B.N.M. Institute of Technology

An Autonomous Institution under VTU, Approved by AICTE

Department of Mathematics

Syllabus

Semester: I			
Course: Calculus and Linear Algebra (CSE, ISE, AIML) **Course Code: 25MAC111**			
L:T:P:J	**2:2:2:0**	**CIA : 50**	
Credits:	**04**	**SEA : 50**	
Hours:	**40 hours for theory and 10 lab sessions**	**SEA Duration : 03 Hours**	

Course Learning Objectives: The students will be able to develop the theoretical and practical knowledge of calculus, linear algebra, partial differentiation, numerical methods and modular arithmetic in a comprehensive manner in various fields of engineering.

Module-1: Differential Calculus	No. of hours	Blooms cognitive Levels
Examples from Engineering that require polar curves Review of elementary differential calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature - Cartesian and Polar forms (Problems only), Taylor and Maclaurin series expansions for one variable **Problem Solving (Tutorials)** *Applications: Curve plotting using computer software, testing convergence of Taylor's and Maclaurin expansion.*	**L : 04** **T : 04**	**L1** **L2** **L3**
Module-2: Linear Algebra		
Examples from Engineering that require linear algebra. Review of matrices, rank of a matrix-echelon form, solution of system of linear equations-consistency. Gauss-elimination method, Crout's LU Decomposition method. Eigen values and eigen vectors – Largest eigen value and corresponding eigenvector by Rayleigh's power method. Diagonalization of a matrix. **Problem Solving (Tutorials)** *Applications: Solution of system of different equations arise in Electric field.*	**L : 04** **T : 04**	**L1** **L2** **L3**
Module-3: Partial Differentiation		
Examples from Engineering that require partial differentiation. Introduction to partial differentiation, total derivatives - differentiation of composite functions, Jacobians-direct evaluation, maxima and minima for a function of two variables, Lagrange's method of undetermined multiplier with single constraint for a function of three variables, Taylor's expansions of a function of two variables. **Problems solving (Tutorials)** *Applications: Errors and approximations in application of total derivatives.*	**L: 04** **T : 04**	**L1** **L2** **L3**
Module-4: Numerical Methods		
Examples from Engineering that require numerical methods. **Finite differences:** Introduction to forward and backward differences. Interpolation / extrapolation - Newton's forward and backward difference formulae, Newton's general interpolation formula for divided difference and Lagrange's interpolation formulae (all formulae without proof). Numerical solution of algebraic and transcendental equations–Newton-Raphson method for a simple real root. **Numerical integration:** Trapezoidal rule, Simpson's $1/3^{rd}$ rule and Simpson's $3/8^{th}$ rule (without proof)-Problems. **Problem Solving (Tutorials)** *Applications: Displacement, Area under the curve.*	**L :04** **T : 04**	**L1** **L2** **L3**
Module-5: Modular Arithmetic		
Examples from Engineering that require Modular Arithmetic Introduction to Congruences, Linear Congruences, The Remainder theorem, Solving Polynomials, Linear Diophantine Equation, System of Linear Congruences, Euler's Theorem, Wilson Theorem and Fermat's little theorem. Applications of Congruences-RSA algorithm. **Problem Solving (Tutorials)** *Applications: Cryptography, encoding and decoding, RSA applications in public key encryption.*	**L : 04** **T : 04**	**L1** **L2** **L3**

List of Laboratory experiments:(2 hours/week per batch)-10 Lab sessions
1 Introduction class+8 Lab sessions + 1 Repetition class

Sl. No.	Experiment
1	2D & 3D plots for Cartesian and Polar curves.
2	Finding angle between two polar curves, curvature and radius of curvature of a given curve.
3	Solution of system of linear equations-test for consistency and graphical representation, Gauss-Seidel iteration method .
4	Finding Eigenvalues and Eigenvectors of a square matrix.
5	Finding Partial derivatives, Jacobian and plotting the graphs.
6	Applications to Maxima and Minima of function of two variables.
7	Computation of area under the curve using Trapezoidal & Simpson's rule (1/3rd and 3/8th).
8	Finding GCD using Euclid's Algorithm, Solving linear congruences $ax \equiv b(mod\ m)$.

