts. **Attitude:** Demonstrating patience, attention to detail, and creativity in developing lateral surfaces, as well as openness to learning and adapting to new techniques and applications in surface development.

6	Multidisciplinary Applications & Practice	**Knowledge:** Understanding various sketching techniques, drawing principles, and software tools used in multidisciplinary applications. **Skill:** Proficiency in accurately creating sketches, diagrams, and drawings using both manual and software-based methods. **Attitude:** Willingness to continuously learn and adapt, demonstrating patience, diligence, and creativity in representing diverse objects and systems.

3. Syllabus

Computer Aided Engineering Drawing **SEMESTER – II**			
Course Code	**M23BCEDK103/203**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**2:2:2:0**	SEE Marks	**50**
Total Number of Lecture Hours	**40**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Module -1

Introduction:*forCIE only*

Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineeringdrawing, 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,filletandcurves.

OrthographicProjectionsofPoints,LinesandPlanes:

Introduction to Orthographic projections: Orthographic projections of points in 1^{st}and3^{rd}quadrants.Orthographicprojectionsoflines(PlacedinFirstquadrant only).

Orthographicprojectionsof planesviztriangle,square,rectangle,pentagon,hexagon,andcircularlaminae(PlacedinFirstquadrantonlyusing changeofpositionmethod).

ApplicationonprojectionsofLines&Planes(ForCIEonly)

Module -2

OrthographicProjectionofSolids:

Orthographic projectionofrightregularsolids (**Solids RestingonHPonly**): Prisms &Pyramids (triangle,square,rectangle,pentagon,hexagon),Cylinders,Cones,Cubes&Tetrahedron.***ProjectionsofFrustumofconeandpyramids(Forpracticeonly, notforCIEandSEE).***

Module -3

IsometricProjections:

Isometricscale,

Isometricprojectionofhexahedron(cube),rightregularprisms,pyramids,cylinders,conesandspheres.Isometric projectionofcombinationoftwosimplesolids.

Conversion of simple isometric drawings into orthographic views.

Problems on applications of Isometric projections of simple objects/engineering components.

Introduction to drawing view susing 3Denvironment (For CIEonly).

Module -4

DevelopmentofLateralSurfacesofSolids:

Development of lateral surfaces of right regular prisms, cylinders, pyramids and cones resting with base on HP only.Developmentoflateralsurfacesoftheirfrustumsandtruncations.

Problemsonapplicationsof developmentof lateralsurfaceslikefunnelsand trays.

on applications of development of lateral surfaces of transition pieces connecting circular duct andrectangularduct(ForCIEOnly

Module -5

MultidisciplinaryApplications&Practice*(ForCIEOnly):*

Free hand Sketching; True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc**DrawingSimpleMechanisms;**Bicycles,Tricycles,Geartrains,Ratchets,two-wheelercart&Four-wheelercartstodimensionsetc

ElectricWiringandlightingdiagrams;Like,Automaticfirealarm,Callbellsystem,UPSsystem,Basicpowerdistributionsystemusingsuitablesoftware

BasicBuildingDrawing;Like,Architecturalfloorplan,basicfoundationdrawing,steelstructures-Frames,bridges,trussesusingAutoCADorsuitablesoftware,

ElectronicsEngineeringDrawings-Like,SimpleElectronicsCircuitDrawings,practiceonlayersconcept.

Graphs & Charts: Like, Column chart, Pie chart, Line charts, Gantt charts, etc. using Microsoft Excel or anysuitablesoftware.

Text Books

1. S.N. Lal, & T Madhusudhan:, Engineering Visulisation, 1st Edition, Cengage, Publication
2. Parthasarathy N. S., Vela Murali, Engineering Drawing, Oxford University Press, 2015.

Reference Books

1. Bhattacharya S. K., Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint 2005.
2. Chris Schroder, Printed Circuit Board Design using AutoCAD, Newnes, 1997.
3. K S Sai Ram Design of steel structures, , Third Edition by Pearson
4. Nainan p kurian Design of foundation systems, Narosa publications
5. A S Pabla, Electrical power distribution, 6th edition, Tata Mcgraw hill
6. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt. Limited, 2019.

13. K. R. Gopalakrishna, &SudhirGopalakrishna: Textbook Of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1: Introduction	Significance of Engineering drawing, BIS Conventions of Engineering Drawing, Free hand sketching of engineeringdrawing, Scales. Introduction to Computer Aided Drafting software, Co-ordinate system and reference planes HP, VP,RPP& LPP of 2D/3D environment.
2	Week 2-4: Projection of Points	Introduction to Orthographic projections: Orthographic projections of points in $1^{st}$and 3^{rd}quadrants.
3	Week 4-5: Projection of Lines	Introduction to Orthographic projections: Orthographic projections of points in $1^{st}$and 3^{rd}quadrants Orthographicprojectionsoflines(PlacedinFirstquadrant only).
4	Week 6-9: Projection of Planes	Orthographicprojectionsof planesviztriangle,square,rectangle,pentagon,hexagon,andcircularlaminae(Placedin Firstquadrantonlyusingchangeofpositionmethod).
5	Week 10-12: Projection of Solids	Orthographic projectionofrightregularsolids (Solids RestingonHPonly): Prisms &Pyramids (triangle,square,rectangle,pentagon,hexagon),Cylinders,Cones,Cubes&Tetrahedron.
6	Week 12-13: Isometric Projection	Isometricscale, Isometricprojectionofhexahedron(cube),rightregularprisms,pyramids,cylinders,cone sandspheres.
7	Week 13-14: Development of Lateral Surfaces	Development of lateral surfaces of right regular prisms, cylinders, pyramids and cones resting with base on HP only
8	Week15: Multidisciplinary Drawings	Free hand Sketching, ElectricWiringandlightingdiagrams, BasicBuildingDrawing and ElectronicsEngineeringDrawings

5. Teaching-Learning Process Strategies

S/L	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.

6. 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 theModules are covered based on below detailed weightage.

Module	Max Marks Weightage	Evaluation weightage in marks	
		Computer Display & print out	Preparatory Sketching
Module – 1	15	10	05
Module – 2	20	15	05
Module – 3	20	20	00
Module – 4	20	20	00
Module – 5	25	15	10
TOTAL	**100**	**80**	**20**
Consideration of Class work		**100 Marks is scaled down to 30 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 20Marks
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**

7. Learning Objectives

S/L	Learning Objectives	Description

1	Understanding Engineering Drawing Significance:	Comprehend the importance of engineering drawing in communicating design ideas, specifications, and details accurately
2	Familiarization with BIS Conventions:	Learn the standard conventions and symbols specified by the Bureau of Indian Standards (BIS) to ensure uniformity and clarity in engineering drawings.
3	Proficiency in Free Hand Sketching:	Develop skills in true free hand and guided free hand sketching techniques for depicting various objects, structures, and components encountered in engineering.
4	Grasping Scales and Dimensioning:	Understand the use of scales in engineering drawings for accurate representation of dimensions and proportions, ensuring clarity and readability.
5	Introduction to CAD Software:	Gain familiarity with CAD software tools and functions for creating, editing, and manipulating engineering drawings in both 2D and 3D environments.
6	Mastering Coordinate Systems:	Learn about coordinate systems and reference planes such as Horizontal Plane (HP), Vertical Plane (VP), Reference Plane of Projection (RPP), and Line of Projection Plane (LPP) in both 2D and 3D environments.
7	Skill Development in CAD Commands:	Acquire proficiency in using CAD commands and creation techniques for generating different geometric entities such as lines, points, polygons, circles, ellipses, and text, and performing operations like move, copy, mirror, rotate, trim, extend, break, chamfer, fillet, and curves.
8	Application of Orthographic Projections:	Apply learned concepts to accurately project points, lines, and planes in orthographic views, ensuring precise representation of geometric features.

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

Course Outcomes (COs)

COs	Description
M23BCEDK203.1	Ability to apply orthographic projection principles to represent points and lines in various quadrants.
M23BCEDK203.2	Apply orthographic projection principles to represent regular plane surfaces for different resting positions and orientation within the first quadrant.
M23BCEDK203.3	Proficiently apply orthographic projection techniques to represent right regular solids resting on HP.
M23BCEDK203.4	Apply isometric scale and projection techniques to visualize and represent various solids facilitating a comprehensive understanding of engineering drawings
M23BCEDK203.5	Analyze and create lateral surfaces for solids resting on HP
M23BCEDK203.6	Create freehand sketches of various Multidisciplinary Applications drawings and generate graphs/charts using appropriate software

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M23BCEDK203.1	3	-	-	-	-	-	-	-	-	-	-	-
M23BCEDK203.2	-	3		-	-	-	-	-	-	-	-	-
M23BCEDK203.3	-	-	3	-	-	-	-	-	-	-	-	-
M23BCEDK203.4	-	-	-	3	-	-	-	-	-	-	-	-
M23BCEDK203.5	-	-	-	-	2	-	-	-	-	-	-	-
M23BCEDK203.6	-	-	-	-	-	2	-	-	-	-	-	-
M23BCEDK203	3	3	3	3	2	2	-	-	-	-	-	-

9. Assessment Plan

10. Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	CO6	Total
Module 1	**5%**	**20%**					**25%**
Module 2			**30%**				**30%**
Module 3				**20%**			**20%**
Module 4					**20%**		**20%**
Module 5						**5%**	**5%**
Total	**5%**	**20%**	**30%**	**20%**	**20%**	**5%**	**100%**

11. Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	CO6	Total
Module 1	**05**	**15**					**20**
Module 2			**30**				**30**
Module 3				**25**			**25**
Module 4					**25**		**25**
Module 5							**-**
Total	**5**	**15**	**30**	**25**	**25**		**100**

10. Future with this Subject

- **Integration of Advanced Technologies:**
  Embrace advancements in CAD software and 3D modeling technologies to enhance the visualization and representation capabilities of engineering drawings.

11. **Focus on Sustainability and Green Engineering:**
    Incorporate principles of sustainability and green engineering into drawing practices, emphasizing eco-friendly design solutions and materials.
12. **Interdisciplinary Collaboration:**
    Encourage interdisciplinary collaboration between engineering disciplines, architecture, and design fields to create comprehensive and integrated engineering drawings for complex projects.
13. **Emphasis on Digital Twin and Virtual Reality:**
    Utilize digital twin and virtual reality technologies to create immersive and interactive representations of engineering designs, allowing for real-time simulation and analysis.
14. **Continued Professional Development:**
    Promote continuous professional development among engineers and designers, fostering lifelong learning and adaptation to emerging trends and technologies in engineering drawing practices.

2nd Semester	Engineering Science Courses - II (ESC) Introduction to Civil Engineering	M23BESK204A

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Mathematics	Basic algebra and trigonometry
2	Physics	Mechanics and properties of materials
3	Chemistry	Understanding of chemical reactions relevant tomaterials
4	Engineering Drawing	Visualization and interpretation of technicaldrawings
5	Environmental Science	Awareness of environmental issues and regulations

2. Competencies (A minimum of four competencies may be written)

S/L	Competency	KSA Description
1	Analyzing, Designing, Implementing	**Knowledge:** Structural and Geo technical principles. **Skill:** Application of design codes. **Attitude:** Attention to detail.
2	Planning, Managing, Optimizing	**Knowledge:** Construction management techniques. **Skill:** Project scheduling. **Attitude:** Strategic thinking.
3	Evaluating, Innovating, Enhancing	**Knowledge:** Sustainable development practices. **Skill:** Problem-solving for urban issues. **Attitude:** Environmental consciousness.
4	Measuring, Calculating, Reporting	**Knowledge:** Surveying methods. **Skill:** Use of surveying equipment. **Attitude:** Precision and accuracy.
5	Designing, Calculating, Assessing	**Knowledge:** Fluid mechanics in hydraulics. **Skill:** Water resource management. **Attitude:** Analytical thinking.

3. Syllabus

INTRODUCTIONTOCIVILENGINEERING SEMESTER– I/II			
CourseCode	**M23BESK104/204A**	CIEMarks	**50**
NumberofLectureHours/Week (L:T: P:S)	**(2:2:0)**	SEE Marks	**50**
TotalNumberofLectureHours	**50hours**	Total Marks	**100**
Credits	**03**	ExamHours	**03**

Module-1

CivilEngineeringDisciplinesandBuilding Science

Introduction to Civil Engineering: Surveying, Structural Engineering, Geotechnical Engineering, Hydraulics & Water Resources, Transportation Engineering, Environmental Engineering, Construction planning & Project management.

BasicMaterialsofConstruction:Bricks,Cement&mortars,Plain,Reinforced&Pre-stressedConcrete,Structuralsteel,ConstructionChemicals.

Structural elements of abuilding:foundation,plinth,lintel,chejja,Masonry wall,column, beam, slab and staircase.

Module-2

SocietalandGlobalImpact ofInfrastructure

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

Environment:WaterSupplyandSanitarysystems,urbanairpollutionmanagement,Solid waste management, identification of Landfill sites, urban flood control

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

Module-3
Analysis of force systems: Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution and composition of forces, Law of Parallelogramof forces, Resultant ofconcurrent and non-concurrent coplanar force systems, moment offorces, couple, Varignon's theorem, free bodydiagram, equations ofequilibrium,equilibriumofconcurrentandnon-concurrentcoplanarforcesystems
Module-4
Centroid: Importanceofcentroidandcentreofgravity, methodsofdeterminingthecentroid, locating the centroid of plane laminae from first principles, centroid of built-up sections. Numerical examples
Module-5
Moment of inertia: Importance of Moment of Inertia, method of determining the second moment of area (moment of inertia) of plane sections from first principles, parallel axis theorem and perpendicular axis theorem, section modulus, radius of gyration, moment of inertia of built-upsections, Numerical Examples.
TextBooks: 1.BansalR. K.,RakeshRanjanBeohar andAhmadAliKhan, BasicCivilEngineeringandEngineering Mechanics, 2015,Laxmi Publications. 2.KolhapureBK,ElementsofCivilEngineeringandEngineeringMechanics,2014,EBPB **ReferenceBooks:** 1. Beer F.P.andJohnstonE.R.,Mechanicsfor Engineers, StaticsandDynamics, 1987,McGrawHill. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall. 2. HibblerR.C.,EngineeringMechanics:Principles ofStaticsandDynamics,2017,PearsonPress. 3. TimoshenkoS,YoungD.H.,RaoJ.V.,EngineeringMechanics, 5thEdition,2017,PearsonPress.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week1-3:	Students will learn about various disciplines of civil engineering such as Surveying, StructuralEngineering, GeotechnicalEngineering, Hydraulics &WaterResources,TransportationEngineering,Environmental Engineering,Constructionplanning&Projectmanagement.
2	Week4-6:	Students will learn about sustainable development goals, Smart city concept, clean city, concept, Safe city concept, Water Supply andSanitary systems, urban air pollution management, Solid waste management, identification of Landfill sites, urban flood control. Energy efficientbuildings,recycling,TemperatureandSoundcontrolin buildings, Securitysystems;Smartbuildings.
3	Week7-9:	Students will learn about Concept of idealization, system of forces, principles of superposition and transmissibility, Resolution and composition of forces, Law of Parallelogram of forces, Resultant of concurrentandnon-concurrentcoplanar forcesystems, momentofforces, couple,Varignon'stheorem,freebodydiagram,equationsof equilibrium, equilibriumofconcurrent andnon-concurrent coplanar force systems
4	Week10-12:	Students will learn about Importance of centroid and centre of gravity, methods of determining the centroid, locating the centroid of plane laminaefromfirstprinciples,centroidofbuilt-upsectionsandnumerical examples.
5	Week13-16:	Students will learn about Importance of Moment of Inertia, method of determining the second moment of area (moment of inertia) of plane sections from first principles, parallel axis theorem and perpendicularaxis theorem, section modulus, radius of gyration, moment of inertia of built-up sections and numerical examples.

5.Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lectures	Delivertheoreticalknowledgeand foundationalconcepts.
2	PracticalLabs	Hands-onsessionsforsurveying,materialtesting,andgeotechnicalinvestigations.

3	GroupProjects	Collaborativeprojectsto designandanalyzestructuralelementsor urban planning initiatives.
4	CaseStudies	Real-worldexamplestoillustratetheapplicationofenvironmental engineering and project management concepts.
5	GuestLectures	Industryexpertstoprovideinsightsoncurrentpracticesandfuture trends in civil engineering.
6	Interactive Seminars	Discussionsessionsto deepenunderstandingandencouragecritical thinking.
7	FieldTrips	Visitstoconstructionsites,watertreatmentplants,andsmartcity projectsfor practicalexposure.

6.Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	**Learning Objectives**	**Description**
1	Understand FundamentalConcepts	Graspthebasicprinciplesandconceptsinsurveying,structural engineering,andgeotechnicalengineering.
2	ApplyKnowledgeto Practical Scenarios	Utilizetheoreticalknowledgetosolvereal-worldproblemsin hydraulics,waterresources,andtransportationengineering.
3	DevelopSustainable Solutions	Designsolutionsthat integratesustainabledevelopmentgoalsand smartcityconcepts.
4	Manage EnvironmentalImpact	Implementstrategiesforairpollutionmanagement,solidwaste management,andurbanflood control.
5	AnalyzeStructural Elements	Performdetailedanalysisanddesignofstructural componentsusing principleslearned.

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

Course Outcomes (COs)

COs	**Description**
M23BESK204A.1	Comprehendandapplytheknowledgeoffundamentalsofengineeringtoknowabout variousdisciplinesofcivilengineering,basicconstructionmaterials,structuralelements of a building and infrastructure requirement for sustainable development.
M23BESK204A.2	Analyzetheresultantandequilibriumofforcesystemsontherigid bodies.
M23BESK204A.3	Determineandlocatethecentroidofplaneandbuilt-up sections.
M23BESK204A.4	Determinethemoment ofinertiaofplaneandbuilt-up sections.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 110	PO 11	PO 12
M23BESK204A.1	**3**					**2**	**2**					
M23BESK204A.2		**2**										
M23BESK204A.3		**2**										
M23BESK204A.4		**2**										
M23BESK204A	3	**2**				2	2					

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	CO6	**Total**
Module 1	10				10	10	
Module 2	10				10	10	
Module 3		10			10		10
Module 4			10		10		
Module 5				10	10		
Total	**20**	**10**	**10**	**10**	**50**	**20**	**10**

Semester End Examination (SEE)

	20				20	20	
Module 1	20				20	20	
Module 2		20			20		20
Module 3			20		20		
Module 4				20	20		
Module 5	**40**	**20**	**20**	**20**	**100**	**40**	**20**
Total	20				20	20	

ConditionsforSEEPaperSetting:
EachmoduleofSEEquestionpaper should beallocatedwithquestions for 20%ofthetotalSEE marks.

10. Future with this Subject

This subject lays the foundational knowledge and practical skills required for a career in civil engineering. Mastery of these concepts enables students to pursue advanced studies or professional roles in various sub-disciplines such as structural engineering, environmental engineering, and urban planning. The integration of sustainable development goals and smartcity concepts prepares students to contribute to the future of resilient and sustainable infrastructure development.

1. **FoundationforFurtherStudy:** Understandingthebasicsofcivilengineeringprovidesa strong foundation for students who may later choose to specialize in civil engineering or related fields during their undergraduate studies. This subject introduces them to key concepts, principles, and disciplines within civil engineering.
2. **Career Paths:** Even if students do not pursue civil engineering as a major, theknowledge gained from this subject can be beneficial in various career paths. Many industries, such as construction management, urban planning, environmental consulting, and infrastructure development, value individuals with a basic understanding of civil engineering principles.
3. **Interdisciplinary Knowledge:** Civil engineering concepts often overlap with other engineering disciplines and fields such as architecture, environmental science, and urban design. Students gain interdisciplinaryknowledge that canbe applied indiverse contexts.
4. **Problem-Solving Skills:** Civil engineering emphasizes analytical thinking, problem-solving, and project management skills. These skills are transferable to manyprofessions and are highly valued in industries that require systematic problem-solving abilities.
5. **Sustainability and Urban Development:** With increasing emphasis on sustainabilityand smart cities, knowledge gained in civil engineering can contribute to addressing global challenges like climate change, urbanization, and infrastructure resilience.
6. **Professional Development:** Introduction to civil engineering subjects often include exposure to industry practices, standards, and regulations. This early exposure can help

students develop professional skills and understand the expectations of the civil engineering profession.

7. **Entrepreneurship Opportunities:** Understanding civil engineering basics can inspire entrepreneurial ventures in construction technology, sustainable development solutions, or infrastructure innovations.

2nd Semester	Engineering Science Courses - II (ESC) Introduction to Electrical Engineering	M23BESK204B

a. Prerequisites

S/L	Proficiency	Prerequisites
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 componentssuch 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.

b. Competencies

S/L	Competency	KSA Description
1.	**Basics of power generation and DC circuits**	**Knowledge:** • Insight into how electricity is generated from various sources, transmitted over long distances through high-voltage transmission lines, and distributed to end-users through the grid. • Techniques for analyzing simple DC circuits containing resistors, voltage sources, and current sources**.** **Skills:** • Ability to apply voltage divider rule, ohms-law, KVL, KCL and Thevenin theorem to design the required DCcircuit for small signal using transistor. • Understanding power generation technologies and their applications is valuable in fields such as renewable energy, electrical utilities, and sustainable development. **Attitudes:** • Learning about renewable energy technologies encourages a commitment to sustainability and the preservation of natural resources for future generations
2.	**Analysis of Single Phase and Three Phase Circuits**	**Knowledge:** • Will gain an understanding of the differences between single-phase and three-phase electrical systems, including their configurations, advantages, and applications. • Will achieve knowledge of impedance, power, power factor and related concepts. **Skills:** • Skills gained include circuit analysis techniques, problem-solving, critical thinking, technical communication, hands-on application, teamwork etc. **Attitudes:** • Appreciation for the essential role of electrical engineering roles in diverse industries
3.	**DC Generators and Motors**	**Knowledge:** • Understanding their principles enables efficient conversion between mechanical and electrical energy, vital for various applications like industrial machinery and transportation. **Skills:** • Imparts electrical engineering skillsand troubleshooting techniques, crucial for engineering innovation. **Attitudes:** • Valuing the knowledge of conversion of various forms of energy in to electrical energy

4.	**Transformers and Three phase Induction Motors**	**Knowledge:** • Involves comprehending electromagnetic principles, transformer configurations, and transformer losses, crucial for power distribution and voltage transformation. • Understanding three-phase induction motors encompasses principles of rotating magnetic fields, motor construction, starting methods **Skills:** • Exploring transformers and three-phase induction motors enriches electrical engineering proficiencyfor industrial machinery applications. **Attitudes:** • Appreciation for understanding AC machines for specific application
5.	**Domestic Wiring and Safety Measures**	**Knowledge:** • It involves understanding wiring regulations, circuitry layouts, and safety protocols to prevent electrical hazards such as shocks and fires. . **Skills:** • Learning domestic wiring and safety measures cultivates essential electrical skills for residential installations.. **Attitudes:** • Proficiency in wire sizing, grounding, and proper insulation ensures safe and reliable electrical systems, promoting household safety.

c. Syllabus

Introduction to Electrical Engineering **SEMESTER – I / II**			
Course Code	**M23BESK104/204B**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**4:0:0:0**	SEE Marks	**50**
Total Number of Lecture Hours	**40(T)Hrs**	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 and 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

Introduction: Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.Power Generation: Hydel, Nuclear, Solar & wind power generation (Block Diagram approach).DC Circuits:Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits. Simple Numerical.

Module -2

A.C. Fundamentals:Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phasedifference, average value, RMS value, form factor, peak factor. (only definitions)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 (excluding proof)

Module -3

DC Machines:**DC Generator**: Principle of operation, constructional details, induced emf expression, types ofgenerators.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

Transformers: Necessity of transformer, principle of operation, Types and construction of singlephase 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: Requirements, Types of wiring: casing, capping.Two way and three way controof 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.
Suggested Learning Resources: **Text Books:** 1. Basic Electrical Engineering by D C Kulshreshtha, Tata McGraw Hill, First Edition 2019. 2. A text book of Electrical Technology by B.L. Theraja, S Chand and Company, reprint edition 2014. **Reference Books:** **1.** Basic Electrical Engineering, D. P. Kothari and I. J. Nagrath, Tata McGraw Hill 4th edition, 2019. 2. Principles of Electrical Engineering & Electronics by V. K. Mehta, Rohit Mehta, S. Chand and Company Publications, 2nd edition, 2015. 3. Fundamentals of Electrical Engineering by Rajendra Prasad, PHI, 3rd edition, 2014. **Web links and Video Lectures(e-Resources):** •www.nptel.ac.in
Course outcomes: This course will enable students to: • Understand the concepts of various energy sources and Electric circuits. • Apply the basic Electrical laws to solve circuits. • Discuss the construction and operation of various Electrical Machines. • Identify suitable Electrical machine for practical implementation. • Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures

d. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3:	Students learn Conventional and non-conventional energy resources; General structure of electrical power systems using single line diagram approach.Power Generation: Hydel, Nuclear, Solar & wind power generation (Block Diagram approach) as introduction to Electrical Engineering. . Further, basics of DC Circuits:Ohm's Law and its limitations. KCL & KVL, series, parallel, series-parallel circuits with Simple Numerical
2	Week 4-5:	**A.C. Fundamentals**suchasEquation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phasedifference, average value, RMS value, form factor, peak factor. (only definitions)Voltage and current relationship with phasor diagrams in R, L, and C circuits are discussed. 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 with Simple Numerical etc are also included.
3	Week 6-8:	**Three Phase Circuits:**Generation of Three phase AC quantity, advantages and limitations; star and delta connection,relationship between line and phase quantities (excluding proof) are discussed. **DC Generator**: Principle of operation, constructional details, induced emf expression, types ofgenerators.Relation between induced emf and terminal voltage with Simple numerical also covered. **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 with Simple numerical are discussed.
4	Week 9-10	**Transformers**: Necessity of transformer, principle of operation, Types and construction of singlephase transformers, EMF equation, losses, variation of losses with respect to load. Efficiency and simple numerical are addressed. **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 with simple numerical are included.
5	Week 10-11:	**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 consumersare addressed.
6	Week 12:	**Equipment Safety measures:** Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits are discussed. **Personal safety measures:** Electric Shock, Earthing and its types, Safety Precautions to avoid shock are also covered.

e. 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 Verilog 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.

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

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

g. Learning Objectives

S/L	Learning Objectives	Description
1	To explain the laws used in the analysis of DC and AC circuits.	This course help the students to solve parameters of DC / AC circuits by applying electrical laws.
2	To explain the behaviour of circuit elements in single-phase circuits.	Students will be able to understand the operation of inductors and capacitors with respect to AC circuits.
3	To explain the construction and operation of transformers, DC generators and motors and induction motors.	These topics are applications of the concepts they learned in DC and AC circuits.
4	To introduce concepts of circuit protecting devices and earthing.	Students learn the details of domestic wiring.
5	To explain electric power generation, transmission and distribution, electricity billing, equipment and personal safety measures.	The basics of power generation, distribution, safety measures to be followed when working with electrical systems, electricity bill calculation etc are discussed.