Suggested Software: MatLab / Python

Course Outcomes: After completing the course, the students will be able to	
CO 1:	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
CO 2:	Make use of matrix theory for solving system of linear equations and compute eigen values and eigenvectors required for matrix diagonalization process.
CO 3:	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.
CO 4:	Apply the knowledge of numerical methods to find approximate solutions of problems that are difficult or impossible to solve analytically.
CO 5:	Apply modular arithmetic to computer algorithms.

CO - PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2			2							
CO 2	3	2			2							
CO 3	3	2			2							
CO 4	3	2			2							
CO 5	3	2			2							

Reference Books:

1. E. Kreyszig: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed. (Reprint), 2016.
2. B. S. Grewal: "Higher Engineering Mathematics", Khanna Publishers, 44th Ed., 2017.
3. C. Ray Wylie, Louis C. Barrett : "Advanced Engineering Mathematics", 6th Edition, 2. McGraw-Hill Book Co., New York, 1995.
4. James Stewart : "Calculus -Early Transcendentals", Cengage Learning India Private Ltd., 2017.
5. B. V. Ramana: "Higher Engineering Mathematics" 11th Edition, Tata McGraw-Hill, 2010.
6. Ajay Kumar Chaudhuri: "Introduction to Number Theory" NCBA Publications, 2nd Ed.,2009.
7. Jayant Ganguly, "Discrete Mathematical Structures" Published by LAL M. Prasad, Sanguine Technical Publishers.

Web links and Video Lectures:

1. https://youtu.be/ixDGaEqWuA0
2. https://youtu.be/ZCJfq77sFE8
3. https://youtu.be/ZMDTndFMgks
4. https://youtu.be/5zSS9Qopdoc
5. https://youtu.be/ZztjQnEKnbQ
6. https://youtu.be/2q0HMHY-2iM

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Department of Mathematics

Syllabus

Semester: I			
Course: Calculus and Linear Algebra (ECE, EEE, ME) **Course Code: 25MAE111**			
L:T:P:J	**2:2:2:0**	**CIA : 50**	
Credits:	**04**	**SEA : 50**	
Hours:	**40 hours for theory and 10 lab sessions**	**SEA Duration : 03 Hours**	

Course Learning Objectives: The students will be able to develop the theoretical and practical knowledge of calculus, differential equations, partial differentiation, numerical methods and linear algebra in a comprehensive manner in various fields of engineering.

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Examples from Engineering that require polar curves Review of elementary differential calculus, Polar curves - angle between the radius vector and tangent, angle between two curves, pedal equation. Curvature and radius of curvature - Cartesian and Polar forms (Problems only), Taylor and Maclaurin series expansions for one variable **Problem Solving (Tutorials)** *Applications: Curve plotting using computer software, testing convergence of Taylor's and Maclaurin expansion.*	**L : 04** **T : 04**	**L1** **L2** **L3**
Module-2: Linear Algebra		
Examples from Engineering that require linear algebra. Review of matrices, rank of a matrix-echelon form, solution of system of linear equations-consistency. Gauss-elimination method, Crout's LU Decomposition method. Eigen values and eigen vectors – Largest eigen value and corresponding eigenvector by Rayleigh's power method. Diagonalization of a matrix. **Problem Solving (Tutorials)** *Applications: Solution of system of differet equations arise in Electric field.*	**L : 04** **T : 04**	**L1** **L2** **L3**
Module-3: Partial Differentiation		
Examples from Engineering that require partial differentiation. Introduction to partial differentiation, total derivatives - differentiation of composite functions, Jacobians-direct evaluation, maxima and minima for a function of two variables, Lagrange's method of undetermined multiplier with single constraint for a function of three variables, Taylor's expansions of a function of two variables. **Problems solving (Tutorials)** *Applications: Errors and approximations in application of total derivatives.*	**L : 04** **T : 04**	**L1** **L2** **L3**
Module-4: Numerical Methods		
Examples from Engineering that require numerical methods. **Finite differences:** Introduction to forward and backward differences. Interpolation / extrapolation - Newton's forward and backward difference formulae, Newton's general interpolation formula for divided difference and Lagrange's interpolation formulae (all formulae without proof). Numerical solution of algebraic and transcendental equations–Newton-Raphson method for a simple real root. **Numerical integration:** Trapezoidal rule, Simpson's $1/3^{rd}$ rule and Simpson's $3/8^{th}$ rule (without proof)-Problems. **Problem Solving (Tutorials)** *Applications: Displacement, Area under the curve.*	**L : 04** **T : 04**	**L1** **L2** **L3**
Module-5: First Order Ordinary Differential Equations		
Examples from Engineering that require first order ordinary differential equations. Linear and Nonlinear differential equations: Exact, Linear and Bernoulli's differential equations. Applications of first order ordinary differential equations-orthogonal trajectories, Newton's law of cooling, L-R circuit. **Problem Solving (Tutorials)** *Applications: Rate of Growth or decay, Practical problems on Newton's law of cooling and plot of solution.*	**L : 04** **T : 04**	**L1** **L2** **L3**

List of Laboratory experiments:(2 hours/week per batch)-10 Lab sessions
1 Introduction class+8 Lab sessions + 1 Repetition class

Sl. No.	Experiment
1	2D & 3D plots for Cartesian and polar curves.
2	Finding angle between two polar curves, curvature and radius of curvature of a given curve.
3	Solution of system of linear equations-test for consistency and graphical representation, Gauss-Seidel iteration method .
4	Finding Eigenvalues and Eigenvectors of a square matrix.
5	Finding Partial derivatives, Jacobian and plotting the graphs.
6	Applications to Maxima and Minima of function of two variables.
7	Computation of area under the curve using Trapezoidal & Simpson's rule (1/3rd and 3/8th).
8	Solution of first order differential equations and plotting the graph.

Suggested Software's : MatLab / Python

Course Outcomes: After completing the course, the students will be able to	
CO 1:	Apply the knowledge of calculus to solve problems related to polar curves and its applications in determining the bentness of a curve.
CO 2:	Make use of matrix theory for solving system of linear equations and compute eigen values and eigenvectors required for matrix diagonalization process.
CO 3:	Learn the notion of partial differentiation to calculate rates of change of multivariate functions and solve problems related to composite functions and Jacobians.
CO 4:	Apply the knowledge of numerical methods to find approximate solutions of problems that are difficult or impossible to solve analytically.
CO 5:	Solve first order linear / non-linear differential equation analytically using standard methods.

CO - PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2			2							
CO 2	3	2			2							
CO 3	3	2			2							
CO 4	3	2			2							
CO 5	3	2			2							

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6. Srimanta Pal & Subodh C Bhunia: "Engineering Mathematics", Oxford University Press, 3rd Reprint, 2016.

Web links and Video Lectures:

1. https://youtu.be/ixDGaEqWuA0
2. https://youtu.be/ZCJfq77sFE8
3. https://archive.nptel.ac.in/courses/122/107/122107037/
4. https://youtu.be/5zSS9Qopdoc
5. https://youtu.be/ZztjQnEKnbQ
6. https://youtu.be/2q0HMHY-2iM

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Department of Mathematics

Syllabus

Semester: II		
Course: Advanced Calculus and Numerical Methods (CSE, ISE, AIML) **Course Code: 25MAC121**		
L:T:P:J	**2:2:2:0**	**CIA: 50**
Credits:	**04**	**SEA: 50**
Hours:	**40 hours for theory and 10 lab sessions**	**SEA Duration: 03 Hours**

Course Learning Objectives: The students will be able to develop the theoretical and practical knowledge of ordinary differential equations, infinite series, numerical methods, integral and vector calculus in a comprehensive manner in various fields of engineering.