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

Course Outcomes (COs)

COs	Description
M23BESK204B.1	**Interpret** the operation of hydel, nuclear, solar and wind power generators.
M23BESK204B.2	**Illustrate** the electrical safety rules and standards for domestic wiring.
M23BESK204B.3	**Illustrate** the construction and working principle of electrical machines**.**
M23BESK204B.4	**Apply** Ohm's law and Kirchoff's laws to determine voltage, current and powerin electrical circuits and machines**.**

CO-PO-PSO Mapping

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M23BESK204B.1	3	-	-	-	-	-	2	-	-	3	-	2
M23BESK204B.2	3	-	-	-	-	-	2	-	-	-	-	3
M23BESK204B.3	3	2	-	-	-	-	-	-	-	-	-	-
M23BESK204B.4	3	3	-	-	-	-	-	-	-	-	-	-
M23BESK204B	**3**	**2.5**	-	-	-	-	**2**	-	-	**3**	-	**2.5**

Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	**Total**
Module 1	7			5	**12**
Module 2				7	**7**
Module 3			8	5	**13**
Module 4			7	5	**12**
Module 5		6			**6**
Total	**7**	**6**	**15**	**22**	**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	**Total**
Module 1	14			10	**24**
Module 2				14	**14**
Module 3			16	10	**26**
Module 4			14	10	**24**
Module 5		12		-	**12**
Total	**14**	**12**	**30**	**44**	**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

i. Future with this Subject

The "**Introduction to Electrical Engineering**" course in the I / II semester of the B.E program lays a strong foundation for several future courses in the undergraduate program. The contributions of this subject extend across various areas, enhancing the students' understanding and skills in the field of electrical systems. Here are some notable contributions:

Introduction to Electrical Engineering sets the stage for a dynamic future at the intersection of innovation and technology. It equips individuals to tackle evolving challenges in power generation, distribution, and

renewable energy integration. With the rise of smart grids, electric vehicles, and IoT, EE graduates are poised to lead advancements in automation, sustainable infrastructure, and telecommunications. Moreover, as society leans towards cleaner energy solutions, expertise in electrical engineering becomes indispensable for shaping a greener, more connected world. EE professionals will drive progress, ensuring efficient energy utilization and pioneering breakthroughs that redefine how we interact with technology and power our lives. In summary, the "Introduction to Electrical Engineering" course serves as a stepping stone, equipping students with foundational knowledge and skills that are essential for the subsequent courses in their B.E program and for their future careers in various technology-related fields.

2nd Semester	Engineering Science Courses - II (ESC) Introduction to Electronics and Communication	M23BESK204C

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Basic knowledge on Physics	A fundamental understanding of physics.
2	Basic knowledge on Mathematics	A fundamental understanding of mathematics.
3	Semiconductor Fundamentals	Basic knowledge of semiconductor physics and semiconductor devices is beneficial.
4	Basic Electronics	Familiarity with basic electronic components like resistors, capacitors, inductors, and semiconductors is necessary
5	Circuit Theory	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. Competencies

S/L	Competency	KSA Description
1	**Power supplies**	**Knowledge:** Understanding the Basic Principles, Voltage Regulation, Current Limiting etc key knowledge areas is crucial for selecting, operating, and maintaining DC power supplies effectively in electronic systems. Additionally, knowledge of safety standards and regulations is essential to ensure safe operation and compliance with industry standards. **Skills:** By mastering Electrical Engineering Fundamentals, Voltage Regulation Techniques etc skills, you'll be well-equipped to effectively operate, maintain, and troubleshoot DC power supplies in electronic systems while ensuring safety and compliance with industry standards. **Attitudes:** By cultivating a positive attitude characterized by safety consciousness, attention to detail, patience, curiosity, respect, professionalism, and adaptability, you'll be well-equipped to work with DC power supplies effectively and contribute to the success of your projects and endeavors.
2	**Amplifiers**	**Knowledge:** Understanding Basic Amplifier Operation, Amplifier Frequency Response, and Feedback is key knowledge areas is essential for selecting, and using amplifiers effectively in electronic systems. Additionally, proficiency in amplifier theory enables engineers to troubleshoot problems, optimize performance, and innovate in amplifier technology. **Skills:** By mastering skills, you'll be well-equipped to design, analyze, test, and troubleshoot amplifier circuits effectively, contributing to the success of your projects and endeavors in electronics. **Attitudes:** By cultivating attitudes, you'll not only enhance your effectiveness and success when working with amplifiers but also contribute to a positive and productive work environment for yourself and those around you.
3	**Oscillator**	**Knowledge:** Understanding key knowledge areas is essential for designing, analyzing, and troubleshooting oscillator circuits effectively in electronic systems.. **Skills:** By mastering skills, you'll be well-equipped to design, build, and optimize oscillator circuits for a wide range of applications, from communication systems and signal generators to precision timing and frequency synthesis. **Attitudes:** By cultivating attitudes, you'll not only enhance your effectiveness and success when working with oscillators but also contribute to a positive and productive work environment for yourself and those around you
4	**Number base**	**Knowledge:**

	conversion	Understanding number base conversion is essential for working with digital systems, computer programming, data encoding, and various other applications where different base systems are used. **Skills:** By honing skills through practice, application, and continuous learning, you'll become proficient in number base conversion and be able to handle a wide range of conversion tasks effectively and efficiently. **Attitudes:** By adopting attitudes, you'll not only enhance your proficiency in number base conversion but also develop valuable problem-solving skills, a deeper understanding of mathematical concepts, and a greater appreciation for the beauty and complexity of numbers.
5	**Boolean algebra**	**Knowledge:** Understanding Boolean algebra is essential for working with digital systems, logic design, programming, and various other applications in computer science and engineering.Bottom of Form **Skills:** By honing skills, you'll become proficient in Boolean algebra and logic design, enabling you to design, analyze, and optimize digital systems and logic circuits effectively. **Attitudes:** By cultivating attitudes, you'll not only improve your skills in Boolean algebra but also develop valuable problem-solving abilities, logical reasoning skills, and a deeper appreciation for the role of logic in our understanding of the world.
6	**combinational logic**	**Knowledge:** Understanding combinational logic is crucial for designing digital systems, implementing arithmetic operations, and constructing various logic circuits used in computer hardware and other applications. **Skills:** By honing skills through practice, experimentation, and continuous learning, you'll become proficient in designing, analyzing, and optimizing combinational logic circuits for various digital system applications. **Attitudes:** Combinational logic is like the foundation of a sturdy building in the world of digital electronics. It's all about making decisions based on the current inputs without any memory of past events, kind of like a snap judgment. It's straightforward, precise, and essential for tasks like arithmetic operations, data encoding, and decoding .
7	**Embedded systems**	**Knowledge:** Embedded systems are like the hidden heroes of modern technology—they're everywhere, from your microwave to your car, quietly working behind the scenes to make our lives easier. These systems are specialized computers designed to perform specific tasks within a larger system. They're typically low-power, compact, and optimized for real-time operation **Skills:** Embedded systems skills encompass a broad range of technical abilities essential for designing, developing, and maintaining embedded systems. **Attitudes:** Embedded systems require a particular mindset and attitude to navigate the complexities of designing, developing, and maintaining these intricate systems
8	**Analog and digital communication**	**Knowledge:** Analog and digital communication knowledge encompasses a wide range of concepts and technologies essential for transmitting and receiving information in both analog and digital forms. **Skills:** Skills in analog and digital communication are essential for professionals working in fields such as telecommunications, networking, electronics, and signal processing. **Attitudes:** By embodying attitudes, professionals in the field of analog and digital

		communication can navigate the complexities of communication technology effectively, drive innovation, and contribute to the advancement of communication systems that empower connectivity and collaboration in the digital age.

3. Syllabus

Introduction to Electronics & Communication SEMESTER – I/II			
Course Code	**M23BESK104C/204C**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(3:0:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course objectives: This course will enable students to:

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 – Types of amplifiers, Gain, Input and output resistance, Frequency response, Bandwidth, Phase shift, Negative feedback, multi-stage amplifiers (Text 1)

Module -2

Oscillators – Barkhausen criterion, sinusoidal and non-sinusoidal oscillators, Ladder network oscillator, Wein bridge oscillator, Multivibrators, Single-stage astable oscillator, Crystal controlled oscillators (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: Binary numbers, Number Base Conversion, octal & Hexa Decimal Numbers, Complements, Basic definitions, Axiomatic Definition of Boolean Algebra, Basic Theorems and Properties of Boolean Algebra, Boolean Functions, Canonical and Standard Forms, Other Logic Operations, Digital Logic Gates (Text 2: 1.2, 1.3, 1.4, 1.5,2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 2.7) **Combinational logic:** Introduction, Design procedure, Adders- Half adder, Full adder (Text 2:4.1, 4.2, 4.3)

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, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC
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 scheme, 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, Concept of Radio wave propagation (Ground, space, sky)
Digital Modulation Schemes: Advantages of digital communication over analog communication, ASK, FSK, PSK, Radio signal transmission Multiple access techniques. (Text 4)

Text Books

(Title of the Book/Name of the author/Name of the publisher/Edition and Year)

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.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2: Power Supplies and Amplifiers	Power supplies convert AC to DC, regulate voltage, and filter output for stable operation. They consist of transformers, rectifiers, filters, regulators, and loads, ensuring reliable power delivery. Amplifiers increase the strength of electrical signals, such as voltage or current. They come in various types like voltage, current, and power amplifiers, each with specific applications and characteristics, including gain, input/output resistance, and frequency response.
2	Week 3-4: Oscillators and Operational amplifiers	Oscillators rely on the Barkhausen criterion for sustained oscillations and can be sinusoidal or non-sinusoidal (providing essential functions in signal generation and timing circuits. Operational amplifiers (Op-amps) are versatile integrated circuits used for amplification. They feature high input impedance, low output impedance, and high gain, making them crucial components in a wide range of electronic circuits, including amplifiers and voltage comparators.
3	Week 5-6: Boolean Algebra , Logic Circuits and Combinational logic	Binary numbers, octal, and hexadecimal numbers represent data in digital systems, often converted between bases. Complements, basic definitions, and axiomatic definitions define Boolean algebra, with theorems and properties aiding simplification of Boolean functions into canonical and standard forms. Logic operations and gates implement Boolean functions in digital circuits. Combinational logic processes inputs to produce outputs without internal memory. Design involves specifying desired behavior and implementing with logic gates. Adders, including half adders and full adders.
4	Week 7-8: Embedded Systems ,Sensors and Interfacing	Embedded systems are specialized computing systems designed to perform specific functions within larger systems. Embedded systems are categorized based on their size, performance, and application domain. Embedded systems are widely used in consumer electronics, automotive, industrial automation etc. An embedded system comprises hardware components like microcontrollers or microprocessors, memory units, input/output devices, sensors, actuators, and software components such as firmware and application programs. Instruments like transducers convert physical quantities into electrical signals, sensors detect these signals for data acquisition, actuators respond to control signals to produce physical actions, while displays such as LEDs and 7-segment displays visualize information in embedded systems.
5	Week 9-10: Analog Communication Schemes and Digital Modulation Schemes	Modern communication systems involve an information source, which is converted by an input transducer, transmitted through a transmitter, propagated via a channel (hardwired or softwired), received by a receiver, and possibly subjected to multiplexing for efficient transmission. Modulation schemes like Amplitude Modulation (AM), Frequency Modulation (FM), and Phase Shift Keying (PSK) encode information onto carrier signals, enabling efficient transmission and reception of analog signals. Digital modulation schemes like Amplitude Shift Keying (ASK), Frequency Shift Keying (FSK), and Phase Shift Keying (PSK) encode digital data onto carrier signals for transmission, providing robustness

5. 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 sensors and instrumentation 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	Implement PBL to enhance analytical skills and practical application of

	Learning (PBL)	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 deeper understanding of competencies

6. Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	**Learning Objectives**	**Description**
1	Understanding of power supplies,amplifiers,oscillators and operational amplifiers	Understanding D C power supply, types of rectifiers and operation of voltage regulators, oscillators and operational amplifiers and its applications
2	Understanding of Boolean algebra and combinational logic	To equip students with a basic foundation in electronic engineering required for comprehending logic design and combinational logic like half adder, full adder.
3	Understanding of embedded systems and its applications	To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of embedded systems.
4	Understanding of Analog Communication Schemes and Digital Modulation Schemes	To equip students with a basic foundation in electronic engineering required for comprehending the operation and application of communication systems.

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

Course Outcomes (COs)

COs	Description
M23BESK204C.1	Present the comprehensive knowledge of electronic circuits encompassing power supplies, amplifiers, operational amplifiers, oscillators, boolean algebra and logic circuits.
M23BESK204C.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.
M23BESK204C.3	Apply the knowledge of digital electronics concepts to realize the combinational logic circuits.

M23BESK204C.4	Analyze 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	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BESK204C.1	3	-	-	-	-	-	-	-	-	2	-	-
M23BESK204C.2	3	3	-	-	-	-	-	-	-	2	-	-
M23BESK204C.3	3	3	-	-	-	-	-	-	-	-	-	-
M23BESK204C.4	3	2	-	-	-	-	-	-	2	-	-	-
M23BESK204C	3	2.6							2	2		

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	**Total**
Module 1					
Module 2					
Module 3					
Module 4					
Module 5					
Total					**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	**Total**
Module 1					
Module 2					
Module 3					
Module 4					
Module 5					
Total					**100**

Conditions for SEE Paper Setting:
Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks.

10. Future with this Subject

The "Introduction to Electronics Communication" course in the first year of the B.E program lays a strong foundation for several future courses in the undergraduate program. The contributions of this subject extend across various areas, enhancing the students' understanding and skills in the field of sensors and instrumentation. Here are some notable contributions:

- **EmergingTechnologies**: Future developments in electronics communication will likely be heavily influenced by emerging technologies such as 5G, Internet of Things (IoT), Artificial Intelligence (AI), and Quantum Communication. These technologies promise to revolutionize the way we communicate, offering faster speeds, lower latency, and greater connectivity.
- **IoT Integration**: The integration of IoT devices into communication networks will continue to grow, leading to a more interconnected world where everyday objects are smart and able to communicate with each other seamlessly.
- **Wireless Power Transfer**: Research into wireless power transfer technologies holds promise for wirelessly charging devices, which could eliminate the need for traditional power cables and revolutionize how we power our electronic devices.
- **Satellite Communication**: With the increasing demand for global connectivity, satellite communication systems will continue to evolve, offering high-speed internet access to remote regions and enabling new applications in areas such as disaster relief, agriculture, and environmental monitoring.
- **Ethical and Regulatory Considerations**: As communication technologies become more pervasive, there will be important discussions around ethics, privacy, and regulatory frameworks to ensure that these technologies are deployed responsibly and equitably

2nd Semester	Engineering Science Courses - II (ESC) INTRODUCTION TO MECHANICAL ENGINEERING	M23BESKM204D

1. Prerequisites:

S/L	Proficiency	Prerequisites
1	Basic understanding of engineering disciplines	Familiarity with different engineering fields and their societal impact.
2	High school-level physics (work, power, energy, heat)	Foundational knowledge of physics concepts relevant to specific topics.
3	Workshop skills	Prior experience in a workshop setting would be beneficial.
4	Basic computer literacy	Familiarity with the concept of computer-controlled manufacturing and basic principles of 3D printing technology.
5	Visualization skills	Ability to interpret diagrams, schematics, and 3D models relevant to mechanical systems.
6	Basic understanding of chemistry and material properties	Ability to identify different types of engineering materials and their applications.

2. Competencies:

S/L	Competency	KSA Description
1	**Understanding the Role of Mechanical Engineering**	**Knowledge:** Different engineering disciplines and their applications. Societal impact of mechanical engineering advancements. **Skills:** Analyze real-world problems and identify potential mechanical engineering solutions. **Attitudes:** Curiosity and interest in the impact of engineering on society.
2	**Grasping Core Mechanical Engineering Principles**	**Knowledge:** Physics concepts (work, power, energy, heat, mechanics) **Skills:** Apply fundamental principles to solve basic mechanical engineering problems **Attitudes:** Analytical thinking and problem-solving skills.
3	**Understanding Machine Tools and Operations**	**Knowledge:** Working principles of common machine tools (lathe, drill, milling). Types of machining operations (turning, drilling, milling). **Skills:** Demonstrate a basic understanding of machine tool functionalities (no practical operation required). **Attitudes:** Openness to learning new technologies and appreciating the role of practical skills.
4	**Exposure to Advanced Manufacturing Systems**	**Knowledge:** Concept of computer-controlled manufacturing (CNC). Basic principles of 3D printing technology. **Skills:** Recognize the potential of advanced manufacturing techniques. **Attitudes:** Adaptability and willingness to embrace technological advancements.
5	**Understanding Energy Sources and Power Plants**	**Knowledge:** Different types of energy sources (fossil fuels, renewables). Working principles of various power plants (hydro, thermal, nuclear, solar, wind, tidal). **Skills:** Explain the basic functionalities of different power generation technologies. **Attitudes:**

		Environmental awareness and appreciation for sustainable energy solutions.
6	**Introduction to Internal Combustion Engines**	**Knowledge:** Engine components and working principles (4-stroke petrol & diesel). **Skills:** Identify the key components of an internal combustion engine. **Attitudes:** Attention to detail and understanding of cause-and-effect relationships in mechanical systems.
7	**Understanding Refrigeration & Air Conditioning Systems**	**Knowledge:** Refrigeration principles and desirable refrigerant properties. Working principles of basic refrigeration and air conditioning systems. **Skills:** Explain the fundamental concepts behind these systems. **Attitudes:** Appreciation for the importance of thermal comfort and energy efficiency.
8	**Introduction to Joining Processes**	**Knowledge:** Definitions and classifications of common joining processes (soldering, brazing, welding). **Skills:** Recognize different joining techniques and their applications. **Attitudes:** Safety awareness and appreciation for proper tool and technique selection.
9	**Understanding Future Mobility Technologies**	**Knowledge:** Components of electric and hybrid vehicles. Advantages and disadvantages compared to traditional vehicles. **Skills:** Analyze the potential of future mobility solutions. **Attitudes:** Sustainability mindset and interest in technological innovation.

3. Syllabus:

INTRODUCTION TO MECHANICAL ENGINEERING SEMESTER – I			
Course Code	**M23BESKM104/204D**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(2:2:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours Theory**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course objectives: This course will enable students to:

- Explain the role of mechanical engineering in society, including the impact of various engineering disciplines, and identify potential mechanical solutions to real-world problems.
- Apply core physics concepts (work, power, energy, heat, mechanics) to solve basic mechanical engineering problems and understand the working principles of common machine tools (lathe, drill, mill) and different machining operations.
- Recognize the potential of advanced manufacturing techniques like CNC and 3D printing, explain different energy sources and the working principles of various power plants, and identify the components and basic working principles of internal combustion engines.
- Understand refrigeration principles, refrigerant properties, and the basic operation of air conditioning and refrigeration system.
- Recognize the definitions and classifications of common joining processes and analyze future mobility solutions (electric/hybrid vehicles) and their advantages/disadvantages.
- Explain the concepts of mechatronics and robotics (open/closed-loop systems, robot anatomy, applications), demonstrating a foundational understanding of these interdisciplinary fields.

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 Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and bio-fuels, 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, reaming. Working of Milling Machine, Milling operations: plane 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, 3D printing.

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 weldingprocess, 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.
Automation in industry: Definition, types – Fixed, programmable and flexible automation, basic elements with block diagrams, advantages.
Introduction to IOT: Definition and Characteristics, Physical design, protocols, Logical design of IoT, Functional blocks, and communication models.

Textbooks:
1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008
2. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012

Reference Books:
1. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.
2. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rd Ed., 2003.
3. Internal Combustion Engines, V. Ganesan, Tata McGraw Hill Education; 4th edition, 2017
5. Dr SRN Reddy, Rachit Thukral and Manasi Mishra, " Introduction to Internet of Things: A Practical Approach", ETI Labs

Weblinks and Video Lectures (e-Resources):
- https://rakhoh.com/en/applications-and-advantages-of-steam-in-manufacturing- and process industry
- Videos | Makino (For Machine Tool Operation)

4. Syllabus Timeline:

S/L	Syllabus Timeline	Description
1	Week 1-2: Introduction to Mechanical Engineering, Energy Resources.	• Introduction to Mechanical Engineering and Role of Mechanical Engineers in Industry and Society. • Energy resources effective utilization along with advantages and dis advantages.
2	Week 3-4: Machine Tool Operations, Introduction to Advanced Manufacturing Systems	• Introduction to various types of Mechanical Tools. • Machine Tools operations (Lathe and Drilling Machine) • Machine tool Operations(Milling Machine) • CNC, Advantages and Disadvantages of CNC • 3D Printing
3	Week 5-6: Introduction to IC Engines, Insight into Future Mobility	• Introduction to IC Engines, 4 – Stroke Petrol Engine. • 4- Stroke Diesel Engine. • Introduction to Electric vehicles. • Hybrid vehicles: Types of Hybrid vehicles

		• Advantages and Dis advantages of Electric and Hybrid Vehicle.
4	Week 7-8: Engineering Materials, Joining Processes	• Introduction to Engineering Materials. • Types and applications of engineering materials. • Introduction to Joining Processes(Soldering, Brazing, Welding) • Welding, Classifications of welding. • Arc welding, Gas welding, TIG welding.
5	Week 9-10: Introduction to Mechatronics and Robotics, IOT	• Introduction to Mechatronics, open loop and closed loop systems. • Introduction to Robotics and its Anatomy. • Applications of Robots in material handling, processing and assembly and inspection. • Introduction to IOT • Functional blocks and communication models.
6	Week 11-12:	Revision of the subject and visits to department laboratories related to subject.

5. Teaching-Learning Process Strategies:

S/L	TLP Strategies:	Description
1	Lectures & Presentations	Deliver core concepts and foundational knowledge. - Utilize multimedia (images, diagrams, 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	Multiple Representations	Introduce topics in various representations to reinforce competencies
6	Project-Based Learning	Encourage research and design thinking through project-based learning activities
7	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
8	Educational Technology	Utilize online learning platforms, simulations, and interactive software to supplement classroom learning. Provide opportunities for self-paced learning and personalized learning experiences.

6. Assessment Details (both CIE and SEE) :

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives:

S/L	Learning Objectives	Description
1.	Explain the fundamental principles of mechanics (work, power, energy, heat)	Students will be able to clearly define and explain the core concepts of mechanics, including work, power, energy, and heat. This includes understanding the relationships between these concepts and how they apply to basic mechanical systems.
2.	Differentiate between various types of energy sources (fossil fuels, renewables)	Students will be able to identify and distinguish between different energy sources, such as traditional fossil fuels (coal, oil, natural gas) and renewable energy sources (solar, wind, hydro).
3.	Analyze the working principles of different power generation technologies (hydro, thermal, nuclear, solar, wind, tidal).	Students will be able to break down and explain the fundamental operating principles of various power generation technologies. This includes understanding the energy conversion processes involved in each type of power plant.
4.	Identify the key components of internal combustion engines (4-stroke petrol & diesel).	Students will be able to recognize and name the essential components of internal combustion engines, differentiating between those found in petrol and diesel engines.
5.	Explain the basic working principles of internal combustion engines.	Students will be able to describe the fundamental operating cycle of a 4-stroke internal combustion engine, including the intake, compression, combustion, and exhaust strokes.
6.	Analyze the potential of future mobility solutions (electric/hybrid vehicles)	Students will be able to critically examine the potential benefits and drawbacks of future mobility solutions like electric and hybrid vehicles compared to traditional internal combustion engine vehicles. This may involve considerations of environmental impact, energy efficiency, and infrastructure requirements.
7.	Describe the concepts of mechatronics and robotics (open/closed-loop systems, robot anatomy)	Students will be able to explain the basic principles of mechatronics and robotics, including the integration of mechanical, electrical, and control systems. This includes understanding the concept of open-loop and closed-loop systems, as well as the various components that make up a robot's anatomy.
8	Understand the concept of physical design in IoT.	Students will learn about the definition, characteristics, and different design aspects (physical and logical) of IoT systems. They will explore communication protocols, functional blocks, and communication models used in IoT, enabling them to understand the basic building blocks of these interconnected systems.

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

Course Outcomes (COs)

CO's	DESCRIPTION OF THE OUTCOMES
M23BESKM204D.1	**Interpret** the impact of Mechanical Engineering on various industries and society, including emerging trends in various sectors. **Acquire knowledge on** Energy sources& Power plants along with their advantages and dis advantages.
M23BESKM204D.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.
M23BESKM204D.3	Compare and contrast 4-stroke Petrol and Diesel engines through its working principles. **Analyze** future mobility challenges with Electric & Hybrid Vehicles
M23BESKM204D.4	**Apply** knowledge of joining process advantages and limitations to select the most suitable method for specific materials and applications.
M23BESKM204D.5	**Design** a basic mechatronic system for open/closed-loop systems, IOT Models explaining its automation role.

CO's	PO No											
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
M23BESKM204D.1	-	3	-	-	-	-	-	-	-	-	-	-

M23BESKM204D.2	3	-	-	-	-	-	-	-	-	-	-	-
M23BESKM204D.3	-	3	-	-	-	-	-	-	-	-	-	-
M23BESKM204D.4	3	-	-	-	-	-	-	-	-	-	-	-
M23BESKM204D.5	3	-	-	-	-	-	-	-	-	-	-	-
M23BESKM204D	3	3	-	-	-	-	-	-	-	-	-	-

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	**20%**					**20**
Module 2		**20%**				**20**
Module 3			**20%**			**20**
Module 4				**20%**		**20**
Module 5					**20%**	**20**
Total	**10**	**10**	**10**	**10**	**10**	**50**

10.

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	**20%**					**20**
Module 2		**20%**				**20**
Module 3			**20%**			**20**
Module 4				**20%**		**20**
Module 5					**20%**	**2**
Total	**20**	**20**	**20**	**20**	**20**	**100**

10. Future with this Subject

The future of mechanical engineering is brimming with exciting possibilities fueled by advancements in technology, a growing emphasis on sustainability, and the increasing need for automation and efficiency. Here are some key trends that will shape the landscape of mechanical engineering in the years to come:

1. Integration of Advanced Technologies:

- **Robotics and Automation:** Mechanical engineers will play a crucial role in designing, developing, and implementing advanced robots across various industries. Collaborative robots (cobots) working alongside humans will become commonplace.
- **Artificial Intelligence (AI) & Machine Learning (ML):** AI and machine learning will be integrated into mechanical systems for predictive maintenance, process optimization, and autonomous decision-making, leading to smarter machines.
- **Internet of Things (IoT):** Mechanical systems will become increasingly interconnected through the IoT, enabling real-time data collection, remote monitoring, and improved control over operations.

2. Focus on Sustainability:

- **Renewable Energy Systems:** Mechanical engineers will be instrumental in designing and developing efficient renewable energy technologies like solar, wind, and geothermal power plants.
- **Sustainable Materials and Manufacturing:** Developing and utilizing sustainable materials with lower environmental impact will be a major focus. Additive manufacturing (3D printing) will play a significant role in reducing waste and creating complex parts.
- **Energy Efficiency:** Designing mechanical systems with optimized energy consumption and minimal environmental footprint will be a priority.