Module-1: Higher Order Ordinary Differential Equations	No. of Hours	Blooms cognitive Levels
Examples from Engineering that require higher order ordinary differential equations. Second order Ordinary linear differential equations with constant coefficients-Inverse differential operators (Particular Integral is restricted to $\phi(x) = e^{ax+b}$, $\sin(ax+b)$, $\cos(ax+b)$, x^n for $f(D)y = \phi(x)$), method of variation of parameters, Cauchy's and Legendre's homogeneous equations. Applications to oscillations of a spring and L-C-R circuits. **Problem Solving (Tutorials)** *Applications:: Electrical circuits, Mechanical systems & Transmission lines.*	**L :04** **T :04**	**L1** **L2** **L3**
Module-2: Numerical Solutions of Ordinary Differential Equations		
Examples from Engineering that require numerical solutions of ordinary differential Equations Numerical solution of ordinary differential equations of first order - Taylor series method, Euler's method, Modified Euler's method, Runge-Kutta method of fourth order, Milne's predictor and corrector method (without proof) Numerical solution of second order ordinary differential equation using Runge-Kutta method of fourth order. *Application: Estimation of function value by numerical methods.*	**L : 04** **T : 04**	**L1** **L2** **L3**
Module-3: Integral Calculus		
Examples from Engineering that require integral calculus. **Multiple integrals**: Review of elementary integral calculus. Multiple integrals, Evaluation of double and triple integrals. Evaluation of double integrals-changing into polar co-ordinates. Applications to find area, volume. **Special functions:** Gamma and Beta functions as integrals: Definitions, Relation between beta and gamma functions, problems. **Problem Solving (Tutorials)** *Application: Antenna and wave propagation, calculation of optimum power in electrical circuits , field theory.*	**L : 04** **T : 04**	**L1** **L2** **L3**
Module- 4: Vector Calculus		
Examples from Engineering that require vector calculus. **Vector Differentiation**: Scalar and vector fields, Gradient, directional derivative, curl and divergence-physical interpretation, solenoidal and irrotational vector fields and vector identities (statement only). **Vector Integration:** Introduction to the Line integrals, Theorems of Green, Gauss and Stokes (without proof & only evaluation). Applications: (i) work done by force (ii) flux. **Problem Solving (Tutorials)** *Applications: Electromagnetic fields, gravitational fields, electrostatistics.*	**L : 04** **T : 04**	**L1** **L2** **L3**
Module-5: Infinite Series		
Introduction to sequences and infinite series, convergence, divergence and oscillation of an infinite series and properties. Series of positive terms – p-series, Comparison tests, D'Alembert's ratio test, Raabe's test, Cauchy's root test. Alternating series. Absolute and conditional convergent, Leibnitz's test. **Problem Solving (Tutorials)** *Applications: Data Structures and Cryptography..*	**L : 04** **T : 04**	**L1** **L2** **L3**

List of Laboratory experiments:(2 hours/week per batch)-10 Lab sessions
1 Introduction class+8 Lab sessions + 1 Repetition class

Sl.No.	Experiment
1	Solution of second order ordinary differential equations with conditions.
2	Program to find numerical solution of first order differential equation by Taylor series method.
3	Program to find numerical solution of first order differential equation by Modified Euler's method and fourth order Runge - Kutta method.
4	Program to compute double and triple integrals.
5	Program to compute double integrals- change of order of integration.
6	Finding gradient and their geometrical interpretation and angle between two surfaces.
7	Finding divergence, curl and their geometrical interpretation and application.
8	Program to find nature of infinite series.

Suggested Softwares: MatLab / Python

Course Outcomes: After completing of the course, the students will be able to	
CO 1:	Demonstrate various physical models using higher-order linear differential equations with constant and variable coefficients to solve engineering problems.
CO 2:	Apply the knowledge of numerical methods to solve first and second-order initial value problems arising in engineering field.
CO 3:	Apply the knowledge of integration in evaluating double and triple integrals and their use in computing areas and volumes.
CO 4:	Illustrate the applications of multivariate calculus in understanding solenoidal and irrotational vectors, and demonstrate the interdependence of line, surface, and volume integrals.
CO 5:	Apply the knowledge of infinite series to problems arising in computer applications.