2nd Semester	Engineering Science Courses - II (ESC) Introduction to C programming	M23BESCK204E

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Understanding of Basic Programming Concepts	Familiarity with fundamental programming concepts such as variables, data types, operators, control structures (like loops and conditional statements), functions, and basic algorithms is essential.
2	Knowledge of Mathematics	Single-Variable Calculus: Mastery of differentiation and integration in one dimension. Linear Algebra: Understanding of vectors, matrices, determinants, and linear transformations. Basic Series Knowledge: Familiarity with sequences and series, convergence, and divergence.
3	Understanding of Computer Memory	C programming involves direct manipulation of memory addresses and pointers, so a basic understanding of how computers allocate memory and how pointers work is crucial.
4	Command Line Basics	While not strictly necessary, familiarity with navigating and executing commands in a command-line interface (CLI) can be helpful, especially for compiling and running C programs outside of IDEs.
5	Basic Understanding of Operating Systems	Understanding how operating systems manage processes, memory, and file systems can provide context for understanding how C programs interact with the underlying system.
6	Problem-Solving Skills	Programming involves solving problems logically and systematically. Practicing problem-solving skills through small coding exercises or puzzles can be beneficial.

2. Competencies (A minimum of four competencies may be written)

S/L	Competency	KSA Description
1	Ability to Use Development Tools	Be comfortable using a text editor or an integrated development environment (IDE) for writing, compiling, and debugging C programs. Familiarize yourself with compiling C programs using a compiler like GCC or Clang.
2	Command Line Proficiency	Understanding how to navigate and execute commands in a command-line interface (CLI) can be helpful, as it's often used for compiling and running C programs.
3	Logical Thinking and Attention to Detail	C programming requires careful attention to syntax and logical structure. Being detail-oriented and able to think logically through problems is essential.
4	Memory Management	Have a basic understanding of how memory management works in C, especially concepts like stack and heap memory allocation, pointers, and memory addresses.
5	Persistence and Patience	Learning C programming, like any new skill, requires persistence and patience. Be prepared to encounter challenges and take the time to understand concepts thoroughly.

3. Syllabus

Introduction to C Programming			
Course Code	**M23BESCK104/204E**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(3:0:2)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours Theory + 8-10 Lab slots**	Total Marks	**100**
Credits	**04**	Exam Hours	**03**

Course objectives: This course will enable students to:

- Elucidate the basic architecture and functionalities of a computer and also recognize the hardware parts.
- Apply programming constructs of C language to solve the real world problem
- Explore user-defined data structures like arrays in implementing solutions to problems like searching and sorting.
- Explore user-defined data structures like structures, unions and pointers in implementing solutions
- Design and Develop Solutions to problems using modular programming constructs
- using functions

Module -1: Introduction to C

Introduction to computers, input and output devices, designing efficient programs. Introduction to C, Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C.

Textbook: Chapter 1.1-1.9, 2.1-2.2, 8.1 – 8.6, 9.1-9.14

Module -2:Operators and looping in C

Operators in C, Type conversion and typecasting. Decision control and Looping statements: Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.

Textbook: Chapter 9.15-9.16, 10.1-10.6

Module -3:Functions and Arrays

Functions: Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, recursive functions.

Arrays: Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions,

Textbook: Chapter 11.1-11.13, 12.1-12.6

Module -4: Arrays and Strings

Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, multidimensional arrays. Applications of arrays and introduction to strings: Applications of arrays, case study with sorting techniques.

Introduction to strings: Reading strings, writing strings, summary of functions used to read and write characters. Suppressing input using a Scanset.

Textbook: Chapter 12.7-12.12

Module -5: Strings, Pointers and Structures

Strings: String taxonomy, operations on strings, Miscellaneous string and character functions, arrays of strings.

Pointers: Understanding the Computer's Memory, Introduction to Pointers, Declaring Pointer Variables

Structures: Introduction to structures

Textbook: Chapter 13.1-13.6, 14.1-14.3,15.1

PRACTICAL COMPONENT

1.	C Program to find Mechanical Energy of a particle using E = mgh+1/2 mv2.
2.	C Program to convert Kilometers into Meters and Centimeters.
3.	C Program To Check the Given Character is Lowercase or Uppercase or Special Character.
4.	Program to balance the given Chemical Equation values x, y, p, q of a simple chemical equation of the type: The task is to find the values of constants b1, b2, b3 such that the equation is balanced on both sides and it must be the reduced form.
5.	ImplementMatrixmultiplicationandvalidatetherulesofmultiplication.
6.	Computesin(x)/cos(x)usingTaylorseriesapproximation.Compareyour result withthebuiltinlibraryfunction.Print boththeresultswithappropriateinferences.
7.	SortthegivensetofNnumbersusingBubblesort.
8.	Writefunctionstoimplementstringoperationssuchascompare,concatenate,stringlength.Convince the parameter passing techniques.
9.	Implementstructurestoread,writeandcomputeaveragemarksandthestudents scoring aboveandbelowtheaveragemarksforaclass of N students.
10.	Developaprogramusingpointerstocomputethesum, meanandstandarddeviationofallelements stored inanarrayofNrealnumbers.

Textbooks:

1. Computer fundamentals and programming in c, "ReemaThareja", Oxford University, Second edition, 2017.

Reference Books:

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.

4. Syllabus Timeline

S/L	Syllabus Timeline (No. of weeks should be as you have in the semester)	Description (Write the proposed syllabus coverage in detail with maximum of 5 lines)
1	Week 1-2: Calculus	Introduction to computers, input and output devices, Designing efficient programs. Structure of C program, Files used in a C program, Compilers, Compiling and executing C programs, variables, constants, Input/output statements in C.
2	Week 3-4: Series Expansion and Multivariable Calculus	Operators in C, Type conversion and typecasting. Introduction to decision control, Conditional branching statements, iterative statements, nested loops, break and continue statements, goto statement.
3	Week 5-6: Ordinary Differential Equations (ODEs) of First Order	Introduction using functions, Function definition, function declaration, function call, return statement, passing parameters to functions, scope of variables, storage classes, Recursive functions. Declaration of arrays, accessing the elements of an array, storing values in arrays, Operations on arrays, Passing arrays to functions,
4	Week 7-8: Modular Arithmatic	Two dimensional arrays, operations on two-dimensional arrays, two-dimensional arrays to functions, Multidimensional arrays. Applications of arrays, case study with sorting techniques. Reading strings, writing strings, Summary of functions used to read and write characters. Suppressing input using a Scanset.
5	Week 9-10: Linear Algebra	String taxonomy, operations on strings, Miscellaneous string and character functions, Arrays of strings. Understanding the Computer's Memory, Introduction to Pointers, Declaring Pointer Variables Introduction to structures
6	Week 11-12:IntegrationandPractical Applications	Apply learned concepts and competencies to real-world scenarios.Hands-onpractice

5. 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

		Verilog 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	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 deeper understanding of competencies
9	Programming Assignments	. Assign programming tasks to reinforce practical skills associated with competencies.

6. Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	**Learning Objectives**	**Description**
1	Understanding Basic Syntax and Control Structures	Learn how to declare variables, use different data types (integers, floats, characters), and understand their scope. Master control structures like loops (for, while) and conditional statements (if, switch) to control program flow.
2	Working with Functions and Modular Programming	Define and use functions effectively, understanding their role in modular programming. Learn about function prototypes, header files, and organizing code into reusable modules for better code management.
3	Memory Management and Pointers	Understand memory allocation (stack vs heap) and deallocation using malloc, calloc, realloc, and free functions. Master pointers and their importance in C programming, including pointer arithmetic, dynamic memory allocation, and managing memory addresses.

4	Arrays, Strings, and File Handling	Learn how to declare and manipulate arrays and strings in C, including understanding the relationship between arrays and pointers. Explore file handling techniques using functions like fopen, fclose, fread, fwrite, and understand how to read from and write to files.
5	Understanding Structures and Unions	Understand the concept of structures and unions, how they are declared, defined, and used in C programming. Learn about nested structures, structure pointers, and their applications in organizing and managing data efficiently.

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

Course Outcomes (COs)

COs	Description
M23BESCK204E.1	Apply the basic knowledge of computer, computer hardware, functionalities of a computer and principles of C programming.
M23BESCK204E.2	Apply programming constructs of C language to solve the real world problem
M23BESCK204E.3	Apply the design concept of functions, Arrays and Strings and implement applications
M23BESCK204E.4	Analyze user-defined data structures like structures and pointers in Implementing solutions.
M23BESCK204E.5	Design and Develop Solutions to problems and Evaluate the resultanddocumentthecompleteexperimentalprocess.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BESCK204E.1	**3**	**-**										
M23BESCK204E.2	**3**											
M23BESCK204E.3	**3**											
M23BESCK204E.4	**-**	**3**										
M23BESCK204E.5	**-**		**3**									
M23BESCK204E	**3**	**3**	**3**									

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

Studying C programming can open up various opportunities and avenues in the field of computer science and software development. Here's how learning C can benefit your future:

Foundation in Programming: C is often considered a foundational language in computer science and programming. It provides a solid understanding of fundamental concepts like memory management, pointers, and low-level manipulation of data, which are crucial in understanding how

computers work at a deeper level.

Understanding of Systems Programming: C is widely used for system-level programming, such as operating systems, embedded systems, device drivers, and other performance-critical applications. Understanding C gives you the ability to work closer to hardware and optimize performance-sensitive code.

Portability and Efficiency: C programs can be highly portable across different platforms and operating systems, making it a versatile language for cross-platform development. Additionally, C's efficiency in terms of speed and memory usage makes it suitable for applications where performance is critical.

Gateway to Other Languages: Learning C provides a strong foundation for learning other languages, especially those derived from or influenced by C (such as C++, Java, C#, and many others). Many modern languages borrow syntax and concepts from C, so mastering C can ease the learning curve for other languages.

Career Opportunities: Proficiency in C programming opens up various career paths in industries ranging from software development to system programming, embedded systems, game development, and more. Many companies value candidates who have a strong understanding of C due to its versatility and performance benefits.

Contribution to Open Source Projects: Many open-source projects and libraries are written in C or have bindings to C. Contributing to these projects can enhance your skills, build a portfolio, and connect you with a broader community of developers.

Continued Relevance: Despite being over four decades old, C remains relevant and widely used in critical software applications, ensuring that skills in C programming will continue to be in demand.

To maximize the benefits of learning C programming, consider applying your skills through personal projects, internships, or contributing to open-source projects. This practical experience will deepen your understanding and make you more attractive to potential employers or collaborators in the software development industry.

2nd Semester	Emerging Technology Courses - II (ETC) GreenBuildings	M23BETK205A

i. Prerequisites

S/L	Proficiency	Prerequisites
1	**GreenBuildingMaterials.**	Knowledge of construction materials observedin day-to-daylife.
2	**Cost-effectiveConstruction Technologies.**	Knowledgeofconstructionobservedinday-to-daylife.
3	**Sustainability.**	Knowledgeofresourcesweconsumeinday-to-daylife.
4	**GreenDesign andPrinciples.**	Basicunderstandingaboutgreenbuilding materialsandtechnologies.
5	**WasteManagement.**	Knowledgeofwastesgeneratedobservedin day-to-daylife.
6	**GreenBuildingRating.**	Knowledge of basics of green building features.

ii. Competencies

S/L	Competency	KSADescription
1	**Green BuildingMaterials.**	**Knowledge** Understandingeach materialand itsimpact on environment. **Skills** Abilitytodiscretizeconventional andgreen materials. **Attitudes** Appreciationfortheimportanceofadaptinggreenmaterialsinconstruction.
2	**Cost-effectiveConstruction.**	**Knowledge** Knowledge of step by step by procedure of cost-effective constructionanduseofmaterials. **Skills:** Abilityto learn cost-effectiveconstruction techniques. **Attitudes:** Appreciationfor thelearningof constructiontechniques.
3	**Green BuildingConsultant.**	**Knowledge** Knowledgeofmaterialsandconstructiontechniquesleadingtogreenenvironment. **Skills** Designingandconstructingthebuildingwithrespecttogreenfeatures. **Attitudes:** Valuingtheimportanceofgreenbuildings.
4	**Waste Management.**	**Knowledge:** Understandingthedifferent waste generated inbuildingsand handling thosewaste withoutdumpinginto landfill. **Skills:** Abilityto learnandadaptwastemanagementprinciples. **Attitudes:** Opennesstolearningof wastemanagement.
5	**Green BuildingPrinciples andDesign.**	**Knowledge:** Knowledgeof greenbuildingmaterials,techniquesandfeatures. **Skills:** Abilitytodo adapt greenprinciplesanddesigngreenbuilding. **Attitudes:** Appreciationfortheversatilityofdesignofgreenbuildingascomparedto conventional.

iii. Syllabus

GREENBUILDINGS SEMESTER – I/II			
Course Code	M23BETK105/205A	CIEMarks	**50**
Numberof LectureHours/Week(L:T:P:S)	**(3:0:0)**	SEEMarks	**50**
TotalNumberof LectureHours	**40 hours**	TotalMarks	**100**
Credits	**03**	ExamHours	**03**

Module-1

Introductiontotheconceptofcost-effectiveconstruction:

- Differenttypesofmaterials,theiravailability,requirements/propertiesandapplication – Stones,LateriteBlocks,BurntBricks, ConcreteBlocks, Stabilized Mud Blocks,Lime PozzolanaCement,GypsumBoard,FiberReinforcedCementComponents,Fiber ReinforcedPolymerComposite,Bamboo.
- Recyclingofbuilding materials–Bricks,Concrete, Steel,Plastics. Environmentalissuesrelatedtoquarryingofbuildingmaterials.

Module -2

Environmentfriendlyandcost-effectiveBuildingTechnologies

Alternatesforwallconstruction -FlemishBond,RatTrapBond.

- Arches,Panels,CavityWall,FerroCementandFerroConcreteconstructions.
- Differentprecastmembersusingthesematerials-WallandRoofPanels,Beams, Columns,DoorandWindowframes, Watertanks,SepticTanks.
- Alternateroofingsystems -FillerSlab,CompositeBeam andPanelRoof.
- Pre-engineeredand readyto usebuildingelements.
- woodproducts,SteelandPlastic.

Contributionsofagencies-Costford-Nirmithi Kendra–Habitat

Module-3

GlobalWarming

- Definition,CausesandEffect,Contributionof BuildingstowardsGlobalWarming,
- CarbonFootprint – GlobalEffortsto reduce carbonEmissions.
- GreenBuildings–Definition,Features,Necessity,Environmentalbenefit,Economicalbenefits,Health and Socialbenefits, Major Energyefficientareas forbuildings.
- EmbodiedEnergyin Materials.
- GreenMaterials-ComparisonofInitialcostofGreenV/sConventionalBuilding-LifecyclecostofBuildings.

Module-4

GreenBuildingratingSystems–BREEAM,LEED,GREENSTAR,GRIHA(Green RatingforIntegratedHabitatAssessment)andIGBCfornewbuildings–Purpose-Key highlights-PointSystemwithDifferentialweightage.

GreenDesign–Definition,Principlesofsustainabledevelopmentinbuildingdesign, CharacteristicsofSustainableBuildings,sustainablymanagedMaterials. IntegratedLifecycledesignofMaterialsandStructures(Conceptsonly)

Module-5

UtilityofSolarEnergyinBuildings

UtilityofSolarenergyinbuildingsconcepts-SolarPassiveCoolingandHeatingof Buildings, LowEnergyCooling,CasestudiesofSolarPassiveCooledandHeatedBuildings.

GreenCompositesforBuildings

ConceptsofGreenComposites,WaterUtilizationinBuildings,LowEnergyApproaches toWaterManagement,ManagementofSolidWastes,ManagementofSullageWaterand Sewage,UrbanEnvironmentandGreenBuildings.GreenCoverandBuiltEnvironment.

Text Books

1. HarharaIyerG,***GreenBuildingFundamentals***,NotionPress
2.Dr.Adv.HarshulSavla,***GreenBuilding:Principles&Practices***.Notionpress.
3.ShailendraK Shukla,***GreenBuildingTechnologies***,AneBooksPvt.Ltd.

ReferenceBooks

JimmyC.M.Kao,Wen-PeiSung,
anChen,***GreenBuilding,MaterialsandCivilEngineering,*** 1st edition,CRCPress.

4. RossSpiegel,DruMeadows,***GreenBuildingMaterials: AGuidetoProductSelectionandSpecification***,
5. SamKubba,***Handbookon greenbuildingdesign and construction,***BHpublications.

Web links

11. https://www.youtube.com/watch?v=THgOF8zHBW8
12. https://www.youtube.com/watch?v=DRO_rIkywxQ

iv. SyllabusTimeline

S/L	Syllabus Timeline	Description
1	Week1-2	Studentswilllearnaboutvariousmaterialsproductionprocess,properties andapplicationswithrespecttocost-effectiveconstruction.
2	Week3-4	Studentswilllearnaboutvariousenvironmentallyfriendlyandcost-effectivebuildingtechnologies.
3	Week5-6	Studentswilllearnaboutglobalwarminganditseffectsonbuildings,carbonfootprintsanditsmitigation,Embodiedenergyandlifecyclecost ofbuildings.
4	Week7-8	Studentswilllearnaboutgreenbuildingratingsystemanddesign.
5	Week9-10:	Studentswilllearnabouttheutilityofsolarenergyandgreencomposites forbuildings.

5. Teaching-LearningProcessStrategies

S/L	TLPStrategies	Description
1	LectureMethod	Utilizevariousteachingmethodswithinthelectureformatto reinforcecompetencies.
2	Video/Animation	Incorporatevisualaidslikevideos/animationstoenhance understandingof concepts.
3	CollaborativeLearning	Encouragecollaborativelearningforimprovedcompetency application.
4	HigherOrderThinking (HOTS)Questions:	PoseHOTSquestionstostimulatecriticalthinkingrelatedto eachcompetency.
5	Problem-BasedLearning (PBL)	ImplementPBLtoenhanceanalyticalskillsandpractical applicationofcompetencies.
6	Real-WorldApplication	Discusspracticalapplicationstoconnecttheoreticalconcepts

		withreal-world competencies.
7	FlippedClassTechnique	Utilizeaflippedclassapproach,providingmaterialsbefore classtofacilitatedeeperunderstandingofcompetencies.

6. AssessmentDetails (bothCIE andSEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. LearningObjectives

S / L	**Learning Objectives**	**Description**
1	Understandingfundamentals ofconcreteandits Characterization.	Studentswillgraspthefundamentalconceptsofconcrete,includingmaterialcharacterization ofeachingredient,manufacturingprocessofingredient and its effect onperformanceof concrete.
2	Proficiency inproductiona nd handlingo fconcrete.	Studentswillbecomeproficientinproductionandhandlingofconcretetoassessfreshand hardened propertiesofconcrete.
3	Designingof Concretemix	Studentswilllearntodesign concretemixproportion tobeusedinvarious applications.
4	Proficiencyin specialconcrete.	Studentswillbecomeproficientinvarioustypesofspecialconcrete which theycomeacross inpresent scenarioof industrialapplications.
5	Ethicaland Professional	Studentswillunderstandtheethicalandprofessionalresponsibilities associatedwithmaterialcharacterizationofeachingredientofconcrete,
6	Responsibility	andproductionandhandlingofconcreteadheringtoindustrystandards andbestpractices.

8.CourseOutcomes(COs)andMappingwithPOs/PSOs

CourseOutcomes(COs)

COs	**Description**
M23BETK205A.1	**Apply**theknowledgeofscienceandengineeringfundamentalstostudyenvironmental issuesinbuildingmaterialsandenvironmentallyfriendly/alternativebuildingmaterialsforcost effectiveand energyefficient construction.
M23BETK205A.2	**Apply**theknowledgeofengineeringfundamentalstostudyenvironmentallyfriendlyandcost-effectivebuildingtechnologiesin wallandroofingsystem.

M23BETK205A.3	**Illustrate**theconceptofglobalwarmingduetodifferentmaterialsandbuildingsin construction.
M23BETK205A.4	**Exemplify** theconceptofgreenbuildingratingsystemsusedin buildings.
M23BETK205A.5	**Illustrate**thealternatesourceofenergyandeffectivewater&solidwastemanagement usedinbuildingstomeetsustainableenvironment.

CO-PO-PSOMapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M23BETK205A.1	**3**						**2**					
M23BETK205A.2	**3**						**2**					
M23BETK205A.3	**3**					**2**	**2**					
M23BETK205A.4	**3**					**2**	**2**					
M23BETK205A.5	**3**					**2**	**2**					
M23BETK205A	**3**					**2**	**2**					

9.AssessmentPlan

ContinuousInternalEvaluation(CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module1	10					10
Module2		10				10
Module3			10			10
Module4				10		10
Module5					10	10
Total	**10**	**10**	**10**	**10**	**10**	**50**

SemesterEndExamination(SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module1	20					20
Module2		20				20
Module3			20			20
Module4				20		20
Module5					20	20
Total	**20**	**20**	**20**	**20**	**20**	**100**

ConditionsforSEEPaperSetting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEEmarks.

10.FuturewiththisSubject.

The "Green Buildings" course in the first/second semester of the B.E program lays a strongfoundation for several future courses in the undergraduate program. The contributions of thissubject extend across various areas, enhancing the students' understanding and skills in the fieldofconcrete. Here aresome notable contributions:

- **Materials of construction:** The knowledge gained in green building course with respect tomaterialsis aprerequisite for materials of construction.
- **Alternative Building Materials:** The knowledge gained in green building course with respect tomaterialsand cost-effectivetechnologies isaprerequisite formaterials ofconstruction.
- **ConstructionSkillLab**:Theknowledgegainedingreenbuildingcoursewithrespecttomaterialsand cost-effectivetechnologies isaprerequisite for constructionskill lab.
- **Concrete Technology**: The knowledge gained in green building course with respect to materialsandcost-effectivetechnologies is aprerequisite forconcrete technologycourse.
- **Project Work and Research:** The hands-on experience gained through assignments, problem-

solving, experiments and project work using concrete technology concept prepares students formore extensive projects in their later years. It equips them with the skills needed for research inthefield ofconcretetechnology.

- **IndustryApplications:**Thecourseprovidespracticalskillsthataredirectlyapplicableinindustriesrelatedtoconstruction.Graduatesarewell-preparedtocontributetoconstructionindustry.

2nd Semester	Emerging Technology Courses - II (ETC) Introduction to Nanotechnology	M23BETK205B

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Engineering principles	Basic understanding of engineering concepts like design, fabrication, and characterization can be helpful.
2	Basic Chemistry	**Atomic Structure:** Understanding atoms, molecules, and chemical bonds. **Chemical Reactions:** Knowledge of how substances interact and change. **Organic Chemistry:** Familiarity with carbon-based molecules, which are often used in nanotechnology.
3	Basic Physics	**Classical Mechanics:** Basics of motion, forces, and energy. **Electromagnetism:** Understanding electric and magnetic fields and their interactions with matter. **Quantum Mechanics:** Basic principles, as nanotechnology often deals with phenomena at the atomic and molecular levels.
4	Mathematics	**Statistics:** Important for data analysis and understanding probabilistic behaviors at the nanoscale.
5	Fundamentals of Material Science and Engineering	**Solid State Physics:** Crystal structures, defects in solids, and electronic properties of materials. **Thermodynamics:**Basic principles including energy, entropy, and the laws of thermodynamics. **Material Properties:** Mechanical, electrical, optical, and thermal properties of materials.

2. Competencies

S/L	Competency	KSA Description
1	**Nanomaterials**	**Knowledge:** Basic concepts of nanotechnology (nanoscale, properties, structures), Synthesis and fabrication methods (bottom-up, top-down) **Skills:** Identify applications of nanomaterials in engineering fields, Explain the societal impact of nanotechnology (benefits, risks, ethics), Use basic terminology related to nanomaterials **Attitudes:** Curiosity and interest in emerging technologies, Awareness of safety considerations in nanotechnology, Openness to interdisciplinary approaches
2	**CharacterizationofNanomaterials**	**Knowledge:** Knowledge of the principles and techniques used to characterize nanomaterials, such as scanning electron microscopy (SEM), transmission electron microscopy (TEM), and atomic force microscopy (AFM). **Skills:** Ability to interpret data obtained from characterization techniques to determine the size, shape, composition, and surface properties of nanomaterials. **Attitudes:** Curiosity and a desire to learn about new characterization techniques and their applications in nanotechnology.
3	**CarbonBasedMaterials**	**Knowledge:** Understanding of different types of carbon-based materials (e.g., graphene, diamond, polymers) and their properties (e.g., electrical conductivity, mechanical strength), Knowledge of synthesis methods for carbon-based materials, Awareness of applications of carbon-based materials in various fields **Skills:** Ability to analyze and interpret data related to carbon-based materials (e.g., spectroscopy results), Skill in working with

		laboratory equipment used for characterization of carbon-based materials, Ability to troubleshoot problems related to the synthesis or processing of carbon-based materials **Attitudes:** Curiosity and interest in learning about new advancements in carbon-based materials research, Attention to detail and accuracy when working with carbon-based materials, Commitment to safety protocols when handling potentially hazardous materials
4	**Energystorageandconversion**	**Knowledge:** Understanding of Properties of nanomaterials for energy storage (e.g., high surface area, porosity), Different nanomaterials for battery electrodes (e.g., carbon nanotubes, lithium-ion), Principles of energy conversion (e.g., photovoltaics, fuel cells), Nanofabrication techniques (e.g., chemical vapor deposition. **Skills:** Ability to Design and develop nanostructured materials for battery electrodes, Simulate and model energy storage and conversion processes, Fabricate and characterize nanodevices for energy applications, Troubleshoot and optimize energy storage and conversion systems, Collaborate with researchers from other disciplines (e.g., materials science, chemistry) **Attitudes:** Curiosity and a passion for innovation, Critical thinking and problem-solving skills, Attention to detail and accuracy, Strong work ethic and ability to meet deadlines, Effective communication and collaboration skills
5	**Applicationsof Nanotechnology**	**Knowledge:** Understanding of the principles behind various nanotechnology applications. **Skills:** Ability to identify suitable nanomaterials for specific applications, Skill in designing and developing nanotechnology-based solutions. **Attitudes:** Positive attitude towards the potential of nanotechnology to solve real-world problems, Critical thinking skills to evaluate the risks and benefits of nanotechnology applications

3. Syllabus

Introduction to Nanotechnology **SEMESTER – I/II**			
Course Code	**M23BETK105/205B**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	3:0:0:0	SEE Marks	**50**
Total Number of Lecture Hours	40	Total Marks	**100**
Credits	3	Exam Hours	**03**

Courseobjectives

- Toprovideacomprehensiveoverviewofsynthesisandcharacterizationofnanoparticles,nanocomposites andhierarchical materials withnanoscalefeatures.
- Toprovidetheengineeringstudentswithnecessarybackgroundforunderstandingvariousnanomaterials characterizationtechniques.
- Todevelopanunderstandingofthebasisofthechoiceofmaterialfordeviceapplications.
- Togiveaninsightintocompletesystemswherenanotechnologycanbeusedtoimproveoureverydaylife.
- To describe the historical development and the future potential of nanotechnology.

Module -1

IntroductiontoNanomaterials

Nanotechnology, Frontier of future-an overview, Length Scales, Variation of physical properties from bulk to

thinfilmstonanomaterials,Confinementofelectronin0D,1D,2Dand3Dsystems,SurfacetoVolumeRatio,SynthesisofNanomaterials:Bottom-Upapproach:ChemicalRoutesforSynthesisofnanomaterials-Sol-gel,Precipitation,SolutionCombustionsynthesis,Hydrothermal,SILAR,ChemicalBathDeposition.Top-Down approach-Ballmillingtechnique,Sputtering,LaserAblation.

Module -2

CharacterizationofNanomaterials

Basic principles and instrumentations of Electron Microscopy –Transmission Electron Microscope, ScanningElectron Microscope, Scanning Probes- Scanning Tunneling microscope, Atomic Force Microscope –differentimaging modes,comparisonofSEM andTEM,AFMand STM,AFMand SEM.BasicprinciplesofworkingofX-raydiffraction,derivationofDebye-Scherrerequation,numericalonDebye, Scherrerequation,OpticalSpectroscopy-InstrumentationandapplicationofIR,UV/VIS(Bandgapmeasurement).

Module -3

CarbonBasedMaterials

Introduction,Synthesis,Properties(electrical,ElectronicandMechanical),andApplicationsofGraphene,SWCNT,MWCNT,FullerenesandotherCarbonMaterials:Carbonnanocomposites, nano-fibers,nano-discs,nano-diamonds.

Module -4

NanotechnologyinEnergystorageandconversion

Solar cells: First generation, second generation and third generation solar cells: Construction and working of DyesensitizedandQuantumdotsensitizedsolar cells.

Batteries:NanotechnologyinLithiumionbattery-working,Requirementsofanodicandcathodicmaterials,classification based on ion storage mechanisms, limitations of graphite anodes, Advances in Cathodic materials,Anodicmaterials,Separators

Fuel Cells: Introduction, construction, working of fuel cells and nanotechnology in hydrogen storage and protonexchangemembranes.

Module -5

ApplicationsofNanotechnology

NanotechApplicationsandRecentBreakthroughs:Introduction,SignificantImpactofNanotechnologyandNanomaterial,MedicineandHealthcareApplications,BiologicalandBiochemicalApplications(Nanobiotechnology), Electronic Applications (Nano electronics), Computing Applications (Nano computers), ChemicalApplications (Nano chemistry), Optical Applications (Nano photonics), Agriculture and Food Applications, RecentMajorBreakthroughsin Nanotechnology.

SuggestedLearningResources:

Books

1. NanoMaterials–A.K.Bandyopadhyay/NewAgePublishers
6. Nanocrystals: Synthesis, Properties and Applications – C.N.R. Rao, P. John Thomas and G. U. Kulkarni, SpringerSeriesinMaterialsScience
7. NanoEssentials-T.Pradeep/TMH
8. PeterJ.F.Harris,Carbonnanotubescience:synthesis,properties,andapplications.CambridgeUniversityPress, 2011
9. M.A.Shah,K.A.Shah, “Nanotechnology:TheScienceofSmall”,WileyIndia,ISBN13:9788126538683.

ReferenceBooks

5. IntroductiontoNanotechnology,C.P.PooleandF.J.Owens,Wiley,2003
6. UnderstandingNanotechnology,ScientificAmerican,2002
7. Nanotechnology,M.RatnerandD.Ratner,PrenticeHall,2003
8. Nanotechnology,M.Wildon,K.Kannagara,G.Smith,M.SimmonsandB.Raguse,CRCPressBocaRaton,2002.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description

1	Week 1-2	**IntroductiontoNanomaterials:** Nanotechnology, Frontier of future-an overview, Length Scales, Variation of physical properties from bulk to thinfilmstonanomaterials,Confinementofelectronin0D,1D,2Dand3Dsystems,SurfacetoVolumeRatio,SynthesisofNanomaterials:Bottom-UpapproachChemicalRoutesforSynthesisofnanomaterials-Sol-gel,Precipitation.
2	Week 3-4	SolutionCombustionsynthesis,Hydrothermal,SILAR,ChemicalBathDeposition.Top-Down approach-Ballmillingtechnique,Sputtering,LaserAblation.**CharacterizationofNanomaterials:** Basic principles and instrumentations of Electron Microscopy –Transmission Electron Microscope, ScanningElectron Microscope, Scanning Probes-Scanning Tunneling microscope, Atomic Force Microscope – differentimaging modes,
3	Week 5-6	ComparisonofSEM andTEM,AFMand STM,AFMand SEM. BasicprinciplesofworkingofX-raydiffraction,derivationofDebye-Scherrerequation,numericalonDebye Scherrerequation,OpticalSpectroscopy-InstrumentationandapplicationofIR,UV/VIS(Bandgapmeasurement).
4	Week 7-8	**CarbonBasedMaterials:** Introduction,Synthesis,Properties(electrical,ElectronicandMechanical),and ApplicationsofGraphene,SWCNT,MWCNT,FullerenesandotherCarbonMaterials:Carbonnanocomposites,nano-fibers,nano-discs,nano-diamonds.**NanotechnologyinEnergystorageandconversion:** Solar cells: First generation, second generation and third generation solar cells: Construction and working of DyesensitizedandQuantumdotsensitizedsolar cells.
5	Week 9-10	**Batteries:**NanotechnologyinLithiumionbattery-working,Requirementsofanodicand cathodicmaterials,classification based on ion storage mechanisms, limitations of graphite anodes, Advances in Cathodic materials,Anodicmaterials,Separators **Fuel Cells:**Introduction, construction, working of fuel cells and nanotechnology in hydrogen storage and protonexchangemembranes

6	Week 11-12	**ApplicationsofNanotechnology:**	NanotechApplicationsandRecentBreakthroughs:Introduction,SignificantImpactofNanotechnologyandNanomaterial,MedicineandHealthcareApplications,BiologicalandBiochemicalApplications(Nanobiotechnology), Electronic Applications (Nano electronics), Computing Applications (Nano computers), ChemicalApplications (Nano chemistry), Optical Applications (Nano photonics), Agriculture and Food Applications, RecentMajorBreakthroughsin Nanotechnology.

5. 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 nano materials 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	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.

6.Assessment Details (both CIE and SEE)

Continuous Internal Evaluation:

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description

1	Nano materials	To provide a comprehensive overview of synthesis and characterization ofnanoparticles, nanocomposites and hierarchical materials with nanoscale features.
2	Characterization techniques	To provide the necessary background for understanding various nanomaterials characterization techniques
3	Properties and Applications	Compare and contrast the properties of bulk materials with their counterparts at the nanoscale. Identify potential applications of nanotechnology in one specific engineering field
4	Types of nanomaterials	Todevelopanunderstandingofthebasisofthechoiceofmaterialfordeviceapplications
5	Applications of nanomaterials	Togiveaninsightintocompletesystemswherenanotechnologycanbeusedtoimproveoureverydaylife

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

Course Outcomes (COs): Students will be able to

COs	Description
M23BETK205B.1	**Make use of** the fundamental concepts of nanotechnology tosynthesizethenanoparticlesbyvarious techniques.
M23BETK205B.2	**Illustrate**the workingofbasicinstrumentsusedincharacterizationofnanoparticles.
M23BETK205B.3	**Apply** the concepts of nanotechnology in various engineering discipline.
M23BETK205B.4	**Interpret** the unique properties of carbon and its various allotropes like diamond, graphite andgraphene.
M23BETK205B.5	**Analyze** the relationship between material properties at the nanoscale and their energy storage and conversion capabilities.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BETK205B.1	**3**											
M23BETK205B.2	**3**											
M23BETK205B.3	**3**											
M23BETK205B.4	**3**											
M23BETK205B.5		**3**										
M23BETK205B	**3**	**3**										

9.Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	**10**					**10**
Module 2		**10**				**10**
Module 3			**10**			**10**
Module 4				**10**		**10**
Module 5					**10**	**10**
Total	**10**	**10**	**10**	**10**	**10**	**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	**20**					**20**
Module 2		**20**				**20**
Module 3			**20**			**20**
Module 4				**20**		**20**
Module 5					**20**	**20**
Total	**20**	**20**	**20**	**20**	**20**	**100**

10.Future with this Subject

Studying "Introduction to Nanotechnology" opens up a multitude of promising career paths and opportunities for students due to the multidisciplinary nature and expansive applications of nanotechnology. An introduction to nanomaterials is a springboard to a field with a very promising future. Nanotechnology is revolutionizing many areas, from medicine and electronics to energy and environmental science. This means there's a constant demand for people who understand how to design, develop, and use these materials. Nanomaterials have unique properties that make them applicable in a wide range of industries. A student with this background could find opportunities in sectors like aerospace,

pharmaceuticals, or renewable energy.There's a constant push to develop new nanomaterials and improve existing ones. A student with a strong foundation could pursue research careers in universities, government labs, or private companies. As the field matures, there will likely be a growing need for specialists in specific areas of nanomaterials. An introductory course can open doors to further studies in areas like nanoelectronics, nanomedicine, or nanocomposites.

2nd Semester	Emerging Technolgy Courses - II (ETC) Renewable Energy Sources	M23BETK205C

1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Basic Physics	• Understanding of energy, power, and force. • Knowledge of thermodynamics, particularly the laws of energy conservation and conversion.
2.	Basic Chemistry	• Understanding of chemical reactions and processes. • Understanding the materials and reactions involved in energy storage, bioenergy, and fuel cells.
3.	Basic Biology	Basics of plant biology and ecology for bioenergy.
4.	Environmental Science	Basic understanding of Ecology, Pollution &Environmental Impact and Sustainability.
5.	Conventional Sources	Basic knowledge of fossil fuels, coal, hydro & nuclear.

2. Competencies

S/L	Competency	KSA Description
1.	**Energy Sources & its availability**	**Knowledge:** • Understanding knowledge of different energy sources. • Understanding the India & Global energy scenario. **Skills:** Ability to analyze alternative solutions to overcome the problems of conventional energy sources. **Attitudes:** Recognizing the significances of energy sources availabity.
2.	**Design and Implementation**	**Knowledge:** • Knowledge of system integration and the ability to work with hybrid energy systems. • Understanding of energy storage solutions and their integration with renewable sources. **Skills:** • Ability to design and implement renewable energy systems such as solar, wind, hydro, and biomass energy systems. • Identifying and solving technical issues in renewable energy systems. **Attitudes:** Perform economic and environmental impact analyses of renewable energy solutions.
3.	**Innovative Thinking**	**Knowledge:** Proficiency in making informed decisions based on data analysis, technical feasibility, economic viability, and environmental impact. **Skills:** Ability to develop creative solutions to challenges in the renewable energy sector. **Attitudes:** Openness to think creative ideas for improvisation for renewable sources.
4.	**Ethical and Sustainable Practices**	**Knowledge:** • Understanding of ethical issues related to energy production and consumption. • Understanding of sustainability principles and their importance in the energy sector. **Skills:** Adaptability to evolving industry trends and emerging challenges. **Attitudes:** Commitment to promoting the awareness of the ethical implications of energy choices and their impact on the environment and society.

3. Syllabus

RENEWABLE ENERGY SOURCES SEMESTER – I/II			
Course Code	M23BETK105/205C	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(3:0:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course objectives:

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

Module -1

Introduction: Principles of renewable energy; energy and sustainable development, fundamentals and social implications. worldwide renewable energy availability, renewable energy availability in India, brief descriptions on solar energy, wind energy, tidal energy, wave energy, ocean thermal energy, biomass energy, geothermal energy, oil shale. Introduction to Internet of energy (IOE).

Module -2

Solar Energy: Fundamentals; Solar Radiation; Solar radiation Measurements- Pyrheliometers, Pyrometer, 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- single, double and muliblade system. 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, 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,ZeroenergyConcepts.Benefits of hydrogen energy, hydrogen production technologies (electrolysis method only).

Text Books:

1. Nonconventional Energy sources, G D Rai, Khanna Publication, Fourth Edition,
2. Energy Technology, S.Rao and Dr. B.B. Parulekar, Khanna Publication.Solarenergy, SubhasPSukhatme, TataMcGrawHill, 2ndEdition,1996.

Reference Books:

1. Principles of Energy conversion, A. W. Culp Jr.,, McGraw Hill, 1996
2. Non-Convention EnergyResources, Shobh Nath Singh, Pearson, 2018

Links

1. https://www.youtube.com/@mitmysore-mechanicalengine8107
2. https://www.youtube.com/watch?v=mh51mAUexK4&list=PLwdnzlV3ogoXUifhvYB65lLJCZ74o_fAk

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2: Introduction and Availability of Energy Sources	Introduction to energy sources, Classification of Energy Sources, Sustainable development, socialimplications,worldwide renewable energy availability, renewable energy availability in India, brief descriptions on energy alternatives. Introduction to Internet of energy (IOE).
2	Week 3-4: Fundamentals	Solar radiation, Terrestrial & Extra-terrestrial radiation, Solar radiation

	of Solar Radiation &Solar electric power generation	Measurements- Pyrheliometers, Pyrometer, Sunshine Recorder.Solar Thermal systems: Flat plate collector; Solar distillation; Solar pond electric power plant.
3	Week 5-6: 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- single, double and muliblade system. Vertical axis- Savonius and darrieus types.
4	Week 7-8: Biomass Energy	Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies-fixed dome; Urban waste to energy conversion; Biomass gasification (Downdraft)
5	Week 9-10: Tidal Power & OTEC	Tides and waves as energy suppliers and their mechanics; fundamental characteristics of tidal power, harnessing tidal energy, advantages and limitations.Principle of working, OTEC power stations in the world, problems associated with OTEC.
6	Week 11-12: Geothermal Energy & Green Energy	Construction & working of Geothermal Energy. Introduction to Fuel cells: Classification of fuel cells – H2; Operating principles, ZeroenergyConcepts.Benefits of hydrogen energy, hydrogen production technologies (electrolysis method only), hydrogen energy storage, applications of hydrogen energy, problem associated with hydrogen energy.

5. 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 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.

6. Assessment Details (both CIE and SEE)

Continuous Internal Evaluation (CIE):

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description
1	Basics of Renewable Energy	Students will learn to define renewable energy and distinguish it from non-renewable sources & identify various renewable energy sources, including solar, wind, hydroelectric, biomass, geothermal, and tidal energy.
2	Analyzing Resource Availability:	Students will learnto assess the global distribution and availability of renewable energy resources & identify factors influencing the spatial and temporal variability of renewable energy sources, such as sunlight intensity, wind speed, water flow, biomass productivity, geothermal gradients, and tidal patterns.
3	Working Principles of RES	Students will learn the construction & working of solar, wind, Tidal, OTEC, Geothermal & hydrogen energy.
4	Project-Based Learning	Through mini projects & seminar, students will learn about the team work, ppt presentation, and writing report and communication skills also.
5	Ethical and Professional Responsibility	Students will understand the ethical and professional responsibilities associated Renewable Energy Sources and their importance.

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

Course Outcomes (COs)

COs	Description
M23BETK205C.1	Make use of the basic physics of energy conversion to identify the environmental aspects of renewable energy resources in comparison with various conventional energy systems, their prospects and limitations.
M23BETK205C.2	Explain Concept of Solar radiation & the working of solar radiation measuring devices.
M23BETK205C.3	Illustrate the methods of energy conversion using the concept of wind energy and bio mass energy concepts.
M23BETK205C.4	Interpret the different energy generation technologies by identifying the key operating principles of ocean energy.
M23BETK205C.5	Explain the components and operation of geothermal power plant and Hydrogen Energy.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BETK205C.1	**3**	-	-	-	-	-	-	-	-	-	-	-
M23BETK205C.2	**3**	-	-	-	-	-	-	-	-	-	-	-
M23BETK205C.3	**3**	-	-	-	-	-	-	-	-	-	-	-
M23BETK205C.4	**3**	-	-	-	-	-	-	-	-	-	-	-
M23BETK205C.5	**3**	-	-	-	-	-	-	-	-	-	-	-
M23BETK205C	**3**											

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	**10**					**10**
Module 2		**10**				**10**
Module 3			**10**			**10**
Module 4				**10**		**10**
Module 5					**10**	**10**
Total	**10**	**10**	**10**	**10**	**10**	**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	Total
Module 1	**20**					**20**
Module 2		**20**				**20**
Module 3			**20**			**20**
Module 4				**20**		**20**

Module 5					**20**	**20**
Total	**20**	**20**	**20**	**20**	**20**	**100**

10. Future with this Subject

The trend in renewable energy sources is characterized by significant growth and increasing adoption worldwide.Renewable energy capacity, particularly solar and wind, has been experiencing rapid growth globally. This expansion is driven by falling costs, technological advancements, supportive policies, and increasing environmental concerns.

Identifying Technology Advancements:

Investigate emerging technologies and innovations in renewable energy generation, storage, and distribution. Assess the potential impact of technological advancements on the cost-effectiveness and efficiency of renewable energy systems.

Addressing Challenges and Barriers

Identify technological barriers and limitations hindering the widespread adoption of renewable energy. Explore research and development efforts aimed at overcoming technical challenges and improving renewable energy technologies.

Assessing Environmental Benefits:

Investigate the environmental benefits of renewable energy, including reductions in air and water pollution, land use impacts, and ecosystem preservation.

Analyze the potential for renewable energy to contribute to biodiversity conservation and ecological sustainability.

Encouraging Research and Development:

Identify areas for further research and innovation in renewable energy technology, policy, and market design. Explore interdisciplinary approaches and collaborations to address complex challenges in the renewable energy sector.

2nd Semester	Emerging Technology Courses - II (ETC) Waste Management	M23BETK205D

1. Prerequisites

S/L	Proficiency	Prerequisites
1	**Waste Management.**	Knowledge of types of waste in day today life..
2	**Handling and Disposal of Waste.**	Knowledge of different types of waste and its impact.
3	**Sustainability.**	Knowledge of resources we consume in day-to-day life.
4	**Regulatory Compliances and Policy Development Principles.**	Basic understanding aboutwaste management principles.
5	**Health and Safety**	Knowledge of impact of waste to our health.

2. Syllabus

Waste Management SEMESTER –I/II			
Course Code	M23BETK105/205D	CIEMarks	**50**
NumberofLectureHours/Week(L:T:P:S)	**(3:0:0)**	SEE Marks	**50**
TotalNumberofLectureHours	**40 hours**	TotalMarks	**100**
Credits	**03**	ExamHours	**03**

Module-1

Introduction to solid waste management

Classification of solid wastes (source and type based), solid waste management (SWM), elements of SWM,ESSWM(environmentallysoundsolidwastemanagement)andEST(environmentallysound technologies),factorsaffectingSWM,Indianscenario,progressinMSW(municipalsolidwaste) Management in India. Indian and global scenario of e-waste,

Module-2

Waste Generation Aspects

Wastestreamassessment(WSA),wastegenerationandcomposition,wastecharacteristics(physical and chemical), health and environmental effects (public health and environmental), comparative assessment of waste generation and composition of developing and developed nations, a case study results from an Indian city, handouts on solid waste compositions. E-waste generation.

Module-3

COLLECTION,STORAGE,TRANSPORTANDDISPOSALOFWASTES

WasteCollection,StorageandTransport:Collectioncomponents,storage-containers/collection vehicles,collectionoperation,transferstation,wastecollectionsystemdesign,recordkeeping, control,inventoryandmonitoring,implementingcollectionandtransfersystem,acasestudy.Waste Disposal:keyissuesinwastedisposal,disposaloptionsandselectioncriteria,sanitarylandfill, landfillgasemission,leachateformation,environmentaleffectsoflandfill,landfilloperationissues,a casestudy.

Module-4

WASTE PROCESSING TECHNIQUES & SOURCE REDUCTION, PRODUCTRE COVERY & RECYCLING

Purposeofprocessing,mechanicalvolumeandsizereduction,componentseparation,dryingand dewatering.SourceReduction,ProductRecoveryandRecycling:basics,purpose,implementation monitoringandevaluationofsourcereduction,significanceofrecycling,planningofarecycling programme,recyclingprogrammeelements,commonlyrecycledmaterialsandprocesses,acase study.

Module-5

HAZARDOUS WASTE MANAGEMENT AND TREATMENT

Identification and classification of hazardous waste, hazardous waste treatment, pollution prevention and waste minimization, hazardous wastes management in India. E-waste recycling.

Text Books

11. Tchobaanoglous, G.,Theisen, H.,andSamuel AVigil,Integrated Solid WasteManagement,McGraw-Hill Publishers, 1993.
12. Bilitewski B., HardHe G., MarekK., Weissbach A., and Boeddicker H., Waste Management, Springer,1994.

Reference Books

11. White,F.R., FrankeP.R.,,&HindleM., Integratedsolidwaste management:a lifecycleinventory. Mc Dougall,P. John Wiley & Sons. 2001
12. Nicholas,P.,&Cheremisinoff,P.D.,Handbook ofsolid wastemanagementandwasteminimization technologies, Imprint of Elsevier Science. 2005

Weblinks

- https://nptel.ac.in/courses/105103205
- https://www.youtube.com/watch?v=k0ktJRoRcOA
- https://nptel.ac.in/courses/103/107/103107125/
- https://onlinecourses.nptel.ac.in/noc22_ce76/preview
- https://onlinecourses.swayam2.ac.in/cec20_ge13/preview

3. SyllabusTimeline

S/L	Syllabus Timeline	Description
1	Week1-2	Studentswilllearnaboutintroductiontosolidwastemanagement.
2	Week3-4	Studentswilllearnaboutwastegenerationaspects.
3	Week5-6	Students will learn about Collection, Storage, Transport and Disposal of Wastes.
4	Week7-8	StudentswilllearnaboutWasteProcessingTechniques&SourceReduction, Product Recovery & Recycling.
5	Week9-10:	StudentswilllearnaboutHazardous WasteManagementAndTreatment

4. Teaching-LearningProcessStrategies

S/L	TLPStrategies	Description
1	Lecture Method	Utilizevariousteachingmethodswithinthelectureformatto reinforcecompetencies.
2	Video/Animation	Incorporatevisualaidslikevideos/animationstoenhance understandingofconcepts.
3	Collaborative Learning	Encouragecollaborativelearningforimprovedcompetency application.
4	Higher Order Thinking (HOTS)Questions:	PoseHOTSquestionstostimulatecriticalthinkingrelatedto eachcompetency.
5	Problem-Based Learning (PBL)	ImplementPBLtoenhanceanalyticalskillsandpractical applicationofcompetencies.
6	Real-World Application	Discusspracticalapplicationstoconnecttheoreticalconcepts withreal-worldcompetencies.
7	Flipped Class Technique	Utilizeaflippedclassapproach,providingmaterialsbefore classtofacilitatedeeperunderstandingofcompetencies.

5. AssessmentDetails(bothCIEandSEE)

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

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

	Total Marks	**50**	**20**

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

6. LearningObjectives

S/L	Learning Objectives	Description
1	Understanding fundamentalsof Waste Management	Studentswillgraspthefundamentalconceptsofwastemanagement.
2	Proficiencyin handlingand disposal ofwaste.	Studentswillbecomeproficientinhandlinganddisposalofdifferenttypes of waste.
3	Designingofmodeltohandle waste.	Studentswilllearntodesigningmodeltohandle waste.
4	Proficiencyin Hazardous waste.	Studentswillbecomeproficientinvarioustypesofspecialconcretewhich they come across in present scenario of industrial applications.
5	Ethical and Professional Responsibility.	Students will understand the ethical and professional responsibilities associated with material characterization of each ingredient of concrete, andproductionandhandlingofconcreteadheringtoindustrystandardsandbestpractices.

7. CourseOutcomes(COs)andMappingwithPOs/PSOs Course Outcomes (COs)

COs	Description
M23BETK205D.1	Applythebasicsofsolidwastemanagementtowardssustainabledevelopment
M23BETK205D.2	Applytechnologiestoprocesswasteanddisposethesame.
M23BETK205D.3.	Designworkingmodelstoconvertwastetoenergy
M23BETK205D.4	Identifyandclassifyhazardouswasteandmanagethehazard

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
M23BETK205D.1	**3**						**2**					
M23BETK205D.2	**3**						**2**					
M23BETK205D.3.			**2**			**2**	**2**					
M23BETK205D.4		**2**				**2**	**2**					
M23BETK205D	3	**2**	2			**2**	**2**					

8. Assessment Plan

Continuous Internal Evaluation(CIE)

	CO1	CO2	CO3	CO4	**Total**
Module1	10				10
Module2	10				10

Module3		10			10
Module4			10		10
Module5				10	10
Total	**20**	**10**	**10**	**10**	**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	**Total**
Module1	20				20
Module2	20				20
Module3		20			20
Module4			20		20
Module5				20	20
Total	**40**	**20**	**20**	**20**	**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks.

9. Future with this Subject.

The "Waste Management" course in the first/second semester of the B.E program lays a strong foundation for several future courses in the undergraduate program of civil engineering and also other programme students will learn about this course and its impact on environment so that he will become responsible citizen in the society to protect mother earth.

2nd Semester	Emerging Technology Courses - II (ETC) Introduction to Internet of Things	M23BETK205E

1. Prerequisites (A minimum of five prerequisites may be written)

S/L	Proficiency	Prerequisites
1	Basics of Networking	Understanding of networking types Familiarity with fundamental layered networking models
2	Emergence of IOT	Knowledge of evolution of IoT, independence technology, network components and network strategy.
3	Sensors and Actuators	Differentiation of sensor and Actuators, characteristics associated with the sensors and the actuators, associated with multifaceted.
4	IoT Processing Topologies and Types	Basic understanding of importance of processing, topology, design and selection consideration.
5	Cloud Computing	Ability to analyze , Virtualization, Cloud Models, Service-Level Agreement andImplementation, and their services
6	Agricultural IoT	Knowledge relate to the applicability of IoT in real scenarios
7	Paradigms, Challenges, and the Future	Assess the various evolving aspects and paradigms of IoT , Understand the most prominent challenges encountered during the design and development of IoT solutions, Understand the common hardware platforms, sensors, and actuators used in IoT,Describe the common analytical tools and machine learning algorithms used with IoT data

2. Competencies (A minimum of four competencies may be written)

S/L	Emergence	KSA Description
1	**Basics of Networking**	**Knowledge:** Understanding of networking types. Knowledge of layers and models. **Skills:** Ability to apply concepts of basic terminologies andtechnology and new concepts of IoT with the basics of networking. **Attitudes:** Appreciation for the importance of of IoT with the basics of networking and topology.
2	**Emergence of IoT**	**Knowledge:** Understanding of evolutionof IOT, independence technology. **Skills:** Relate new concepts with concepts learned earlier to make a smooth transition to IoT. **Attitudes:** Recognize the unique features of IoT which set it apart from other similar paradigms.
3	Sensors and Actuators	**Knowledge:** Understand the concept of salient features of transducers, differentiate between sensors and actuators, characterize sensors and distinguish between types of sensors. **Skills:** Multi-faceted considerations associated with sensing, characterize actuators and distinguish between types of actuators. **Attitudes:** Understand the concept of sensor- multi-faceted considerations associated with actuation
4	**Associated IoT Technologies** -Cloud Computing	**Knowledge:** Understand the concept of cloud computing and its features. **Skills:** Understand virtualization, different cloud models, and service-level agreements. (SLAs) Identify the salient features of various cloud computing models.