CO - PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2			2							
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Web links and Video Lectures:

1. https://youtu.be/tXT55ahtd4U
2. https://youtu.be/qNZxf0j41tw
3. https://youtu.be/KgItZSst2sU
4. https://youtu.be/s7M_K-SuCYk
5. https://youtu.be/ma1QmE1SH3I

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Department of Mathematics

Syllabus

Semester: II		
Course: Advanced Calculus and Numerical Methods (ECE, EEE, ME) **Course Code: 25MAE121**		
L:T:P:J	**2:2:2:0**	**CIA: 50**
Credits:	**04**	**SEA: 50**
Hours:	**40 hours for theory and 10 lab sessions**	**SEA Duration: 03 Hours**

Course Learning Objectives: The students will be able to develop the theoretical and practical knowledge of ordinary / partial differential equations, numerical methods, integral and Vector calculus in a comprehensive manner in various fields of engineering.

Module-1: Higher Order Ordinary Differential Equations	**No. of Hours**	**Blooms cognitive Levels**
Examples from Engineering that require higher order ordinary differential equations. Second order Ordinary linear differential equations with constant coefficients-Inverse differential operators (Particular Integral is restricted to $\phi(x) = e^{ax+b}$, $\sin(ax+b)$, $\cos(ax+b)$, x^n for $f(D)y = \phi(x)$), method of variation of parameters, Cauchy's and Legendre's homogeneous equations. Applications to oscillations of a spring and L-C-R circuits. **Problem Solving (Tutorials)** *Applications:: Electrical circuits, Mechanical systems & Transmission lines.*	**L :04** **T :04**	**L1** **L2** **L3**
Module-2: Numerical Solutions of Ordinary Differential Equations		
Examples from Engineering that require Numerical Solutions of Ordinary Differential Equations. Numerical solution of ordinary differential equations of first order - Taylor series method, Euler's method, Modified Euler's method, Runge-Kutta method of fourth order, Milne's predictor and corrector method (without proof) Numerical solution of second order ordinary differential equation using Runge-Kutta method of fourth order. *Application: Estimation of function value by numerical methods.*	**L : 04** **T : 04**	**L1** **L2** **L3**
Module-3: Integral Calculus		
Examples from Engineering that require integral calculus. **Multiple integrals**: Review of elementary integral calculus. Multiple integrals, Evaluation of double and triple integrals. Evaluation of double integrals-changing into polar co-ordinates. Applications to find area, volume. **Special functions:** Gamma and Beta functions as integrals: Definitions, Relation between beta and gamma functions, problems. **Problem Solving (Tutorials)** *Application: Antenna and wave propagation, calculation of optimum power in electrical circuits , field theory.*	**L : 04** **T : 04**	**L1** **L2** **L3**
Module- 4: Vector Calculus		
Examples from Engineering that require vector calculus. **Vector Differentiation:** Scalar and vector fields, Gradient, directional derivative, curl and divergence-physical interpretation, solenoidal and irrotational vector fields and vector identities (statement only). **Vector Integration:** Introduction to the Line integrals, Theorems of Green, Gauss and Stokes (without proof & only evaluation). Applications: (i) work done by force (ii) flux. **Problem Solving (Tutorials)** *Applications of vector differentiation: electromagnetic fields, gravitational fields, electrostatistics .*	**L : 04** **T : 04**	**L1** **L2** **L3**
Module-5: Partial Differential Equations(PDE)		
Examples from Engineering that require Partial Differential Equations. Formation of PDE's by elimination of arbitrary constants / functions, solution of non-homogeneous PDE by direct integration, solution of Lagrange's linear equation. Solution of one dimensional wave and heat equation by method of separation of variables, D'Alembert's solution for wave equation. **Problem Solving (Tutorials)** *Applications: Fluid mechanics, heat transfer, electromagnetic theory & vibration of a string.*	**L : 04** **T : 04**	**L1** **L2** **L3**

List of Laboratory experiments:(2 hours/week per batch)-10 Lab sessions
1 Introduction class+8 Lab sessions + 1 Repetition class

Sl.No.	Experiment
1	Solution of second order ordinary differential equations with conditions.
2	Program to find numerical solution of first order differential equation by Taylor series method.
3	Program to find numerical solution of first order differential equation by Modified Euler's method and fourth order Runge - Kutta method.
4	Program to compute double and triple integrals.
5	Program to compute double integrals- change of order of integration.
6	Finding gradient and their geometrical interpretation and angle between two surfaces.
7	Finding divergence, curl and their geometrical interpretation and application.
8	Solution and plot of Partial Differential equation.