		Attitudes: Understand the concept of sensor-clouds
5	Agricultural IoT	**Knowledge:** Understanding the applicability of IoT in real scenarios. **Skills:** Relate to the appropriate use of various IoT technologies through real-life use cases on IoT-based leaf area index assessment and an IoT-based irrigation system. **Attitudes:** Relate to the applicability of IoT in real scenarios.
6	**IoT case studies and future trends** -Paradigms, Challenges, and the Future	**Knowledge:** Understanding various evolving aspects and paradigms of IoT. **Skills:** Understand the most prominent challenges encountered during the design and development of IoT solutions. **Attitudes:** Research upcoming and emerging domains, which find significant applicability in IoT.
7	**Hands on IoT** Beginning IoT Hardware Projects	**Knowledge:** Understand the common hardware platforms, sensors, and actuators used in IoT. Assess the importance of each sensor or hardware in various applications. **Skills:** Using Arduino board and Raspberry Pi, installation and design. **Attitudes:** Assess the importance of each sensor or hardware in various applications

3. Syllabus

Introduction to Internet of Things(IOT) **SEMESTER – I**			
Course Code	**M23BETK105/205E**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(3:0:2)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours Theory**	Total Marks	**100**
Credits	**04**	Exam Hours	**03**

Course objectives: This course will enable students to:
CO1: Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.
CO2: Classify various sensing devices and actuator types.
CO3: Demonstrate the processing in IoT.
CO4: Apply Associated IoT Technologies.
CO5 :Analyze hands on IoT Applications

Module -1

Basics of Networking: Introduction, Network Types, Layered network models
Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components
Textbook 1: Chapter 1- 1.1 to 1.3; Chapter 4 – 4.1 to 4.4

Module -2

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

Module -3

IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. Textbook 1: Chapter 6 – 6.1 to 6.5

Module -4

ASSOCIATED IOT TECHNOLOGIES
Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service.
IOT CASE STUDIES
Agricultural IoT – Introduction and Case Studies
Textbook 1: Chapter 10– 10.1 to 10.6; Chapter 12- 12.1-12.2

Module -5
IOT CASE STUDIES AND FUTURE TRENDS AND IOT HANDS-ON **Paradigms, Challenges, and the Future**: Introduction, Evolution of New IoT Paradigms, Challenges Associated with IoT. **Beginning IoT Hardware Projects** : Introduction to Arduino Boards, **IoT Analytics:** Introduction Textbook 1: Chapter 15– 15.1-15.3; Chapter 16- 16.1; Chapter 17- 17.1
Text Books: Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year) 1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021. **Reference:** 2. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press. 3. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014. 4. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

4. Syllabus Timeline

S/L	Syllabus Timeline (No. of weeks should be as you have in the semester)	Description (Write the proposed syllabus coverage in detail with maximum of 5 lines)
1	Week 1-2: **Basics of Networking, Emergence of IoT**	**Basics of Networking, Emergence of IoT**
2	Week 3-4: **IoT Sensing and Actuation**	**IoT Sensing and Actuation**
3	Week 5-6: **IoT Processing Topologies and Types**:	**IoT Processing Topologies and Types**:
4	Week 7-8: **Cloud Computing ,Agricultural IoT**	**Cloud Computing ,Agricultural IoT**
5	Week 9-10: **Paradigms, Challenges, and the Future**	**Paradigms, Challenges, and the Future**
6	Week 11-12 **Beginning IoT Hardware Projects**	**Beginning IoT Hardware Projects**

5. 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 Verilog 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.
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 deeper understanding of competencies.
9	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

6. Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding Basics of Networking	Students will grasp the fundamental concepts networking types familiarity with fundamental layered networking models.
2	Designing **Emergence of IoT**	Students will ability to apply concepts of basic terminologies andtechnology and new concepts of IoT with the basics of networking.
3	Proficiency in sensors and actuators	Students will become proficient in Differentiation of sensor and Actuators, characteristics associated with the sensors and the actuators, associated with multifaceted
4	Collaboration and Communication Skills	Students will work collaboratively in teams on cloud computing and agricultural IoT and ability to communicate effectively.
5	Project-Based Learning	Through hands-on projects, students will apply their knowledge ofArduino Boards and Raspberry pi

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

Course Outcomes (COs)

COs	Description
M23BETK205E.1	Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.
M23BETK205E.2	Classify various sensing devices and actuator types.
M23BETK205E.3	Demonstrate the processing in IoT.
M23BETK205E.4	Apply Associated IoT Technologies.
M23BETK205E.5	Analyze hands on IoT Applications

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
M23BETK205E.1		**3**										
M23BETK205E.2		**3**										
M23BETK205E.3		**3**										
M23BETK205E.4			**3**									

M23BETK205E.5			**3**									
M23BETK205E		**3**	**3**									

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

The “Introduction to Internet of Things" course in the ……semester of the B.E program lays a strong foundation for several future courses in the undergraduate program. The contributions of this subject extend across various areas, enhancing the students' understanding and skills in the field of digital systems. Here are some notable contributions:

- **Cloud Computing:** The knowledge gained in this course, Understand the concept of cloud computing and its features and understand virtualization, different cloud models, and service-level agreements (SLAs). Students can delve deeper into topics such as Identify the salient features of various cloud computing models • Understand the concept of sensor-clouds.
- **Introduction to Arduino Boards and Raspberry Pi**.Understand the common hardware platforms, sensors, and actuators used in IoT , Assess the importance of each sensor or hardware in various applications, Understand the code structure required to operate these hardware and sensors /actuators connected to them , Relate the IoT hardware and sensors according to the requirements of their applications.
- **Machine learning**: Describe the common analytical tools and machine learning algorithms used with IoT data assess the importance and applicability of each algorithm , understand the operating principle of each of these analytical methods

2nd Semester	Emerging Technology Courses - II (ETC) Introduction to Cyber Security	M23BETK205F

1. Prerequisites

S/L	Proficiency	Prerequisites
1	**Computer Basics**	Understanding how computers work, including hardware components like CPU, memory, storage, and input/output devices
2	**Operating Systems**	Familiarity with popular operating systems like Windows, macOS, and Linux, including basic file management and navigation.
3	**Networking**	Basic concepts of how networks operate, including IP addressing, DNS, routing, and protocols like TCP/IP.
4	**Programming**	Basic knowledge of programming concepts can be helpful, though it's not always a strict requirement. Understanding concepts like variables, loops, conditionals, and functions can aid in understanding certain aspects of cybersecurity.
5	**Mathematics**	While not always necessary, a basic understanding of mathematics, particularly concepts like binary, hexadecimal, and boolean algebra, can be helpful.

2. Competencies

S/L	Competency	KSA Description
	Cybercrime and Information Security	***Knowledge:*** 5. **Understanding Cybercrime**: o Definition of cybercrime and its various manifestations (e.g., hacking, malware, social engineering). o Knowledge of the motives behind cybercriminal activities (e.g., financial gain, political motives, espionage). 6. **Cyber Threat Landscape**: o Awareness of common cyber threats and attack vectors (e.g., phishing, ransomware, insider threats). o Understanding of emerging cyber threats and trends (e.g., AI-driven attacks, supply chain vulnerabilities). 7. **Impact on Information Security**: o Understanding how cybercrime compromises information security (confidentiality, integrity, availability). o Knowledge of the consequences of cybercrime on individuals, organizations, and society (financial loss, reputational damage, regulatory penalties). 8. **Legal and Regulatory Framework**: o Familiarity with relevant cybersecurity laws, regulations, and standards (e.g., GDPR, HIPAA, PCI-DSS). o Understanding of the legal implications of cybercrime and the responsibilities of organizations in protecting data and mitigating risks. ***Skills:*** 5. **Cybersecurity Practices**: o Ability to implement cybersecurity best practices to protect against cyber threats (e.g., network security, endpoint protection, access control). o Skill in configuring and maintaining security tools and technologies (firewalls, intrusion detection/prevention systems, antivirus software). 6. **Incident Response and Management**: o Proficiency in incident detection, analysis, and response to cybersecurity incidents. o Ability to formulate and execute incident response plans, including containment, eradication, and recovery measures. 7. **Risk Assessment and Management**: o Skill in conducting risk assessments to identify vulnerabilities and assess potential impacts of cyber threats. o Competence in developing and implementing risk

		mitigation strategies and controls to reduce cyber risks. 8. **Security Awareness and Training**: o Capability to raise awareness among stakeholders about cybersecurity risks and best practices. o Skill in delivering cybersecurity training programs to educate users and enhance their vigilance against social engineering and phishing attacks. ***Attitudes:*** 5. **Ethical Responsibility**: o Commitment to ethical behavior and compliance with legal and regulatory requirements in cybersecurity practices. o Respect for privacy rights and data protection principles in handling sensitive information. 6. **Continuous Learning and Adaptability**: o Willingness to stay updated with evolving cyber threats, technologies, and best practices in cybersecurity. o Readiness to adapt strategies and defenses in response to new and emerging cyber threats. 7. **Collaboration and Teamwork**: o Openness to collaborate with colleagues, stakeholders, and cybersecurity professionals to enhance organizational security posture. o Ability to work effectively in cross-functional teams to address cybersecurity challenges and incidents. 8. **Resilience and Problem-Solving**: o Resilience in responding to cybersecurity incidents and mitigating their impact on organizational operations. o Problem-solving skills to analyze complex cybersecurity issues and develop effective solutions under pressure.

3. Syllabus

Course Code	**M23BETK105/205F**	CIE Marks
Teaching Hours/Week (L:T:P: S)		SEE Marks
Total Hours of Pedagogy	40	Total Marks
Credits	03	Exam Hours

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. **Chalk and Talk**
2. **PPT presentation**
3. **Animation based videos**
4. **Interactive learning**

Module 1

Introduction to Cybercrime: Introduction, Cybercrime:Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws.
Text 1: 1.1, 1.2, 1.4, 1.5, 1.7, 1.8.

Module 2

Cyber Offenses: Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cyber cafe & cybercrimes, The fuel for cybercrime, Attack Vector
Text 1: 2.1 to 2.7 (Except 2.2.4)

Module 3

Tools and Methods used in Cybercrime: Introduction**,** Introduction, Proxy Servers and Anonymizers, Phishing,
Password Cracking, Key Loggers and Spy-ways, Virus and Worms, Trozen Horses and Backdoors, Steganography, Attacks on Wireless networks.
Text 1: 4.1 to 4.8, 4.12.1, 4.12.3.

Module 4

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

Text 1: 5.1, 5.2, 5.3.1, 5.3.2, 5.3.3.
Module 5 **Understanding Computer Forensics:** Introduction, Historical Background of Cyber forensics, Digital Forensics Science, Need for Computer Forensics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts. Text 1: 7.1 to 7.4, 7.7, 7.8
Suggested Learning Resources: **Books:** 6. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics and legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018)
Web links and Video Lectures (e-Resources): 5. https://www.youtube.com/watch?v=yC_hFm0BX28&list=PLxApjaSnQGi6Jm7LLSxvmNQjS_rt9swsu 6. https://www.youtube.com/watch?v=nzZkKoREEGo&list=PL9ooVrP1hQOGPQVeapGsJCktzIO4DtI4_ 7. https://www.youtube.com/watch?v=6wi5DI6du-4&list=PL_uaeekrhGzJlB8XQBxU3z__hDwT95xlk 8. https://www.youtube.com/watch?v=KqSqyKwVuA8.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2:	**Introduction to Cybercrime**:
2	Week 3-4:	**Cyber Offenses**
3	Week 5-6:	**Tools and Methods used in Cybercrime**
4	Week 7-8:	**Phishing and Identity Theft**
5	Week 9-10:	**Understanding Computer Forensics:**
6	Week 11-12:	Digital Forensic Life cycle, Chain of Custody Concepts.

5. 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 cybersecurity 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	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 deeper understanding of competencies
9	Programming Assignments	. Assign programming tasks to reinforce practical skills associated with competencies.

6. Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description
1	**Foundational Understanding**	• Define cybersecurity and its significance in protecting digital assets, data, and systems from cyber threats. • Explain the principles of confidentiality, integrity, and availability (CIA) in the context of cybersecurity.
2	**Cyber Threat Landscape**	• Identify common types of cyber threats and attack vectors, such as malware, phishing, ransomware, and social engineering. • Understand the impact of cyber threats on individuals, organizations, and society.
3	Security Principles and Concepts	• Describe essential cybersecurity principles and concepts, including defense-in-depth, least privilege, and resilience. • Explain the importance of risk management and mitigation strategies in cybersecurity.
4	Cybersecurity Technologies and Tools	• Explore fundamental cybersecurity technologies and tools used to protect networks, systems, and data. • Discuss the role of firewalls, antivirus software, intrusion detection/prevention systems (IDS/IPS), and encryption in cybersecurity defense.
5	Legal and Ethical Considerations	• Discuss legal and regulatory requirements related to cybersecurity, including data protection laws (e.g., GDPR, CCPA). • Understand ethical considerations in cybersecurity practices, including privacy rights and responsible use of technology.
6	Cybersecurity Awareness and Education	• Highlight the importance of cybersecurity awareness among users and stakeholders. • Discuss strategies for promoting a cybersecurity-aware culture within organizations and communities.

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

Course Outcomes (COs)

COs	Description
M23BETK205F.1	Explain the cybercrime terminologies.
M23BETK205F.2	Describe cyber offenses and botnets.
M23BETK205F.3	Illustrate tools and methods used in cybercrime.
M23BETK205F.4	Demonstrate the need of phishing and identity theft.
M23BETK205F.5	Analyze the need of computer forensics.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BETK205F.1	**3**											
M23BETK205F.2	**3**											
M23BETK205F.3					**3**							
M23BETK205F.4		**3**										
M23BETK205F.5	**3**											
M23BETK205F	**3**	**3**			**3**							

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

The contributions of this subject extend across various areas, enhancing the students' understanding and skills in the field of digital systems. Here are some notable contributions:

1. **Artificial Intelligence and Machine Learning**:
- **Trend**: Increasing use of AI and ML for cybersecurity applications such as threat detection, anomaly detection, and behavioral analytics.
- **Impact**: Enhances the ability to identify and respond to cyber threats in real-time, automates repetitive tasks, and improves overall security posture.

7. **Internet of Things (IoT) Security**:
- **Trend**: Growth in IoT devices and networks necessitates improved security measures to protect against vulnerabilities and potential cyber attacks.
- **Impact**: Focus on securing IoT ecosystems, including device authentication, encryption, and monitoring for anomalous behavior.

8. **Cloud Security**:
- **Trend**: Continued migration of data and applications to cloud environments requires robust security controls and frameworks.
- **Impact**: Emphasis on cloud-native security solutions, data encryption, identity and access management (IAM), and compliance with data protection regulations.

9. **Zero Trust Architecture**:
- **Trend**: Shift towards Zero Trust security models that verify every user and device attempting to access resources, regardless of their location.
- **Impact**: Enhances security posture by minimizing the attack surface, implementing strict access controls, and continuously monitoring network activity

10. **Quantum Computing and Cryptography**:
- **Trend**: Development of quantum computing poses challenges to traditional cryptographic methods, driving research into quantum-resistant algorithms.
- **Impact**: Need for quantum-safe encryption to protect sensitive data from potential quantum-enabled attacks in the future.

2nd Semester	Programming Language Courses - II (PLC) INTRODUCTION TO WEB PROGRAMMING	M23BPLCK205A

1. Prerequisites

S/L	Proficiency	Prerequisites
1	**HTML (HyperText Markup Language):**	**Purpose:** HTML forms the structure and content of web pages. **Skills Needed:** Understanding of HTML tags, elements, attributes, and how they create the basic structure of web pages.
2	**CSS (Cascading Style Sheets):**	**Purpose:** CSS is used for styling HTML elements, controlling their layout, appearance, and responsiveness. **Skills Needed:** Proficiency in CSS selectors, properties, positioning, responsive design principles, and CSS frameworks (e.g., Bootstrap).
3	**JavaScript**	**Purpose:** JavaScript adds interactivity to web pages, allowing dynamic behavior such as user interactions, form validation, and asynchronous communication. **Skills Needed:** Knowledge of JavaScript syntax, DOM manipulation, event handling, AJAX (Asynchronous JavaScript and XML), and ES6+ features.
4	**Web Accessibility**	**Purpose:** Ensuring web content is accessible to all users, including those with disabilities. **Skills Needed:** Familiarity with accessibility guidelines (, and testing tools for accessibility compliance.
5	**Server-Side Languages and Frameworks**	**Purpose:** Handling server-side logic, database interactions, and generating dynamic content. **Skills Needed:** Proficiency in at least one server-side language and its associated frameworks.
6	**Web APIs (Application Programming Interfaces)**	**Purpose:** Integrating with external services, accessing data from third-party sources, and enabling communication between different software systems. **Skills Needed:** Knowledge of RESTful APIs, HTTP methods and authentication methods

2. Competencies

S/L	Competency	KSA Description
1	**Proficiency in Front-End Technologies**	**HTML:** Ability to create semantically correct markup for web pages. **CSS:** Skill in styling and layout, including responsive design principles. **JavaScript:** Mastery in DOM manipulation, event handling, and asynchronous programming.
2	**Understanding of Back-End Development**	**Server-Side Languages:** Competence in languages like Python, Ruby, PHP, or Node.js for server logic. **Frameworks:** Proficiency in popular frameworks such as Django, Ruby on Rails, Laravel, or Express.js for efficient development.
3	**Performance Optimization**	**Front-End Optimization:** Knowledge of techniques for improving loading times and rendering performance of web pages. **Back-End Optimization:** Skill in optimizing database queries and server-side code for scalability and efficiency.
4	**Continuous Learning and Adaptability**	**Technology Trends:** Keeping up-to-date with the latest trends and advancements in web development. **Problem-Solving:** Strong analytical and problem-solving skills to tackle complex technical challenges.

3.Syllabus

Introduction to Web Programming SEMESTER – I			
Course Code	**M23BPLCK105/205A**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(3:0:2:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours Theory + 8-10 Lab slots**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**
Course objectives:			

This course will enable students to:

CO 1. Apply the knowledge of fundamental concepts of HTML, XHTML, CSS and JavaScript

CO 2. Identify complex engineering problems and providing suitable solutions using HTML5 and JavaScript

CO 3. Analyze various attributes, values and types of CSS to design Web components.

CO 4. Investigate the core constructs and event handling mechanisms of JavaScript and CSS for providing valid solutions.

Module -1

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

Module -2

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

Module -3

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

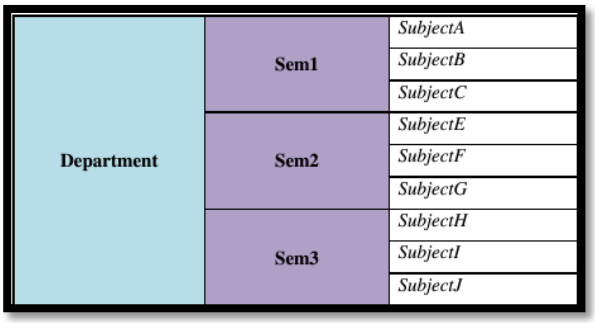
Module -4

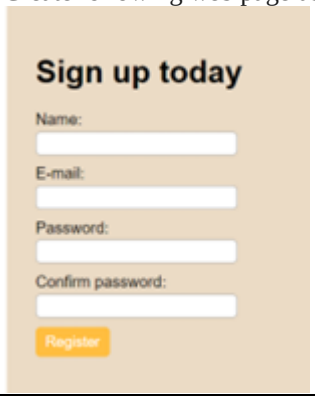
Tables and CSS, Links and Images:Table Elements, Formatting a Data Table: Borders, Alignment, and Padding, CSS Structural PseudoClass Selectors, thead and tbody Elements, Cell Spanning, Web Accessibility, CSS display Property with Table Values, a Element, Relative URLs, Navigation Within a Web Page, CSS for Links, Bitmap Image Formats: GIF, JPEG, PNG, img Element, Responsive Images, Positioning Images, Shortcut Icon, iframe Element . TextBook2: 5.2 to 5.8, 6.2, 6.3, 6.6., 6.7, 6.9, 6.10, 6.12, 7.2 to 7.4

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, Forms and How They're Processed: 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

PRACTICAL COMPONENT

10. **1**	Create an XHTML page using tags to accomplish the following: (i) A paragraph containing text "All that glitters is not gold". Bold face and italicize this text (ii) Create equation: x=1/3(y12+z12 (iii) Put a background image to a page and demonstrate all attributes of background image (iv) Create unordered list of 5 fruits and ordered list of 3 flowers
2	Create following table using XHTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary. 
3	Use HTML5 for performing following tasks: (i) Draw a square using HTML5 SVG , fill the square with green color and make 6px brown stroke width (ii) Write the following mathematical expression by using HTML5 MathML. d=x2-y2 (iii) Redirecting current page to another page after 5 seconds using HTML5 meta tag
4	Demonstrate the following HTML5 Semantic tags- <article>, <aside>, <details>, <figcaption>,

	<figure>, <footer>, <header>, <main>, <mark>, <section> for a webpage that gives information about travel experience
5	Create a class called income, and make it a background color of #0ff. Create a class called expenses, and make it a background color of #f0f. Create a class called profit, and make it a background color of #f00. Throughout the document, any text that mentions income, expenses, or profit, attach the appropriate class to that piece of text. Further create following line of text in the same document: The current price is 50₹ and new price is 40₹.
6	Change the tag li to have the following properties: (1)A display status of inline (2)A medium, double-lined, black border(3) No list style type Add the following properties to the style for li:(4) Margin of 5px (5)Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px to the left .Also demonstrate list style type with user defined image logos
7	Create following web page using HTML and CSS with tabular layout 
8.	Create following calculator interface with HTML and CSS 
9.	Write a Java Script program that on clicking a button, displays scrolling text which moves from left to right with a small delay.
1. **10.**	Create a webpage containing 3 overlapping images using HTML, CSS and JS. Further when the mouse is over any image, it should be on the top and fully displayed.

Text Books:

TextBook-1: HTML & CSS: The Complete Reference Thomas A. Powell, , Fifth Edition, Tata McGraw Hill,

TextBook-2: WEB PROGRAMMING with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, First Edition

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	**Week 1-2:**Traditional HTML and XHTML	**Competency**: Basic Concepts of HTML and XHTML **Knowledge** :Structure of HTML **Skills**: Applying the basic concepts through execution.
2	**Week 3-4:**HTML5	**Competency**: Document structure of HTML **Knowledge**: Basics tags of HTML an new tags of HTML5 **Skills:** Implementing the HTML5 tags.
3	**Week 5-6:**Cascading Style Sheets (CSS)	**Competency:** Basic concepts of Cascading style sheets. **Knowledge**: different CSS styles applied to different components. **Skills**: Designing and implementing CSS on HTML.

4	**Week 7-8:**Tables and CSS, Links and Images	**Competency:**Understanding creation of Tables, Links and Images. **Knowledge:** Importance of CSS on links and Tables. **Skills:** Applying the concept Create HTML5 document with CSS ,Links and different table tags..
5	**Week 9-10:**Introduction to JavaScript	**Competency:** Basic concepts of JavaScript **Knowledge**: Understanding structure of JavaScript with HTML5 **Skills**: Implementing HTML4 using JavaScript.

5. 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 Verilog 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	**Pair Programming**	. Incorporate pair programming sessions where students collaborate in pairs to solve coding tasks or work on projects together.
7	**Case Studies and Best Practices**	Analyzing code snippets, architectural decisions, and design patterns employed in these projects to help students understand how Scala is applied in practice
8	**Problem-Solving Sessions**	Organize problem-solving sessions where students can work together to solve coding challenges and overcome programming obstacles

6. Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description

1	**Understanding Web Technologies**	**Objective:** Explain the foundational technologies of web development including HTML, CSS, and JavaScript. **Skills:** Write semantic HTML markup, apply CSS for styling and layout, and implement JavaScript for interactivity and dynamic content.
2	**Implementing Client-Side Programming**	**Objective:** Apply JavaScript frameworks (e.g., React, Angular, Vue.js) to build interactive user interfaces and enhance user experience. **Skills:** Use frameworks/libraries for state management, component-based architecture, and handling asynchronous operations
3	**Optimizing Web Performance**	**Objective:** Optimize web application performance by minimizing load times, reducing server response times, and improving overall user experience. **Skills:** Perform front-end optimization (e.g., minification, lazy loading), optimize database queries, use caching mechanisms (e.g., CDN, browser caching), and monitor performance metrics.
4	**Continuous Learning and Adaptation**	**Objective:** Stay updated with emerging web technologies, industry trends, and best practices to continuously improve skills and adapt to evolving demands. **Skills:** Participate in online communities, attend workshops/conferences, and explore new tools/frameworks to enhance proficiency and innovate in web development.

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

Course Outcomes (COs)

COs	Description
M23BPLCK205.1	Apply the knowledge of fundamental concepts of HTML, XHTML, CSS and JavaScript
M23BPLCK205.2	Identify complex engineering problems and providing suitable solutions using HTML5 and JavaScript
M23BPLCK205.3	Analyze various attributes, values and types of CSS to design Web components
M23BPLCK205.4	Investigate the core constructs and event handling mechanisms of JavaScript and CSS for providing valid solutions.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BPLCK205.1	**3**											
M23BPLCK205.2		**3**										
M23BPLCK205.3			**3**									
M23BPLCK205.4				**3**								
M23BPLCK205	**3**	**3**	**3**	**3**								

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	**Total**
All Experiments	**10**	**10**	**10**	**20**	**50**
Total					**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	**Total**
All Experiments	**20**	**20**	**30**	**30**	**100**
Total					**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

The future of web programming is promising and continues to evolve rapidly with advancements in technology and changing user expectations. Here are several key aspects that highlight the future of web programming:

1.Progressive Web Applications (PWAs):

PWAs combine the best features of web and mobile applications, offering fast loading times, offline capabilities, and native-like user experiences. They are expected to become more prevalent as technology improves.

2.Single Page Applications (SPAs):

SPAs provide seamless user experiences by dynamically updating content without reloading the entire page. Frameworks like React, Angular, and Vue.js continue to dominate this space, with ongoing improvements in performance and developer experience.

3.Serverless Architecture:

Serverless computing allows developers to focus on writing code without managing servers. Services like AWS Lambda, Azure Functions, and Google Cloud Functions enable scalable and cost-effective solutions, driving the adoption of serverless architectures in web applications.

4.Web Assembly (Wasm):

Wasm enables running high-performance languages like C, C++, and Rust in web browsers, expanding the capabilities of web applications beyond traditional JavaScript limitations. It facilitates tasks such as gaming, multimedia processing, and complex computations directly in the browser.

5.AI and Machine Learning Integration:

AI and machine learning technologies are increasingly integrated into web applications for personalized user experiences, predictive analytics, and automation. JavaScript libraries and frameworks like TensorFlow.js and Brain.js enable developers to leverage AI capabilities in the browser.

6.Blockchain and Web3:

Blockchain technology and decentralized applications (dApps) are reshaping the web landscape with concepts like Web3. They offer enhanced security, transparency, and new economic models, influencing areas such as finance, supply chain management, and digital identity verification.

7.Responsive and Adaptive Design:

As the number of devices accessing the web grows, responsive and adaptive design principles remain crucial. Techniques such as CSS Grid, Flexbox, and responsive frameworks ensure that web applications deliver consistent user experiences across various screen sizes and devices.

8.Accessibility and Inclusive Design:

There is a growing emphasis on accessibility in web development, ensuring that web applications are usable by people with disabilities. Integrating accessible design practices and tools like screen readers, keyboard navigation, and ARIA roles will continue to be essential.

9.Cybersecurity and Privacy:

With increasing concerns over data privacy and security breaches, web developers must prioritize implementing robust security measures. This includes HTTPS encryption, secure authentication mechanisms, input validation, and regular security audits to protect user data and prevent vulnerabilities.

10.Continuous Learning and Adaptation:

Web developers need to embrace continuous learning to keep up with technological advancements, frameworks, and best practices. This involves staying engaged with developer communities, attending conferences, and exploring new tools and methodologies to stay competitive in the evolving field of web programming**.**

2nd Semester	Programming Language Courses - II (PLC) Introduction to Python Programming	M23BPLCK205B

1. Prerequisites

S/L		Prerequisites
1	**Basic Computer Skills**	Familiarity with using computers, navigating files systems, and basic software operations.
2	**Fundamental Programming Concepts**	Understanding of basic programming concepts such as variables, data types, loops, conditionals, functions, and basic algorithms. This can be from any programming language.
3	**Problem-Solving Skills**	Ability to analyze problems and formulate logical steps to solve them.
4	**Mathematical and Logical Thinking**	Basic understanding of arithmetic operations, boolean logic, and problem-solving techniques.
5	**English Proficiency**	Since many learning resources and documentation are in English, a basic understanding of English is beneficial.

2. Competencies

S/L	Competency	KSA Description
1	**Syntax and Semantics**	Understanding the basic syntax rules and language constructs of Python, such as variables, data types, operators, and control structures (loops, conditionals).
2	**Data Structures**	Proficiency in working with Python's built-in data structures like lists, tuples, dictionaries, sets, and understanding when to use each.
3	**Functions and Modules**	Ability to define and use functions effectively, including understanding function parameters, return values, and scope. Knowledge of importing and using modules to organize and reuse code.
4	**Object-Oriented Programming(OOP)**	Understanding of OOP concepts such as classes, objects, inheritance, polymorphism, and encapsulation. Proficiency in creating and using classes and objects in Python.
5	**File Handling**	Ability to read from and write to files using Python's file handling mechanisms, including text and binary files.
6	**Exception Handling**	Skill in handling errors and exceptions gracefully in Python programs using try-except blocks.
7	**Algorithmic Thinking**	Ability to apply algorithmic principles to solve computational problems efficiently using Python.
8	**Documentation and Code Organization**	Skill in writing clear, concise, and well-documented Python code. Understanding of code organization best practices, including naming conventions, comments, and documentation standards.

3. Syllabus

Introduction to Python Programming **SEMESTER – I/II**			
Course Code	**BPLCK105B/205B**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	2:0:2:0	SEE Marks	**50**
Total Number of Lecture Hours	40 hours	Total Marks	**100**
Credits	**03**	Exam Hours	**03**

Course objectives: This course will enable students to:

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

Module-1 (08 hrs)

Python Basics: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, andString Data Types, String Concatenation and Replication, Storing Values in Variables, Your FirstProgram, 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 withsys.exit(), **Functions:** def Statements with Parameters, Return Values and return Statements,TheNone 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 (08 hrs)

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 (08 hrs)

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/WritingProcess, Saving Variables with the shelve Module,Saving Variables with the pprint.format() Function
Textbook 1: Chapters 6 , 8

Module-4 (08 hrs)

Organizing Files: The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module
Debugging: Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE‟sDebugger.
Textbook 1: Chapters 9-10

Module-5 (08 hrs)

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,Theinit method, The __str__ method, Operator overloading, Type-baseddispatch, Polymorphism, Interface and implementation,
Textbook 2: Chapters 15 – 17

Programming Exercises:

1. a. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.
b. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.
2. a. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.
b. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).
3. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.
4. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.
5. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items]
6. Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(),readlines(), and write()].
7. Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.
8. Write a function named DivExp which takes TWO parameters a, b and returns a value c (c=a/b). Write suitable assertion for a>0 in function DivExp and raise an exception for when b=0. Develop a suitable program which reads two values from the console and calls a function DivExp.
9. Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class ‘Complex’ to represent the complex number. Develop a program to read N (N >=2) complex numbers and to compute the addition of N complex numbers.
10. Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use __init__() method to initialize name, USN and the lists to store marks and total, Use getMarks() method to read marks into the list, and display() method to display the score card

details.]

Suggested Learning Resources:

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)

Course outcomes (Course Skill Set):

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

- Use advanced functions and productivity tools to assist in developing worksheets.
- Manipulate data lists using Outline and PivotTables.
- Use Consolidation to summarise and report results from multiple worksheets.
- Apply Macros and Autofilter to solve the given real world scenario.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2: **Python Basics Flow control Lab -1aLab-1b**	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 .Boolean Values, Comparison Operators,Boolean Operators,Mixing Boolean and Comparison Operators, Elements of Flow Control,Program Execution
2	Week 3-4: **Flow control Functions Lists Lab -2aLab- 2b Lab-3**	Flow Control Statements, Importing Modules,Ending a Program Early withsys.exit(), 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 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,
3	Week 5-6: **Dictionaries and Structuring Data Manipulating StringsLab - 4Lab-5**	The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things,Working with Strings, Useful String Methods, Working with Strings, Useful String Methods
4	Week 7-8: **Reading and Writing Files Organizing FilesLab - 6Lab-7**	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, The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module
5	Week 9-10: **Debugging Classes and objects Lab -8Lab-9**	Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE‟s Debugger Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying,
6	Week 11-12: **Classes and functions Classes and methodsLab-10**	Time, Pure functions, Modifiers, Prototyping versus planning, Object-oriented features, Printing objects, Another example, A more complicated example,Theinit method, The __str__ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation,

5. Teaching-Learning Process Strategies

S/L	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 (Read-Eval-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**	Assign projects that require students to apply Python to solve practical problems. This approach reinforces understanding, encourages creativity, and prepares students for real-world coding scenarios.
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	**Continuous Learning**	Python is a rapidly evolving language with new features and libraries regularly introduced. Encourage students to stay updated through online resources, tutorials, and participation in Python communities.

6. Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description
1	**Understanding Basic Programming Constructs**	• Define and use variables, constants, and data types in Python. • Apply basic operations (arithmetic, comparison, logical) in Python.
2	**Control Structures**	• Implement conditional statements (if, elif, else) and understand their purpose. • Utilize loops (for, while) for repetitive tasks and iteration.

3	**Functions and Modular Programming**	. • Define and call functions in Python. • Understand function parameters, return values, and scope. • Organize code into modules and understand their role in code organization and reusability.
4	**Data Structures**	• Understand and use fundamental data structures in Python such as lists, tuples, dictionaries, and sets. • Implement operations on these data structures (e.g., indexing, slicing, adding, removing items).
5	**Object-Oriented Programming (OOP)**	• Define classes and objects in Python. • Implement encapsulation, inheritance, and polymorphism in Python classes. • Understand the benefits of OOP and when to use it.
6	**Error Handling**:	• Recognize common types of errors and exceptions in Python. • Use try-except blocks to handle exceptions gracefully.

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

Course Outcomes (COs)

COs	Description
BPLCK205B.1	Apply the fundamentals of Python programming to solve complex problems.
BPLCK205B.2	Analysedifferent data structures, concepts of string manipulation used in python programming
BPLCK205B.3	Interpret the concepts of object oriented programming using Python
BPLCK205B.4	Develop Solutions to the real world problems using python and justify through formal reasoning with completeexperimentaldocumentation.

CO-PO-PSO Mapping

COs/POs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
BPLCK205B.1	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
BPLCK205B.2	**-**	**3**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
BPLCK205B.3	**-**	**-**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
BPLCK205B.4			**-**	**3**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
BPLCK205B	**3**	**3**	**2**	**3**	**2**							

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**100**

Conditions for SEE Paper Setting:
Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

Python's future looks promising across various domains and industries due to its versatility, ease of use, and strong community support. Here are ten aspects that highlight Python's future prospects:

1. **Data Science and Machine Learning**: Python is the dominant language in data science and machine learning due to libraries like NumPy, Pandas, SciPy, and scikit-learn. Its simplicity and powerful libraries make it ideal for data manipulation, analysis, and building machine learning models.
2. **Artificial Intelligence (AI) and Deep Learning**: Python, especially with frameworks like TensorFlow, PyTorch, and Keras, is widely used for AI and deep learning applications. Its flexibility and ease of integration with other technologies make it a preferred choice for developing AI solutions.
3. **Web Development**: Python frameworks like Django and Flask are popular for web development. They offer robust features, security, and scalability, making Python a strong contender for building web applications and APIs.
4. **Scientific Computing**: Python's libraries such as SciPy, Matplotlib, and SymPy make it valuable for scientific computing tasks such as simulations, numerical computing, and visualization.
5. **Automation and Scripting**: Python's simplicity and extensive standard library make it ideal for automation tasks, system administration, and scripting. It is used in DevOps for configuration management and deployment automation.
6. **Education**: Python's readability and simplicity make it an excellent language for teaching programming fundamentals. It is widely used in educational institutions worldwide to introduce students to coding.
7. **IoT (Internet of Things)**: Python's lightweight footprint and support for microcontrollers make it suitable for IoT development. Libraries like MicroPython and CircuitPython simplify programming for IoT devices.
8. **Finance and Fintech**: Python is widely used in finance for quantitative analysis, risk management, algorithmic trading, and building financial models. Its libraries like pandas and NumPy are particularly valuable in financial analytics.
9. **Game Development**: Python, with libraries like Pygame and Panda3D, is used for developing 2D and 3D games. Its simplicity and rapid development capabilities make it popular among game developers.
10. **Cross-platform Compatibility**: Python's cross-platform compatibility allows developers to write code once and deploy it across multiple platforms, including Windows, macOS, Linux, and mobile platforms (via frameworks like Kivy and BeeWare).

2nd Semester	Programming Language Courses - II (PLC) Basics of JAVA Programming	M23BPLCK205C

1. Prerequisites

S/L	Proficiency	Prerequisites
1.	Basic Programming Constructs	Knowledge of fundamental programming concepts such as variables, data types, control structures (if statements, loops), and functions/methods.
2.	Logic and Problem-Solving Skills	Ability to think logically and solve problems systematically.
3.	Mathematical Operations	Basic arithmetic operations and understanding of basic algebra.
4.	Using a Text Editor or IDE	Comfort with text editors (e.g., Notepad++, Sublime Text) or Integrated Development Environments (IDEs) like IntelliJ IDEA, Eclipse, or NetBeans.
5.	Problem-Solving Skills	Ability to analyze problems, break them down into smaller components, and devise solutions. Shell scripting often involves solving various problems efficiently.

2. Competencies

S/L	Competency	KSA Description
1.	**Proficiency in Command Line Interface**	**Knowledge:** Understand the fundamental of Command line Interface when writing Java program using Linux terminal **Skills:** ● Efficient file manipulation, text processing, and system administrations. **Attitudes:** ● Be comfortable with command line interface
2.	**Syntax and Semantics**	**Knowledge:** ● Understanding Java syntax and semantics, including data types, operators, control structures, and exception handling. **Skills:** Writing Java program to solve various problems using the learned skills **Attitudes:** Confident in writing Java Program.
3.	**Object-Oriented Programming**	**Knowledge:** Deep knowledge of OOP principles and their application in Java, including classes, objects, inheritance, polymorphism, encapsulation, and abstraction. **Skills:** ● Increase problem analysis and developing program. **Attitudes:** ● Confident in using OOP principles when developing program.
4.	**Algorithm Design**	**Knowledge:** ● Ability to design and implement algorithms to solve complex problems. **Skills:** ● Ability convert algorithm into program. **Attitudes:** ● Comfortable in writing java program to solve complex problems.

3. Syllabus

Basic of JAVA Programming SEMESTER – I			
Course Code	M23BPLK105/205C	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(2:0:2)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**
Course Learning objectives: ● Learn fundamental features of object oriented language and JAVA ● Set up Java JDK environment to create, debug and run simple Java programs.			

- Learn object oriented concepts using programming examples.
- Study the concepts of importing of packages and exception handling mechanism.

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, A Few Words About Strings.
Text book 1: Ch 2, Ch 3

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.
Text book 1: Ch 4, Ch 5

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.
Text book 1: Ch 6, Ch 7 (7.1-7.9)

Module -4

Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.
Text book 1: Ch 8

Module -5

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. Text book 1: Ch 9, Ch 10

Text Book(s)

1. Herbert Schildt, Java The Complete Reference, 7th Edition, Tata McGraw Hill, 2007.

Web link:

- https://onlinecourses.nptel.ac.in/noc22_cs47/preview

Programming Assignments

1. Write a JAVA program that prints all real solutions to the quadratic equation ax2+bx+c=0. Read in a, b, c and use the quadratic formula.
2. Write a JAVAprogram for multiplication of two arrays.
3. Demonstrate the following operations and sign extension with Java programs (i) << (ii) >> (iii) >>>
4. Write aJAVA program to sort list of elements in ascending and descending order
5. Create a JAVA class called Student with the following details as variables within it.

USN
NAME
BRANCH
PHONE
PERCENTAGE

Write a JAVA program to create n Student objects and print the USN, Name, Branch, Phone, and percentage of these objects with suitable headings.

6. Write a JAVA program demonstrating Method overloading and Constructor overloading.
7. Design a super class called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a JAVA program to read and display at least 3 staff objects of all three categories.
8. Demonstrate dynamic dispatch using abstract class in JAVA.
9. Create two packages P1 and P2. In package P1, create class A, class B inherited from A, class C .In package P2, create class D inherited from class A in package P1 and class E. Demonstrate

working of access modifiers (private, public, protected, default) in all these classes using JAVA.
10. Write a JAVA program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. Also demonstrate working of ArrayIndexOutOfBoundException.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2: **An Overview of Java**	**Understand:** Principles of object oriented programming, Java programming concepts. **Acquire the Knowledge** of OOP's concepts and basics of Java Program (Data Types, Variables, arrays, etc.) Including the implementation of Java program for the learned concepts.
2	Week 3-4: **Operators**	**Impart the knowledge of** various operators used in Java program. Also understand the process of type conversion etc. Including the implementation of Java program for the learned concepts.
3	Week 5-6: **Introducing Classes**	Understand the one of the important principles of Java program that is class and class structure. Including the implementation of Java program for the learned concepts.
4	Week 7-8: **Inheritance**	**Acquire the Knowledge:** Inheritance and different types of inheritance. Implementation of inheritance. Including the implementation of Java program for the learned concepts.
5	Week 9-10: **Packages and Interfaces**	**Understand the importance of** package and interface. Implement the packages and interfaces.
6	Week 11-12: **Integration and Practical Applications**	Apply learned concepts and competencies to real-world scenarios. Hands-on practice with programming assignments.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Live Demonstration	Develop and run Java programs in the classroom.
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	Programming Assignments	Assign programming tasks to improve the practical skills.

6. Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding Programming Fundamentals	**Syntax and Structure**: Learn the basic syntax and structure of Java programs, including data types, variables, operators, control flow statements (if, else, switch), and loops (for, while, do-while).
2	Mastering Object-Oriented Programming (OOP)	**Core OOP Concepts**: Grasp the fundamental principles of OOP, such as classes, objects, inheritance, polymorphism, encapsulation, and abstraction.
3	Developing Problem-Solving Skills	**Algorithm Development**: Develop the ability to break down problems into smaller, manageable tasks and create algorithms to solve them.
4	Building Simple Applications	**Hands-On Practice:** Apply your knowledge to build simple applications, reinforcing what you've learned and gaining practical experience.

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

Course Outcomes (COs)

COs	Description
M23BPLK205C.1	Understand and apply the fundamental concepts and object oriented concepts in JAVA programming.
M23BPLK205C.2	Analyze working of various operators and control statements in JAVA
M23BPLK205C.3	Develop simple programs based on classes, polymorphism and inheritance.
M23BPLK205C.4	Develop a java program to importing packages and exception handling mechanism.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BPLK205C.1	**3**	-	-	-	**3**	-	-	-	-	-	-	**2**
M23BPLK205C.2	-	**3**	-	-	**3**	-	-	-	-	-	-	**2**
M23BPLK205C.3	-	-	**3**	-	**3**	-	-	-	-	-	-	**2**
M23BPLK205C.4	-	-	**3**	-	**3**	-	-	-	-	-	-	**2**
M23BPLK205C	**3**	**3**	**3**		**3**							**2**

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1						
Module 2						
Module 3						
Module 4						
Module 5						
Total						**100**

Conditions for SEE Paper Setting:
Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

The "Basics of Java Programming" course in the first semester of the B.E (Computer Science & Engineering Branches) program places an important role for learning several future courses in the undergraduate program. This subject is very important in learning subjects such as Analysis and Design of Algorithm, Data Structures, Python programming, etc.

Here are some notable contributions:

- **Cloud Platforms:** Understand how to deploy Java applications to cloud platforms like AWS, Google Cloud Platform, or Azure.
- **Big Data Technologies:** Explore big data technologies such as Hadoop, Spark, and Kafka, and how to integrate them with Java applications.
- **Android Development:** Study Android development to build mobile applications using Java.
- **Advanced Data Structures:** Study advanced data structures like trees (binary trees, AVL trees, red-black trees), graphs, and heaps.
- **Algorithms:** Learn about more complex algorithms, including sorting algorithms (quick sort, merge sort), search algorithms (binary search, depth-first search, breadth-first search), and dynamic programming.

2nd Semester	Programming Language Courses - II (PLC) Introduction to C++ Programming	M23BPLCK205D

1. Prerequisites

S/L	Proficiency	Prerequisites
1	**Basic Computer Skills**	Familiarity of different Operating Systems and the basic knowledge of command line usage is very needful.
2	**Knowledge of Integrated Development Environment**	Requires the basic skills to use various tools like text editor, compiler, linker and C++ IDE.
3	**Problem Solving Skills**	Knowledge of the Algorithmic thinking and Logical thinking needed.
4	**Mathematics**	Proficiency in Mathematics required to find the roots of quadratic equation, Trigonometric Functions etc,.
5	**Basics of C Programming**	Fundamental understanding of C is essential for object-oriented programming. This includes syntax, data types, variables, control structures, functions, and pointers
6	**Previous Coursework**	Completion of introductory courses in principles of programming in C related field.

2. Competencies

S/L	Competency	KSA Description
1	**Introduction to Object Oriented Concepts**	**Knowledge:** Importance of Object Orientation Concepts. Understanding of the basics of Object Orientation Programming. **Skills:** Ability to apply Object Orientation Concepts to create objects using appropriate structure. **Attitudes:** Appreciation to understand the importance of object orientation perspective and implement the same at basic level.
2	**Basic of Programming**	**Knowledge:** Understanding of basic elements of programming specific to C++ Language. Basics of C++ program execution. **Skills:** Designing basic C++ program using basic elements of programming language. Creating and executing simple C++ programs. **Attitudes:** Appreciation for the role of C++ programming elements and its execution.
3	**C++ Classes and its methods**	**Knowledge:** Understanding how classes are defined with data members and methods. **Skills:** Designing of classes for real world objects. Defining appropriate attributes and methods for classes. **Attitudes:** Valuing the importance of classes and its methods in line with real-world objects.
4	**Reusability of Classes and Methods**	**Knowledge:** Understanding the importance of code reusability through classes and methods reusability. **Skills:** Applying concepts of object orientation with classes and methods. Describing the actually importance of reusability through implementations. **Attitudes:** Openness to learning and using object orientation concepts to achieve code reusability.
5	**Exceptions and Handling the Exceptions**	**Knowledge:** Understanding of issues with exceptions. **Skills:**

		Implementing how to handle the exceptions through appropriate C++ programming construct. **Attitudes:** Appreciation for the way exception is handled and making the execution of program in control.

3. Syllabus structure

S/L	Syllabus structure	KS Description
1.	Module 1: Introduction to object Oriented Programming	**Competency**: Basic C++ Programming **Knowledge**: C++ Programming basic constructs. **Skills**: Applying basic programming constructs in C++ execution environment
2	Module 2: Basic data types and Decision and Control Structures	**Competency**: C++ Looping Constructs and Classes **Knowledge**: Basics of C++ Classes with looping constructs. **Skills:** Designing and Implementing Classes in C++ and Looping constructs.
3	Module 3: Classes and Objects and Constructor and Destructors	**Competency:** Class with Constructor and Destructor. **Knowledge**: Basics of C++ Classes with constructors and destructours. **Skills**: Designing and implementing class methods through Constructor and Destructors.
4	Module 4: Operator Overloading Inheritance,	**Competency:** Operator overloading andInheritance with Packages and Interfaces **Knowledge:** Importance of Inheritance, Use of Packages and Interfaces. **Skills:** Applying the concept of Inheritance with Classes, creating package and importing the same with interfaces.
5	Module 5: Polymorphism Exception,, Handling,	**Competency:**Polymorphism,Exceptions, and Exception-handling **Knowledge**: Understanding plymorphism Exception, handling exceptions **Skills**: Implementing exception handlers.

4. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Image/Video/Animation	Incorporate visual aids like image/videos/animations to enhance understanding of programming constructs.
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	Programming-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	Flipped Class Technique	Utilize a flipped class approach, providing materials before class to facilitate deeper understanding of competencies
8	Programming Assignments	Assign programming tasks to reinforce practical skills associated with competencies.

5. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	**Week 1-2:**Introduction to object Oriented Programming and Tokens	. **Competency**: Basic C++ Programming . **Knowledge** :C++Programming Tokens. . **Skills**: Applying basic programming tokens in C++ execution environment.
2	**Week 3-4:** Basic data types and Decision and Control Structures	. **Competency**: Looping Constructs and C++ Classes . **Knowledge**: Basics of C++ Classes with looping constructs. . **Skills:** Designing and Implementing Classes in C++ and Looping constructs.
3	**Week 5-6:** Classes and Objects and Constructor and Destructors,	. **Competency:** Class with Constructor and Destructors. . **Knowledge**: Using Constructor and Destructors memory is allocated and de-allocated . **Skills**: Designing and implementing Constructors.
4	**Week 7-8:** Operator Overloading and Inheritance,	. **Competency:** operator overloading and Inheritance with Packages and Interfaces . **Knowledge:** Importance of Inheritance, Use of Packages and Interfaces. . **Skills:** Applying the concept of Inheritance with Classes, creating package and importing the same with interfaces.
5	**Week 9-10:**Polymorphism and Exceptions-Handling.	. **Competency:**Polymorphism**,**Exceptions, Exception-handling. . **Knowledge**: Understanding Exception, handling exceptions . **Skills**: Implementing exception handlers.

6. Syllabus

INTRODUCTION TO C++ PROGRAMMING SEMESTER – I			
Course Code	**M23BPLK105/205D**	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(3:0:2:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**40 hours Theory + 8-10 Lab slots**	Total Marks	**100**
Credits	**03**	Exam Hours	**03**
Course objectives:			
Module -1			
Introduction to object Oriented Programming: OOP Paradigm, Basic concepts of OOP,Beginning with C++, Applications of C++, A simple C++ programs, Structure of C++ Program. **Tokens:** Character sets and Symbols, Keywords, C++ Identifiers, Variables and Constants, Dynamic Initialization of variables, Reference variables, Operators.			
Module -2			
Basic data types: Data types in C++, User defined data types, Storage classes, Type cast Operators**.** **Decision and 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: Classes in C, class declaration, declaring objects, Define member functions, call by reference, return by reference, inline functions, default arguments, Function Overloading **Constructor and Destructors :** Constructors, Parameterized constructors, Multiple Constructors in a class, Constructors with default arguments, Dynamic initialization of Objects, 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 ineritance, Hybrid Inheritance, Abstract classes, constructors in derived class, Member classes..			
Module -5			
Polymorphism: Introduction, Virtual functions, virtual constructor and destructors. **Exception Handling**: Basic of Exception Handling, Exception Handling Mechanism, Throwing			

Mechanism, Catching Mechanism, Rethrowing an Exception, Exception in Operator overloaded functions.	
List of Programs for Practice	
1	Design a C++ program to perform simple calculator.
2	An election is contested by five candidates. The candidates are numbered 1 to 5 and a voting is done by marking the candidate number in a ballot paper. Write a C++ program to read the ballot and count the votes cast for each candidate using an array variable count. In case, a number read is outside the range 1 to 5 the ballot should be considered as a 'spoilt ballot', and the program should also count the number of spoilt ballots.
3	Develop a C++ program to sort the elements in ascending and descending order
4	Develop a C++ program to demonstrate function overloading for the following prototypes. add(int a, int b) add(double a, double b)
5	Develop a C++ program using Operator Overloading for overloading Unary minus operator.
6	Develop a C++ program to implement Multiple inheritance for performing arithmetic operation of two numbers.
7	Develop a C++ program using Constructor in Derived classes to initialize alpha, beta and gamma and display corresponding values.
8	Develop a C++ program to swap two integer numbers.
9	Develop a function which throws a division by zero exception and catch it in catch block. Write a C++ program to demonstrate usage of try, catch and throw to handle exception.
10	Develop a C++ program that handles array out of bounds exception using C++.
Text Books: 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++.	

7. Assessment Details (both CIE and SEE)

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

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

Final CIE Marks = (A) + (B)

Average internal assessment shall be the best two test marks.

Semester End Examination:

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

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 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.

8. Learning Objectives

S/L	**Learning Objectives**	**Description**
1	Understanding fundamentals of C++ Programming Constructs	Students will grasp the fundamental concepts of C++ Programming, including basic constructs.
2	Executing Simple C++ Programs	Students will learn to design and execute basic and simple C++ programs.
3	Programming-Based Learning	Through program execution-based learning, students will undergo the demonstration of C++ programming constructs working principles.

4	Proficiency in C++ Specific Constructs	Students will become proficient in understanding and applying the C++ specific constructs to improve the efficiency of C++programming logics.
5	Ethical and Professional Responsibility	Students will understand the ethical and professional responsibilities associated with C++ Programming, including respecting intellectual property rights, ensuring design reliability and security, and adhering to industry standards and best practices.

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

Course Outcomes (COs)

COs	Description
M23BPLK205D.1	Understand and apply the basic programming constructs.
M23BPLK205D.2	Apply the structure of classes and methods in C++ programming environment.
M23BPLK205D.3	Analyze the different programming constructs of C++ and its effectiveness in improving the efficiency of C++ programs.
M23BPLK205D.4	Implement appropriate C++ programming constructs to solve real-world problem sample scenarios.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BPLK205D.1	**3**											
M23BPLK205D.2	**3**											
M23BPLK205D.3		**3**										
M23BPLK205D.4			**3**									
M23BPLK205D	**3**	**3**	**3**									

10. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	CO2	CO3	CO4	**Total**
Module 1					
Module 2					
Module 3					
Module 4					
Module 5					
Total					**50**

Semester End Examination (SEE)

	CO1	CO2	CO3	CO4	**Total**
Module 1					
Module 2					
Module 3					
Module 4					
Module 5					
Total					**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

11. Future with this Subject

- **Continued Evolution and Standardization:** C++ continues to evolve with regular updates and new standards. The C++20 standard introduced significant new features such as modules, co routines, concepts, and improved concurrency support. Future standards, such as C++23 and beyond, are anticipated to further enhance the language, focusing on performance, simplicity, and safety. These updates ensure that C++ remains modern and relevant.
- **Educational Importance:** C++ continues to be a staple in computer science education. It teaches fundamental programming concepts, including memory management and system-level programming, which are essential for understanding more complex languages and systems
- **Systems and Embedded Programming:** C++ is foundational in systems programming, including operating systems, drivers, and embedded systems. Its ability to interact closely with hardware while maintaining a high level of performance makes it indispensable in these areas. The Internet of Things (IoT) and smart devices will further bolster the demand for C++ in embedded systems.
- **Artificial Intelligence and Machine Learning :**While Python dominates the AI and machine learning space, C++ is crucial for performance-critical components of ML frameworks like TensorFlow and PyTorch. It is used to optimize algorithms and enhance the efficiency of AI applications, especially in production environments.
- **Web Assembly:** With the rise of Web Assembly, C++ can be used to write high-performance code that runs in the browser. This opens new avenues for C++ in web development, enabling the development of complex web applications that require near-native performance..
- **Community and Ecosystem: The C++ community is vibrant and active, continually c**ontributing to its ecosystem with libraries, tools, and frameworks. This ongoing support ensures that C++ remains relevant and accessible for developers.

2nd Semester	Humanities Professional Writing Skills in English	M23BPWSK206

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Knowledge of Basic English	Basic Grammar and Constructing sentences as studied from 1st to 12th std.

2. Competencies

S/L	Competency	KSA Description
1	**Basic Grammar**	**Knowledge:** Basic knowledge of English grammar. **Skills:** Building/Constructing Sentences . **Attitudes:** Appreciation for the English grammar and literature
2	**Vocabulary**	**Knowledge:** Understanding repository of words **Skills:** Building repository of English words to create effective sentence formation. **Attitudes:** Appreciation for use of strong vocabulary
3	**Essence of Communication**	**Knowledge:** Understanding primary and essential components of communication **Skills:** Designing presentation for an occasion and dealing a situation with effective communication **Attitudes:** Valuing the importance of Effective communication in strong and competitive situations
4	**Professionalism and Managing Emotional Intelligence**	**Knowledge:** Understanding importance of Professionalism and Emotional Intelligence **Skills:** Applying Professionalism to manage business & work. Controlling Emotional Intelligence to handle conflicts **Attitudes:** Achievement of goals through professionalism and ability to handle emotional Intelligence

3. Syllabus

PROESSIONAL WRITING SKILLS IN ENGLISH SEMESTER – II			
Course Code	M23BPWSK206/106	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(2:0:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**30 hours**	Total Marks	**100**
Credits	**01**	Exam Hours	**01**

Course objectives:

1. Students will advance their understanding of English grammar and vocabulary, focusing on common errors in usage, subject-verb agreement, and advanced vocabulary applications.
2. The course aims to improve technical reading and writing capabilities, including understanding technical reports and proposals, scientific writing processes, and professional communication for employment.
3. Participants will learn the essentials of professional communication, including group discussions, job interview strategies, intra- and interpersonal communication skills, and non-verbal cues.
4. Students will gain knowledge in work ethic, professionalism, business etiquette, and emotional intelligence, preparing them for a professional setting.
5. The course will focus on developing emotional intelligence, understanding its components, and applying strategies to enhance leadership and teamwork skills

Module -1

Identifying Common Errors in Writing and Speaking English :

Advanced English Grammar for Professionals with exercises, Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules with Exercises).

Common errors in Subject-verb agreement, Noun-pronoun agreement, Sequence of Tenses and errors identification in Tenses. Advanced English Vocabulary and its types with exercises – Verbal Analogies, Words Confused/Misused. Nature and Style of sensible writing :

Organizing Principles of Paragraphs in Documents, Writing Introduction and Conclusion, Importance of Proper Punctuation, The Art of Condensation (Precise writing) and Techniques in Essay writing, Common Errors due to Indianism in English Communication, Creating Coherence and Cohesion, Sentence arrangements exercises, Practice of Sentence Corrections activities. Importance of Summarising and Paraphrasing.

Misplaced modifiers, Contractions, Collocations, Word Order, Errors due to the Confusion of words, Common errors in the use of Idioms and phrases, Gender, Singular & Plural. Redundancies & Clichés

Module -2

Technical Reading and Writing Practices :

Reading Process and Reading Strategies, Introduction to Technical writing process, Understanding of writing process, Effective Technical Reading and Writing Practices , Introduction to Technical Reports writing, Significance of Reports, Types of Reports.

Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process.

Grammar – Voice and Speech (Active and Passive Voices) and Reported Speech, Spotting Error Exercises, Sentence Improvement Exercises, Cloze Test and Theme Detection Exercises.

Professional Communication for Employment :

The Listening Comprehension, Importance of Listening Comprehension, Types of Listening, Understanding and Interpreting, Listening Barriers, Improving Listening Skills. Attributes of a good and poor listener.

Reading Skills and Reading Comprehension, Active and Passive Reading, Tips for effective reading.

Preparing for Job Application, Components of a Formal Letter, Formats and Types of official, employment, Business Letters, Resume vs Bio Data, Profile, CV and others, Types of resume, Writing effective resume for employment, Model Letter of Application (Cover Letter) with Resume, Emails, Blog Writing, Memos (Types of Memos) and other recent communication types.

Module -3

Professional Communication at Workplace :

Group Discussions – Importance, Characteristics, Strategies of a Group Discussions. Group Discussions is a Tool for Selection. Employment/ Job Interviews - Importance, Characteristics, Strategies of a Employment/ Job Interviews. Intra and Interpersonal Communication Skills - Importance, Characteristics, Strategies of a Intra and Interpersonal Communication Skills. NonVerbal Communication Skills (Body Language) and its importance in GD and PI/JI/EI. Presentation skills and Formal Presentations by Students - Importance, Characteristics, Strategies of Presentation Skills. Dialogues in Various Situations (Activity based Practical Sessions in class by Students).

Business Etiquettes

> Greetings and Introductions in Business Settings
> Business Dining Etiquette
> Dress Code and Personal Grooming
> Electronic Etiquette: Phone, Email, and Social Media
> International Business Etiquette: Understanding Cultural Differences

Module -4

Work Ethic and Professionalism

> Defining Work Ethic: Traits and Characteristics
> The Importance of Reliability and Accountability
> Maintaining Confidentiality
> Building a Positive Professional Image
> Balancing Professionalism with Personal Authenticity

Module -5

Emotional Intelligence

>	Defining Emotional Intelligence (EI)
>	The Five Components of EI (Daniel Goleman's Model)
>	Strategies to Boost Emotional Intelligence
>	Role of EI in Leadership and Teamwork
>	Overcoming Emotional Triggers

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3: Identifying Common Errors in Writing and Speaking English	Advanced English Grammar for Professionals, Common errors in Subject-verb agreement, Noun-pronoun agreement, Sequence of Tenses and errors identification in Tenses. Advanced English Vocabulary and its types with exercises – Verbal Analogies, Words Confused/Misused. Nature and Style of sensible writing ,Importance of Proper Punctuation, Essay writing, The Art of Condensation (Precise writing) and Techniques in Essay writing.
2	Week 4-6: Technical Reading and Writing Practices, Professional Communication for Employment	Reading Process and Reading Strategies, Introduction to Technical writing process, Technical Proposals. Scientific Writing Process, Grammar – Voice and Speech (Active and Passive Voices) and Reported Speech, Spotting Error. The Listening Comprehension,Reading Skills and Reading Comprehension,Preparing for Job Application, Letter writing , Resume Preparation
3	Week 7-9: Professional Communication at Workplace, Business Etiquettes	Group Discussions – Importance, Characteristics, Strategies of a Group Discussions,Employment/ Job Interviews - Importance, Characteristics, Strategies of a Employment/ Job Interviews. Intra and Interpersonal Communication Skills,Body Language Presentation skills and Formal Presentations by Students Business Etiquettes-Appearance grooming, Electronic etiquettes, International Business Etiquettes
4	Week 10-12: Work Ethic and Professionalism	Traits and Characteristics of work ethics, The Importance of Reliability and Accountability, Maintaining Confidentiality, Professional Image Balancing Professionalism with Personal Authenticity
5	One day Crash course:Emotional Intelligence	Definition, Daniel Goleman's model, Boosting and controlled Emotional Intelligence, Role of EI in Leadership and Teamwork

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	. Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	. Team handling and professional communication can be learnt better with activities such as Task management, project planning etc.
3	Collaborative Learning	. Learning in team with small skits, role plays, group activities, debates etc
4	Writing exercises	. Students will be engaged with writing exercises to acquire writing proficiency such as mail writing , report writing and letter writing.
5	Real-World Application	. Situation based learning for Professional communication and Emotional Intelligence management

6. Assessment Details (both CIE and SEE)

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

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

	TotalMarks	50	20

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding Basic Grammar of English	Students will acquire advanced knowledge of English Grammar
2	Sentence Construction	Students will learn to construct sentences used both in written and communicative English.
3	Presentation Skills	Students will learn presentation skill used in many forms .
4	Activity based learning for professional communication and Emotional Intelligence management	Learn through activity is a strong form of learning. Activities are created through Role plays, situation handling and work in team to make students learn Professional Communication, importance of ethics team handling and Emotional Intelligence management.
5	Writing skills	Exposure to writing skills with exercises on letter writing, report writing, resume preparation and Electronic communication

8. Course Outcomes (Cos) and Mapping with Pos/ PSOs

Course Outcomes (Cos)

Cos	Description
M23BPWSK206.1	**Students will be able to acquire proficiency in writingand oral skills in English through recap of basics, presentation techniques, email etiquettes, and understanding team skills.**
M23BPWSK206.2	**Students will be able learn professionalism and handling emotional intelligence**

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BPWSK206.1										**3**		
M23BPWSK206.2								**2**		**3**		
M23BPWSK206.								**2**		**3**		

8. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	Total
Module 1	**10**	
Module 2	**10**	
Module 3	**10**	
Module 4	**10**	
Module 5	**10**	
Total		**50**

Semester End Examination (SEE)

	CO1	Total
Module 1	**20**	
Module 2	**20**	
Module 3	**20**	
Module 4	**20**	

Module 5	**20**	
Total		**100**

Conditions for SEE Paper Setting:
Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

9. Future with this Subject

1. **Project presentation** : Students will be at ease with project presentation with effective Report and oral communication
2. **Professionalism** :Students will understand importance of professionalism and will be able to adopt the same in their profession for career growth.
3. **Succeeding in Corporate World:** Effective communication both in written and oral form, ability toprofessionally handle team and controlling emotional spikes are essential components of success in Corporate world. Students acquire these characteristics from this course.

2nd Semester	Humanities Communicative English	M23BENGK206

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Knowledge of Basic English	Basic Grammar and Constructing sentences as studied from 1st to 12th std.

2. Competencies

S/L	Competency	KSA Description
1	**Basic Grammar**	**Knowledge:** Basic knowledge of English grammar. **Skills:** Building/Constructing Sentences . **Attitudes:** Appreciation for the English grammar and literature
2	**Vocabulary**	**Knowledge:** Understanding repository of words **Skills:** Building repository of English words to create effective sentence formation. **Attitudes:** Appreciation for use of strong vocabulary
3	**Essence of Communication**	**Knowledge:** Understanding primary and essential components of communication **Skills:** Designing presentation for an occasion and dealing a situation with effective communication **Attitudes:** Valuing the importance of Effective communication in strong and competitive situations
4	**Communication in Team**	**Knowledge:** Understanding importance of intra and inter personal communication **Skills:** Applying effective communication to achieve team's objective **Attitudes:** Achievement of goals through effective communication in a team

3. Syllabus

COMMUNICATIVE ENGLISH SEMESTER – I			
Course Code	M23BENGK106/206	CIE Marks	**50**
Number of Lecture Hours/Week(L: T: P: S)	**(2:0:0)**	SEE Marks	**50**
Total Number of Lecture Hours	**30 hours**	Total Marks	**100**
Credits	**01**	Exam Hours	**01**

Module -1

Basic English Communicative Grammar and Vocabulary PART - I :
Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes, Strong and Weak forms of words, Introduction to Vocabulary, All Types of Vocabulary – Exercises on it. Introduction to Communicative English :
Communicative English, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.**06 hrs**

Module -2

Introduction to Phonetics :
Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure. Word Accent, Stress Shift and Intonation, Spelling Rules and Words often Misspelt. Common Errors in Pronunciation.
Basic English Communicative Grammar and Vocabulary PART - II :

Words formation - Prefixes and Suffixes, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Tense and Types of tenses, The Sequence of Tenses (Rules in use of Tenses) and Exercises on it.**06 hrs**
Module -3
Communication Skills for Employment :Information Transfer : Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions – Exercises. Presentation Skills > Planning and Structuring a Presentation > Effective Use of Visual Aids > Engaging the Audience: Techniques and Strategies > Overcoming Stage Fear > Evaluating Presentation Success**06 hrs**
Module -4
Email and Virtual Communication > Email Etiquette: Do's and Don'ts > Crafting Effective Emails: Clarity, Brevity, and Tone > Best Practices for Virtual Meetings (Zoom, Teams, etc.) > Virtual Communication Tools > Navigating Time Zones, Cultural Differences, and Other Challenges Assertiveness > Understanding the Difference: Assertiveness vs Aggressiveness > Benefits of Being Assertive > Techniques for Assertive Communication > Saying No Politely and Firmly > Assertiveness Role-Plays**06 hrs**
Module -5
Team Work and Collaboration > Characteristics of Effective Teams > Roles and Responsibilities within Teams > Strategies for Collaborative Work > Handling Team Conflicts > Celebrating Team Successes**06 hrs**

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-3: Basic English Communicative Grammar and Vocabulary PART - I :	Grammar and Parts of Speech, Articles and Preposition,All Types of Vocabulary – Exercises on it, Introduction to communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.
2	Week 4-6: Introduction to Phonetics, Basic English Communicative Grammar and Vocabulary PART - II	Phonetic Transcription, English Pronunciation, Pronunciation Guidelines to consonants and vowels, Sounds Mispronounced, Silent and Non silent Letters, Syllables and Structure.Common Errors in Pronunciation, Words formation - Prefixes and Suffixes, Contractions and Abbreviations on.
3	Week 7-9: Communication Skills for Employment, Presentation Skills	Oral Presentation and its Practice. Difference between Extempore/Public Speaking, Communication Guidelines. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence. Reading and Listening Comprehensions. Planning and Structuring a Presentation,,Effective Use of Visual Aids, Engaging the Audience: Techniques and Strategies Overcoming Stage Fear,Evaluating Presentation Success
4	Week 10-12: Email and Virtual Communication	Email Etiquette: Do's and Don'ts,Crafting Effective Emails: Clarity, Brevity, and Tone,Best Practices for Virtual Meetings (Zoom, Teams, etc.)Virtual Communication Tools,Navigating Time Zones, Cultural Differences, and Other Challenges Assertiveness,Understanding the Difference: Assertiveness vsAggressiveness,Benefits of Being Assertive, Techniques for Assertive Communication

5	One day Crash course:Team Work and Collaboration	Characteristics of Effective Teams, Roles and Responsibilities within Teams, Strategies for Collaborative Work, Handling Team Conflicts

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	Communicative English can be learnt better with practice. Role plays, JAM, Impromptu at individual levels
3	Collaborative Learning	Learning in team with small skits, role plays, group activities, debates etc
4	Writing exercises	Email writing & responding requires both language and etiquette, students will be engaged with writing exercises to acquire this proficiency
7	Real-World Application	Discuss practical applications of Communicative English

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

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

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

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding Basic Grammar of English	Students will acquire or reinforce their knowledge of English Grammar
2	Sentence Construction	Students will learn to construct sentences used both in written and communicative English.
3	Presentation Skills	Students will learn different forms of presentation skills used in many situations.
4	Activity based learning	Learn through activity is a strong form of learning. Activities are created through Role plays, situation handling and work in team to make students learn communicative English practically.
5	Email communication	Email is a strong source of communication and very important in corporate and business word. Students acquire knowledge of this through email writing exercises

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

Course Outcomes (COs)

COs	Description
M23BENGK206.1	**Students will be able to acquire proficiency in communicative English through recap of basics, presentation techniques, email etiquettes, and understanding team skills.**

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BENGK206.1										**3**		
M23BENGK206										**3**		

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1	**Total**
Module 1	**10**	
Module 2	**10**	
Module 3	**10**	
Module 4	**10**	
Module 5	**10**	
Total		**50**

Semester End Examination (SEE)

	CO1	**Total**
Module 1	**20**	
Module 2	**20**	
Module 3	**20**	
Module 4	**20**	
Module 5	**20**	
Total		**100**

Conditions for SEE Paper Setting:
Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

1. **Presenting Seminars**: Students will be at ease with all seminar presentation
2. **Facing Employment process**: Good communicative English will enhance confidence and improve performance in Employment process
3. **Succeeding in Corporate World:** Half battle is won with good communication in project and idea presentation. The communication proficiency acquired through this course will help students succeed in Corporate world

2nd Semester	Humanities Indian Constitution	M23BICOK207

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Knowledge of Basic Constitution	The basic structure of Indian Constitution.

2. Competencies

S/L	Competency	KSA Description
1	**Basic Constitution**	**Knowledge:** FundamentalRights(FR's),DPSP'sandFundamentalDuties(FD's)ofourconstitution.
2	**Articles**	**Knowledge:** All 395 articles and amendments
3	**Parliament system**	**Knowledge:**Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies
4	**General Law**	**Knowledge:** ElectionCommission,Elections&Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.

3. Syllabus

CourseTitle:	**IndianConstitution**		
CourseCode:	**M23BICOK107/207**	CIEMarks	50
CourseType(Theory/Practical/Integrated)		SEEMarks	50
		TotalMarks	100
TeachingHours/Week(L:T:P:S)	1:0:0:0	ExamHours	01Theory
TotalHoursofPedagogy	15hours	Credits	01

Courseobjectives:

Thecourse**INDIANCONSTITUTION(M23BICOK107/207)**willenablethestudents,

- ToknowaboutthebasicstructureofIndianConstitution.
- ToknowtheFundamentalRights(FR's),DPSP'sandFundamentalDuties(FD's)ofourconstitution.
- ToknowaboutourUnionGovernment,politicalstructure&codes,procedures.
- ToknowtheStateExecutive&ElectionssystemofIndia.
- TolearntheAmendmentsandEmergencyProvisions,other importantprovisionsgivenbytheconstitution.

Teaching-LearningProcess

ThesearesampleStrategies, whichteachercanuseto acceleratetheattainmentof thevariouscourseoutcomes andmake Teaching –Learning more effective: Teachers shall adopt suitable pedagogy for effective teaching - learningprocess.Thepedagogyshallinvolvethecombinationofdifferentmethodologieswhichsuitmoderntechnologicaltools.

(i)Directinstructionalmethod(Low/OldTechnology) ,(ii)Flippedclassrooms(High/advancedTechnologicaltools), (iii) Blendedlearning(Combinationofboth),(iv)Enquiryandevaluationbasedlearning, (v)Personalizedlearning, (vi)Problemsbased learningthroughdiscussion.

(ii) Apart from conventional lecture methods, various types of innovative teaching techniques through videos,animationfilmsmaybeadaptedsothatthedeliveredlessoncanprogressthestudentsIntheoreticalappliedand practicalskills.

Module-1 (03hoursof pedagogy)

IndianConstitution: NecessityoftheConstitution,SocietiesbeforeandaftertheConstitutionadoption.IntroductiontotheIndianconstitution,MakingoftheConstitution, Roleofthe ConstituentAssembly.

Module-2 (03hours of pedagogy)

SalientfeaturesofIndiaConstitution.PreambleofIndianConstitution&KeyconceptsofthePreamble.FundamentalRights(FR's)anditsRestrictionandlimitationsindifferentComplexSituations.building.

Module-3 (03hoursof pedagogy)

DirectivePrinciplesofStatePolicy(DPSP's)anditspresentrelevanceinIndiansociety.FundamentalDuties anditsScopeandsignificanceinNation,UnionExecutive:ParliamentarySystem,UnionExecutive– President,PrimeMinister,UnionCabinet.
Module-4 (03hoursofpedagogy)
Parliament-LSandRS,ParliamentaryCommittees,ImportantParliamentaryTerminologies.JudicialSystemofIndia,Supreme CourtofIndia andother Courts,Judicial ReviewsandJudicialActivism.
Module-5 (03hours ofpedagogy)
StateExecutiveandGoverner,CM,StateCabinet,Legislature-VS&VP,ElectionCommission,Elections&Electoral Process.Amendmentto Constitution,andImportantConstitutionalAmendmentstilltoday.EmergencyProvisions.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	**Module-1 03hours**	Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly.
2	**Module-2 03hours**	Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. building.
3	**Module-3 03hours**	Directive Principles of State Policy (DPSP's) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive : Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.
4	**Module-4 03hours**	Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism.
5	**Module-5 03hours**	State Executive and Governer, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and Important Constitutional Amendments till today. Emergency Provisions.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	group discussion topics
3	Collaborative Learning	Visit the Government office and parliament
4	Writing exercises	Essay writing
5	Real-World Application	Discuss Elections & Electoral

6. Assessment Details (both CIE and SEE)

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

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

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Contents related activities (Activity-based discussions)	
2	For active participation of students instruct the students to prepare Flowcharts and Handouts	
3	Organising Group wise discussions Connecting to placement activities	
4	Quizzes and Discussions	
5	Seminars and assignments	

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

Course Outcomes (COs)

COs	Description
M23BICOK207.1	Analyse the basic structure of Indian Constitution. Understand our State Executive & Elections system of India.
M23BICOK207.2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution. Remember the Amendments and Emergency Provisions, other important provisions given by the constitution

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BICOK207.1						**2**				**3**		
M23BICOK207.2						**2**				**3**		
M23BICOK207						**2**				**3**		

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1/CO2	Total
Module 1	**10**	
Module 2	**10**	
Module 3	**10**	
Module 4	**10**	
Module 5	**10**	
Total		**50**

Semester End Examination (SEE)

	CO1/CO2	Total
Module 1	**20**	
Module 2	**20**	
Module 3	**20**	
Module 4	**20**	
Module 5	**20**	
Total		**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

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

2nd Semester	Humanities (HS) Samskruthika Kannada	M23BKSKK207

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Knowledge of Kannada Lietrecher	Samskruthika Kannada

2. Competencies (A minimum of four competencies may be written)

S/L	Competency	KSA Description
1	**Revolution of Kannada**	**Knowledge:** .ಕರ್ನಾಟಕದಏಕೀಕರಣ: ಒಂದುಅಪೂರ್ವಚರಿತ್ರೆ - ಜಿವೆಂಕಟಸುಬ್ಬಯ್ಯ
2	**Novel writing**	**Knowledge:** ಮೆಗಾನೆಎಂಬಗಿರಿಜನಪರ್ವತ- ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ
3	**Learn Tradition and Culture**	**Knowledge:** ವಚನಗಳು:ಬಸವಣ್ಣ,ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು,ಆಯ್ದಕ್ಕಿಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿಲಕ್ಕಮ್ಮ.

3. Syllabus

ವಿಷಯ	ಸಾಂಸ್ಕೃತಿಕಕನ್ನಡ		
ವಿಷಯಸಂಖ್ಯೆ	**M23BKSKK107/207**		
ಗಂಟೆಗಳುವಾರಕ್ಕೆ	**1**	ಒಟ್ಟುಗಂಟೆಗಳು	15
ಚಾತುರ್ಮಾಸ	1/2	ವಿಭಾಗ	

ಕ್ರಸಂ	ಬೋಧನಾವಿಷಯ
1	**ಘಟಕ-1 ಲೇಖನಗಳು3 Hours** ಕರ್ನಾಟಕಸಂಸ್ಕೃತಿ - ಹಂಪನಾಗರಾಜಯ್ಯ
2	ಕರ್ನಾಟಕದಏಕೀಕರಣ: ಒಂದುಅಪೂರ್ವಚರಿತ್ರೆ - ಜಿವೆಂಕಟಸುಬ್ಬಯ್ಯ
3	ಆಡಳಿತಭಾಷೆಯಾಗಿಕನ್ನಡ - ಡಾ. ಎಲ್ತಿಮ್ಮೇಶಮತ್ತುವಿಕೇಶವಮೂರ್ತಿ
4	**ಘಟಕ-2 ಆಧುನಿಕಪೂರ್ವದಕಾವ್ಯಭಾಗ3 Hours** ವಚನಗಳು:ಬಸವಣ್ಣ,ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು,ಆಯ್ದಕ್ಕಿಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿಲಕ್ಕಮ್ಮ.
5	ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನುಫಲಇದರಿಂದಏನುಫಲ-ಪುರಂದರದಾಸರು
6	ತಲ್ಲಣಿಸದಿರುಕಂಡ್ಯತಾಳುಮನವೇ – ಕನಕದಾಸರು
7	ತತ್ಪದಗಳುಸಾವಿರಕೊಡಗಳಸುಟ್ಟು - ಶಿಶುನಾಳಷರೀಫ
8	**ಘಟಕ – 3 ಆಧುನಿಕಕಾವ್ಯಭಾಗ3 Hours** ಡಿವಿಜಿರವರಮಂಕುತಿಮ್ಮನಕಗ್ಗದಿಂದಆಯ್ದಕೆಲವುಭಾಗಗಳು
9	ಕುರುಡುಕಾಂಚಾಣ - ದ.ರಾ. ಬೇಂದ್ರೆ
10	ಹೊಸಬಾಳಿನಗೀತೆ - ಕುವೆಂಪು
11	**ಘಟಕ – 4 ತಾಂತ್ರಿಕವ್ಯಕ್ತಿಗಳಪರಿಚಯ3 Hours** ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯವ್ಯಕ್ತಿಮತ್ತುಐತಿಹ್ಯಎ.ಎನ್.ಮೂರ್ತಿರಾವ್
12	ಕರಕುಶಲಕಲೆಗಳುಮತ್ತುಪರಂಪರೆಯವಿಜ್ಞಾನಕರಿಗೌಡಬೀಚನಹಳ್ಳಿ
13	**ಘಟಕ – 5 ಕಥೆಮತ್ತುಪ್ರವಾಸಕಥನ3 Hours** ಯುಗಾದಿ - ವಸುಧೇಂದ್ರ
14	ಮೆಗಾನೆಎಂಬಗಿರಿಜನಪರ್ವತ- ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	**Module-1 03hours**	**ಘಟಕ-1 ಲೇಖನಗಳು** ಕರ್ನಾಟಕಸಂಸ್ಕೃತಿ - ಹಂಪನಾಗರಾಜಯ್ಯ ಕರ್ನಾಟಕದಏಕೀಕರಣ: ಒಂದುಅಪೂರ್ವಚರಿತ್ರೆ - ಜಿವೆಂಕಟಸುಬ್ಬಯ್ಯ ಆಡಳಿತಭಾಷೆಯಾಗಿಕನ್ನಡ - ಡಾ. ಎಲ್ತಿಮ್ಮೇಶಮತ್ತುವಿಕೇಶವಮೂರ್ತಿ

2	**Module-2** **03hours**	**ಘಟಕ-2 ಆಧುನಿಕಪೂರ್ವದಕಾವ್ಯಭಾಗ** ವಚನಗಳು:ಬಸವಣ್ಣ,ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು,ಆಯ್ದಕ್ಕಿಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿಲಕ್ಕಮ್ಮ. ಕೀರ್ತನೆಗಳು: ಅದರಿಂದೇನುಫಲಇದರಿಂದಏನುಫಲ- ಪುರಂದರದಾಸರು ತತ್ಪದಗಳುಸಾವಿರಕೊಡಗಳಸುಟ್ಟು - ಶಿಶುನಾಳಷರೀಫ
3	**Module-3** **03hours**	**ಘಟಕ – 3 ಆಧುನಿಕಕಾವ್ಯಭಾಗ** ಡಿವಿಜಿರವರಮಂಕುತಿಮ್ಮನಕಗ್ಗದಿಂದಆಯ್ದಕೆಲವುಭಾಗಗಳು ಕುರುಡುಕಾಂಚಾಣ - ದ.ರಾ. ಬೇಂದ್ರೆ ಹೊಸಬಾಳಿನಗೀತೆ - ಕುವೆಂಪು
4	**Module-4** **03hours**	**ಘಟಕ – 4 ತಾಂತ್ರಿಕವ್ಯಕ್ತಿಗಳಪರಿಚಯ** ಡಾ. ಸರ್. ಎಂ. ವಿಶ್ವೇಶ್ವರಯ್ಯವ್ಯಕ್ತಿಮತ್ತುಐತಿಹ್ಯಎ.ಎನ್.ಮೂರ್ತಿರಾವ್ ಕರಕುಶಲಕಲೆಗಳುಮತ್ತುಪರಂಪರೆಯವಿಜ್ಞಾನಕರಿಗೌಡಬೀಚನಹಳ್ಳಿ.
5	**Module-5** **03hours**	**ಘಟಕ – 5 ಕಥೆಮತ್ತುಪ್ರವಾಸಕಥನ** ಯುಗಾದಿ–ವಸುಧೇಂದ್ರ ಮೆಗಾನೆಎಂಬಗಿರಿಜನಪರ್ವತ- ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	group discussion topics
3	Collaborative Learning	
4	Writing exercises	Essay writing
7	Real-World Application	

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

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

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

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Contents related activities (Activity-based discussions	
2	For active participation of students instruct the students to prepare Flowcharts and Handouts	
3	Organising Group wise discussions	
4	Quizzes and Discussions	
5	Seminars and assignments	

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

Course Outcomes (COs)

COs	Description

M23BKSKK207.1	ಕನ್ನಡ ಸಾಹಿತ್ಯಯ ಸಂಸ್ಕೃತಿ ನಾಡು ನುಡಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು
M23BKSKK207.2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯ,ಕಥೆ, ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯಮಾಡುವುದು
M23BKSKK207.3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಢಿಸುವುದು.

CO-PO-PSO Mapping

COs/POs	PO 1	PO2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BKSKK207.1								**2**		**2**		
M23BKSKK207.2								**2**		**2**		
M23BKSKK207.3								**2**		**2**		
M23BKSKK207								**2**		**2**		

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1/CO2/ CO3	**Total**
Module 1	**10**	
Module 2	**10**	
Module 3	**10**	
Module 4	**10**	
Module 5	**10**	
Total		**50**

Semester End Examination (SEE)

	CO1/CO2/ CO3	**Total**
Module 1	**20**	
Module 2	**20**	
Module 3	**20**	
Module 4	**20**	
Module 5	**20**	
Total		**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

- **Presenting Seminars**: Students will be at ease with all seminar presentation
- **Facing Employment process**: If the student taken any civil service examination and their problem issue

2nd Semester	Humanities (HS) ಬಳಕೆ ಕನ್ನಡ	M23BKBKK207

1. Prerequisites

S/L	Proficiency	Prerequisites
1	Knowledge of Basic Kannada	ಬಳಕೆ ಕನ್ನಡ

2. Competencies (A minimum of four competencies may be written)

S/L	Competency	KSA Description
1	**Basic Grammar**	**Knowledge:** Methods to learn the Kannada language.
2	**Vocabulary**	**Knowledge:**nouns, dubitive
3	**Essence of Communication**	**Knowledge:** To learn the Kannada
4	**Communication in Team**	**Knowledge:** Right the ready the Kannada

3. Syllabus

Subject Name: ಬಳಕೆ ಕನ್ನಡ	
Sub Code: M23BKSKK107/207	**SEE Marks: 50**
Hours/week: 02 hr Theory/week	**CIE Marks : 50**
Total Hours: 15	**Exam : 01hr**
Semester :I/I1	**Credit : 1**

Module 1	**3Hours**
Sl No	ಪಠ್ಯ ವಿಭಜನೆ
1	1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2	Easy learning of a Kannada Language: A few tips. Hints for correct and polite conservation, Listening and Speaking Activities
3	Key to Transcription.
4	ವೈಯಕ್ತಿಕಸರ್ವನಾಮಗಳು, ಸ್ವಾಮ್ಯಸೂಚಕರೂಪಗಳು, ಪ್ರಶ್ನಾರ್ಹಪದಗಳು- Personal Pronouns, Possessive Forms, Interrogative words

Module 2	**3Hours**
Sl No	ಪಠ್ಯ ವಿಭಜನೆ
4	ನಾಮಪದಗಳಸ್ವಾಮ್ಯಸೂಚಕರೂಪಗಳು, ಸಂಶಯಾಸ್ಪದಪ್ರಶ್ನೆಮತ್ತುಸಂಬಂಧಿತನಾಮಪದಗಳು Possessive forms of nouns, dubitive question and Relative nouns
5	ಗುಣಾತ್ಮಕ, ಪರಿಮಾಣಾತ್ಮಕಮತ್ತುಬಣ್ಣಗುಣವಾಚಕಗಳು, ಅಂಕಿಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals
6	**ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ(ಆ ಅದು ಅವು ಅಲ್ಲಿ)** Predictive Forms, Locative Case

Module 3	**3 Hours**
Sl. No.	ಪಠ್ಯ ವಿಭಜನೆ
7	ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು Dative Cases, and Numerals
8	ಸಂಖ್ಯಾಗುಣಚಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು Ordinal numerals and Plural markers
9	ದೋಷಯುಕ್ತ / ಋಣಾತ್ಮಕಕ್ರಿಯಾಪದಗಳುಮತ್ತು ಬಣ್ಣದವಿಶೇಷಣಗಳು Defective / Negative Verbs and Colour Adjectives

Module 4	**3 Hours**
Sl. No.	ಪಠ್ಯ ವಿಭಜನೆ
10	ಅಪ್ಪಣೆ ಒಪ್ಪಿಗೆ ನಿರ್ದೇಶನ ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences)
11	ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ಸ್ವತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು , Accusative Cases and Potential Forms used in General Communication
12	ಇರು ಮತ್ತು ಇರಲ್ಲ ಸಹಾಯಕ ಕ್ರಯಾಪದಗಳು ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs
13	ಹೋಲಿಕೆ ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕಪದಗಳು Comparitive,

	Relationship, Identification and Negation Words
	Module - 5 **03 Hours**
Sl. No.	ಪಠ್ಯ ವಿಭಜನೆ
13	ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳು ವಿವಿಧ ಪ್ರಕಾರಗಳು different types of forms of Tense, Time and Verbs
14	**ಭೂತಕಾಲದರಚನೆ, ಭವಿಷ್ಯಮತ್ತು ಕ್ರಿಯಾಪದರೂಪಗಳೊಂದಿಗೆಪ್ರಸ್ತುತಉದ್ವಿಗ್ನವಾಕ್ಯಗಳು**Formation of Past, Future and Present Tense Sentences with Verb Forms
15	ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು Kannada Vocabulary List Kannada Words in Conversation

4. Syllabus Timeline

S/L	Syllabus Timeline (No. of weeks should be as you have in the semester)	Description (Write the proposed syllabus coverage in detail with maximum of 5 lines)
1	**Module-1 03hours**	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. ವೈಯಕ್ತಿಕಸ್ವಾಮ್ಯ ಸೂಚಕ/ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು Personal Pronouns, Possessive Forms, Interrogative words
2	**Module-2 03hours**	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 ಅವುಅಲ್ಲಿ) Predictive Forms, Locative Case
3	**Module-3 03hours**	ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು Dative Cases and Numerals ,ಸಂಖ್ಯಾಗುಣಚಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು -Ordinal numerals and Plural markers ನ್ಯೂನ ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು ಮತ್ತು ವರ್ಣ ಗುಣವಾಚಕಗಳು Defective / Negative Verbs and Colour Adjectives
4	**Module-4 03hours**	ಅಪ್ಪಣೆ ಒಪ್ಪಿಗೆ ನಿರ್ದೇಶನ ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences) ,ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ಸ್ವತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು Accusative Cases and Potential Forms used in General Communication ಇರು ಮತ್ತು ಇರಲ್ಲ ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು Helping Verbs “iru and iralla”, Corresponding Future and Negation Verbs ಹೋಲಿಕೆ ಸಂಬಂಧ ಸೂಚಕ ಮತ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕಪದಗಳು Comparitive, Relationship, Identification and Negation Words
5	**Module-5 03hours**	ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳು ವಿವಿಧ ಪ್ರಕಾರಗಳು different types of forms of Tense, Time and Verbsಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಲೋಂದಿಗೆ ಭೂತ ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲವಾಕ್ಯ Formation of Past, Future and Present Tense Sentences with Verb Formsಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು Kannada Vocabulary List Kannada Words in Conversation

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description

1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	Conversational practices
3	Writing exercises	Writing practices

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

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

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

4. The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.
5. **Semester End Examination:**
6. The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour
7.

8. Learning Objectives

S/L	Learning Objectives	Description
1	Contents related activities (Activity-based discussions)	
2	For active participation of students instruct the students to prepare Flowcharts and Handouts	
3	Organizing Group wise discussions	
4	Quizzes and Discussions	
5	Seminars and assignments	

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

Course Outcomes (COs)

COs	Description
M23BKBKK207.1	To understand the necessity of learning of local language for comfortable life.
M23BKBKK207.2	To speak, read and write Kannada language as per requirement.
M23BKBKK207.3	To communicate (converse) in Kannada language in their daily life with kannada speakers.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BKBKK207.1								**2**		**2**		
M23BKBKK207.2								**2**		**2**		
M23BKBKK207.3								**2**		**2**		
M23BKBKK207								**2**		**2**		

10. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1/CO2/ CO3	**Total**
Module 1	**10**	
Module 2	**10**	
Module 3	**10**	
Module 4	**10**	
Module 5	**10**	
Total		**50**

Semester End Examination (SEE)

	CO1/CO2/ CO3	**Total**
Module 1	**20**	
Module 2	**20**	
Module 3	**20**	
Module 4	**20**	
Module 5	**20**	
Total		**100**

Conditions for SEE Paper Setting:

Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

11. Future with this Subject

- **Presenting Seminars**: Students will be at ease with all seminar presentation
- **Facing Employment process**: If the student taken any civil service examination and their problem issue

2nd Semester	Ability Enhancement Course **Innovation and Design Thinking**	**M23BIDTK258**

1. Prerequisites

S/L	Proficiency	Prerequisites
1)	Basic Understanding of Design Principles (K)	Familiarity with basic concepts of design and engineering.
2)	Introductory Knowledge of Business Concepts(K)	Basic understanding of business models and market dynamics.
3)	Fundamental Knowledge of Problem-Solving Techniques(K)	Awareness of different problem-solving methodologies and frameworks.
4)	Analytical Thinking (S)	Ability to analyze problems and break them down into manageable components.
5)	Communication Skills (S)	Effective verbal and written communication skills.
6)	Basic Prototyping and Visualization (S)	Basic skills in creating simple prototypes or models.
7)	Open-Mindedness (A)	Willingness to consider new and diverse perspectives.
8)	Curiosity and Inquisitiveness (A)	Eagerness to learn and explore new ideas and concepts.
9)	Collaboration and Teamwork (A)	Positive attitude towards working in teams and valuing the contributions of others.
10)	Adaptability (A)	Willingness to adapt to changing conditions and incorporate new information into the design process.

2. Competencies

S/L	Competency	KSA Description
1	**Design Thinking Principles**	**Knowledge:** • Understanding of the key stages of the design thinking process: empathize, define, ideate, prototype, and test. • Knowledge of human-centered design principles. **Skills:** • Ability to apply design thinking stages to problem-solving. • Proficiency in user research and empathy mapping. **Attitudes:** • Openness to user-centered approaches and valuing user feedback. • Curiosity and willingness to explore diverse perspectives.
2	**Creative Ideation**	**Knowledge:** • Familiarity with ideation techniques such as brainstorming, mind mapping, and SCAMPER. **Skills:** • Ability to generate a wide range of ideas and solutions. • Proficiency in facilitating ideation sessions. **Attitudes:** • Willingness to embrace creativity and think outside the box. • Encouragement of divergent thinking and risk-taking in idea generation.
3	**Prototyping and Testing**	**Knowledge:** • Understanding of prototyping methods and tools. • Knowledge of iterative testing and feedback processes. **Skills:** • Ability to create low-fidelity and high-fidelity prototypes. • Proficiency in conducting user tests and gathering feedback. **Attitudes:** Acceptance of failure as a learning opportunity. • Persistence in iterating and refining prototypes based on feedback.
4	**User Empathy**	**Knowledge:**

		• Understanding of empathy and its role in the design process. **Skills:** • Ability to conduct user interviews and observations. • Proficiency in creating empathy maps and user personas. **Attitudes:** • Deep appreciation for user needs and experiences. • Commitment to designing solutions that prioritize user satisfaction and well-being.
5	**Strategic Thinking and Foresight**	**Knowledge:** • Understanding of strategic innovation and business model design. **Skills:** • Ability to apply strategic foresight and scenario planning. • Proficiency in developing and analyzing business models. **Attitudes:** • Strategic mindset with a focus on long-term impact. • Willingness to challenge the status quo and think strategically about innovation.
6	**Agile Methodologies**	**Knowledge:** • Familiarity with agile principles and methodologies. **Skills:** • Proficiency in iterative development and continuous improvement. **Attitudes:** • Flexibility and adaptability in dynamic environments. • Commitment to incremental progress and iterative learning.
7	**Communication and Storytelling**	**Knowledge:** • Understanding of effective communication and storytelling techniques. **Skills:** • Ability to craft compelling narratives and presentations. • Proficiency in visual communication and data visualization. **Attitudes:** • Confidence in sharing ideas and solutions. • Appreciation for the power of storytelling in influencing and inspiring others.
8	**Continuous Learning and Adaptability**	**Knowledge:** • Awareness of the importance of continuous learning and staying updated with industry trends. **Skills:** • Ability to self-assess and seek out learning opportunities. • Proficiency in adapting to new tools, technologies, and methodologies. **Attitudes:** • Commitment to lifelong learning and personal growth. • Openness to change and adaptability in fast-paced environments.

3. Syllabus

INNOVATION and DESIGN THINKING			
Course Code	**M23BIDTK158/258**	CIE Marks	**50**
Teaching Hours/Week (L: T:P: S)	**1:0:0**	SEE Marks	**50**
Total Hours of Pedagogy	**25**	Total Marks	**100**
Credits	**01**	Exam Hours	**01**
Module-1			
PROCESS OF DESIGN: Understanding Design thinking: Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping			
Module-2			
Tools for Design Thinking: Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space– Empathy for design – Collaboration in distributed Design			
Module-3			
Design Thinking in IT: Design Thinking to Business Process modeling – Agile in Virtual collaboration environment – Scenario based Prototyping			

Module-4
DT For strategic innovations: Growth – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.
Module-5
Design thinking workshop: Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test

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, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

References:

5. YousefHaikandTamerM.Shahin,"EngineeringDesignProcess",CengageLearning,SecondEdition,2011.
6. Book-SolvingProblemswithDesignThinking-TenStoriesofWhatWorks(ColumbiaBusinessSchoolPublishing)Hardcover–20Sep2013byJeanneLiedtka(Author),AndrewKing(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 BasedLearning(SuggestedActivitiesinClass)/PracticalBasedlearning

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

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	Week 1-2 Module 1	Process of Design Introduction to design thinking, team-based design, theory, and practice in design thinking, MVP or prototyping.
2	Week 3-4 Module 2	Tools for Design Thinking Real-time design interaction capture and analysis, efficient collaboration in digital space, empathy for design, collaboration in distributed design.
3	Week 5-6 Module 3	Design Thinking in IT Business process modeling through design thinking, agile collaboration, scenario-based prototyping.
4	Week 7-8 Module 4	Design Thinking for Strategic Innovations Growth, storytelling, strategic foresight, change, sense-making, value redefinition, competition, experience design, standardization, humanization, creative culture, rapid prototyping, business model design.
5	Week 9-10 Module 5	Design Thinking Workshop Hands-on workshop covering empathizing, designing, ideating, prototyping, and testing.
6	Week 11-12	Review and Presentations Review of key concepts and presentations by students, feedback sessions, and discussions on outcomes.

5. 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.

6. Assessment Details

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

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

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Understanding Design Thinking Principles	Students will understand the fundamental concepts of design thinking, including empathy, ideation, prototyping, and testing.
2	Applying Design Thinking in Product Development	Students will apply design thinking principles to develop innovative solutions for product and service development.
3	Grasping Core Concepts of Innovation	Students will grasp the core concepts of innovation and its significance in the real world.
4	Implementing Innovation Methods	Students will implement various innovation methods and techniques in real-world scenarios.
5	Recognizing the Importance of Reverse Engineering	Students will understand the basics and importance of reverse engineering in product analysis and improvement.
6	Applying Reverse Engineering Techniques	Students will apply reverse engineering techniques to dissect and analyze products.
7	Enhancing Collaboration and Communication	Students will work collaboratively in teams on design projects, enhancing their ability to communicate effectively, share ideas, and solve problems collectively.

8	Cultivating Ethical and Professional Responsibility	Students will understand the ethical and professional responsibilities associated with innovation and design thinking, including respecting intellectual property rights and adhering to industry standards.

8. Course Outcomes and Mapping with Pos/ PSOs

CO's	DESCRIPTION OF THE OUTCOMES
M23BIDTK258.1	**Make use** the concept of design thinking to develop innovative solution for the problems identified.
M23BIDTK258.2	**Illustrate** the design ideas through various tools of Design Thinking
M23BIDTK258.3	**Interpret** the Design Thinking approach and model to real world situations
M23BIDTK258.4	**Apply** concepts of Agile software methodology, Business process modeling & scenario based prototyping with design thinking approach to provide solution in IT industries.
M23BIDTK258.5	**Analyze** the role of Design thinking approach in various Business challenges by considering strategic innovation.

CO No	PO No												PSO	
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**1**	**2**
M23BIDTK258.1	3													
M23BIDTK258.2	2													
M23BIDTK258.3	3													
M23BIDTK258.4	2													
M23BIDTK258.5		2												
M23BIDTK258	2.5	2												

9. Assessment Plan

IA

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	15%		5%			**20%**
Module 2	5%	10%			5%	**20%**
Module 3			10%	10%		**20%**
Module 4		5%		5%	10%	**20%**
Module 5		5%	5%	5%	5%	**20%**
Total	**20%**	**20%**	**20%**	**20%**	**20%**	**100%**

SEE

	CO1	CO2	CO3	CO4	CO5	**Total**
Module 1	15%		5%			**20%**
Module 2	5%	10%			5%	**20%**
Module 3			10%	10%		**20%**
Module 4		5%		5%	10%	**20%**
Module 5		5%	5%	5%	5%	**20%**
Total	**20%**	**20%**	**20%**	**20%**	**20%**	**100%**

Conditions for SEE Paper Setting

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

10. Future with this Subject

Advanced Courses: This course serves as a foundation for advanced studies in design thinking, innovation, and engineering design.

Industry Applications: The skills and knowledge gained are applicable in various industries focusing on product development, service design, and business process improvements.

Research: Provides a basis for research in innovative design solutions and the implementation of design thinking methodologies.

2nd Semester	Ability Enhancement Course **Scientific Foundations of Health**	**M23BSFHK258**

1.Prerequisites

S/L	Proficiency	Prerequisites
1	Knowledge of Basic Health	Fitness and Positive Mindset

2.Competencies

S/L	Competency	KSA Description
1	**Balancing Health**	**Knowledge:** Health and behavior, health and society health and family, health and personality **Skills:** Changing health habits for good health **Attitudes:** Learn, create , and including healthy habits
2	**Balancing Diet and fitness**	**Knowledge:** Healthy diet plans, Nutrition guidelines, obesity and overweight disorders. Fitness components and exercise. **Skills:** Building healthy life style through maintainingDiet and fitness **Attitudes:** Learn exercise for fitness and healthy habits.
3	**Essence of healthy and caring relationships**	**Knowledge:** About communication skills, friendship and basic instincts of life changing health behaviors. **Skills:** Building communication skills, create value relationship through social Engineering **Attitudes:** Learning communication skill to maintain health and value relationship.
4	**Prevention and avoiding harmful habits and diseases**	**Knowledge:** Avoiding of addiction, Types of addiction, effects of addiction, Types of infections, Chronic illness. **Skills:** build health compromising behavior to avoid addiction and protect from the different from the infections **Attitudes:** Learn how to avoid addiction create habits to prevent and fight against infection and diseases.

3. Syllabus

CourseTitle:	**Scientific Foundations of Health**		
CourseCode:	**M23BSFHK158/258**	CIEMarks	50
CourseType(Theory/Practical/Integrated)	Theory	SEEMarks	50
		TotalMarks	100
TeachingHours/Week(L:T:P:S)	1:0:0:0	ExamHours	01Theory
TotalHoursofPedagogy	15hours	Credits	01

Courseobjectives:

ThecourseScientificFoundationsofHealth(M23BSFHK108/208)willenablethestudents,

1. ToknowaboutHealthandwellness(anditsBeliefs)&It'sbalanceforpositivemindset.
2. ToBuildthehealthylifestylesforgoodhealthfortheirbetter future.
3. ToCreateaHealthyandcaringrelationshipstomeettherequirementsofgood/social/positivelife.
4. TolearnaboutAvoidingrisksandharmfulhabitsintheircampusandoutsidethecampusfortheirbrightfuture
5. ToPreventandfightagainstharmfuldiseasesforgoodhealththroughpositivemindset

Teaching-LearningProcess ThesearesampleStrategies,whichteachercanusetoacceleratetheattainmentofthevariouscourseoutcomesand make Teaching –Learning more effective: Teachersshalladoptsuitablepedagogyforeffectiveteaching-learningprocess.Thepedagogyshallinvolvethe combination of different methodologies which suit modern technological tools. (i)Directinstructionalmethod(Low/OldTechnology),(ii)Flippedclassrooms(High/advancedTechnologicaltools), (iii)Blendedlearning(Combinationofboth),(iv)Enquiryandevaluationbasedlearning, (v)Personalizedlearning,(vi)Problemsbasedlearningthroughdiscussion,(vii)Followingthemethodofexpeditionary learning Tools and techniques, (viii) Use of audio visual methods. Apartfromconventionallecturemethods,varioustypesofinnovativeteachingtechniquesthroughvideos,animationfilms may be adapted so that the delivered lesson can progress the students In theoretical applied and practical skills.
Module-1 (03hoursof pedagogy)
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 (03hours ofpedagogy)
Buildingofhealthy 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 (03hoursof pedagogy)
CreationofHealthyandcaringrelationships: Buildingcommunicationskills,Friendsandfriendship-Education, thevalueof relationship and communicationskills,Relationshipsfor Better orworsening oflife,understandingof basic instincts of life (more than a biology), Changing health behavioursthrough social engineering.
Module-4 (03hoursofpedagogy)
Avoidingrisksandharmfulhabits: Characteristicsofhealthcompromisingbehaviors,Recognizingandavoiding 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 (03hoursofpedagogy)
Preventing&fightingagainstdiseasesforgoodhealth: Howtoprotectfromdifferenttypesofinfections,Howto reduce risks for good health, Reducing risks & coping with chronic conditions, Management of chronic illness for Qualityof life, Health & Wellness of youth :achallenge for upcoming future, Measuring of health & wealth status.

4. Syllabus Timeline

S/L	Syllabus Timeline	Description
1	**Module-1 03hours**	**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.
2	**Module-2 03hours**	**Buildingofhealthy 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.
3	**Module-3 03hours**	**CreationofHealthyandcaringrelationships:**Buildingcommunicationskills,Friendsandfriendship-Education, thevalueof relationship and communicationskills,Relationshipsfor Better orworsening oflife,understandingof basic instincts of life (more than a biology),

		Changing health behavioursthrough social engineering.
4	**Module-4 03hours**	**Avoidingrisksandharmfulhabits:**Characteristicsofhealthcompromisingbehaviors,Recognizingandavoidingof 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.
5	**Module-5 03hours**	**Preventing&fightingagainstdiseasesforgoodhealth:**Howtoprotectfromdifferenttypesofinfections,Howto reduce risks for good health, Reducing risks & coping with chronic conditions, Management of chronic illness for Qualityof life, Health & Wellness of youth :achallenge for upcoming future, Measuring of health & wealth status.

5. Teaching-Learning Process Strategies

S/L	TLP Strategies:	Description
1	Lecture Method	Utilize various teaching methods within the lecture format to reinforce competencies.
2	Activity based	group discussion topics
3	Collaborative Learning	Ground activities
4	Writing exercises	Essay writing
5	Real-World Application	Discuss about health related fitness

6. Assessment Details (both CIE and SEE)

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

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

The CIE question paper shall have MCQ set for 25 questions, each carrying one mark.

Semester End Examination:

The SEE question paper shall have MCQ set for 50 questions, each carrying one mark. The time duration for SEE is one hour

7. Learning Objectives

S/L	Learning Objectives	Description
1	Contents related activities (Activity-based discussions)	
2	For active participation of students instruct the students to prepare Flowcharts and Handouts	
3	Organising Group wise discussions Connecting to placement activities	
4	Quizzes and Discussions	
5	Seminars and assignments	

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

Course Outcomes (COs)

COs	Description
M23BSFHK258.1	Developthehealthylifestylesforgoodhealthfortheirbetterfuture.
M23BSFHK258.2	BuildaHealthyandcaringrelationshipstomeettherequirementsofgood/social/positive life.
M23BSFHK258.3	TolearnaboutAvoidingrisksandharmfulhabitsintheircampusand outsidethecampusfortheirbright future.

CO-PO-PSO Mapping

COs/POs	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
M23BSFHK258.1						**3**						
M23BSFHK258.2							**3**					
M23BSFHK258.3								**3**				
M23BSFHK258						**3**	**3**	**3**				

9. Assessment Plan

Continuous Internal Evaluation (CIE)

	CO1/CO2	**Total**
Module 1	**10**	
Module 2	**10**	
Module 3	**10**	
Module 4	**10**	
Module 5	**10**	
Total		**50**

Semester End Examination (SEE)

	CO1/CO2	**Total**
Module 1	**20**	
Module 2	**20**	
Module 3	**20**	
Module 4	**20**	
Module 5	**20**	
Total		**100**

Conditions for SEE Paper Setting:
Each module of SEE question paper should be allocated with questions for 20% of the total SEE marks

10. Future with this Subject

- **Presenting Seminars**: Students will be at ease with all seminar presentation
- **Facing Employment process**: If the student taken any civil service examination and their problem issue