Suggested Softwares: MatLab / Python

Course Outcomes: After completing of the course, the students will be able to	
CO 1:	Demonstrate various physical models through higher order differential equations and solve such linear ordinary differential equations.
CO 2:	Apply the knowledge of numerical methods in the modeling of various physical and engineering phenomena.
CO 3:	Apply the concept of change of order of integration and variables to evaluate multiple integrals and their usage in computing the area and volumes.
CO 4:	Illustrate the applications of multivariate calculus to understand the solenoidal and irrotational vectors and also exhibit the interdependence of line, surface and volume integrals.
CO 5:	Construct a variety of partial differential equations and solution by exact methods / method of separation of variables.

CO - PO Mapping:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO 1	3	2			2							
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CO 3	3	2			2							
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CO 5	3	2			2							

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4. James Stewart : "Calculus —Early Transcendentals", Cengage Learning India Private Ltd., 2017.
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Web links and Video Lectures:

1. https://youtu.be/tXT55ahtd4U
2. https://youtu.be/W3HXK1Xe4nc
3. https://youtu.be/mIeeVrv447s
4. https://youtu.be/s7M_K-SuCYk
5. https://youtu.be/ma1QmE1SH3I

B.N.M. Institute of Technology

An Autonomous Institution under VTU

Semester: I/II		
COURSE: Applied Physics for CSE stream		
Course Code: 25PHC112/122	**L:T:P:J: 2:2:2:0**	**CIA Marks:** 50
Credits:	4	**SEA Marks:** 50
Hours:	40 L &14 P	**SEA Duration:** 03 Hours

Course Learning Objectives: The students will be able to

1	Understand and apply the concepts of Quantum Mechanics and its applications in various fields of engineering by gaining practical knowledge to correlate with the theoretical concepts.
2	Demonstrate the engineering applications of Photonics (Lasers and Optical Fibers) by applying basic principles and their realization through experimental approach.
3	Understand and apply electrical properties of Metals and Superconductors using quantum mechanical concepts by gaining practical knowledge to correlate with the theoretical concepts.
4	Understand the basic properties of Nanomaterials &Composite materials and explore their applications in modern engineering fields by gaining practical knowledge to correlate with the theoretical concepts.
5	Understand and apply the basic concepts of Quantum computing in engineering applications.

Module 1 – Quantum Mechanics	**RBT**	**Hrs**
Pre-requisite: Particle nature of Light radiations – Photo electric effect, Black Body Radiation Spectrum and Planck's law of radiation. **Teaching Component:** Need for Quantum mechanics, de-Broglie's hypothesis of Matter Waves and their properties, Heisenberg UncertaintyPrinciple and its application (Non-existence of electrons inside nucleus). Wave function, properties and its physical significance: probability density andNormalization, Time independent one-dimensional Schrodinger equation (derivation), time dependent (qualitative), Particle in a potential well of infiniteheight (Eigen values and Eigen functions), Finite well potential and Quantum Tunneling (qualitative), Numerical problems. **Applications to mention:** Quantum Computers and Quantum entanglement.	**Apply**	**08**
Module 2 – Photonics	**RBT**	**Hrs**
Pre-requisite: Concepts of Absorption and Emission, Reflection, Refraction and total Internal Reflection. **Teaching Component: 2.1: LASER:** Interaction of radiation with matter and characteristic properties of laser, Energy density of a photon at equilibrium in terms of Einstein's coefficients (derivation), Conditions for Laser action, Requisites of a Laser system, Construction and working of CO_2 Laser. Engineering Applications of Lasers: Holography in Data Storage – Recording using Wave front division technique and reconstruction of Holograms, Numerical Problems. **Applications to mention**: LIDAR, Laser welding, drilling & cutting. **2.2: Optical fibers:** Introduction to optical fibers, Propagation mechanism in optical fibers, Acceptance angle and Numerical Aperture (derivation), Types	**Apply**	**08**

of Optical fibers, Attenuation in optical fibers (no derivation) and its mechanisms, Engineering Applications of optical fibers – Point to point communication, Numerical problems. **Applications to mention**: Endoscopy, Broad band Internet connection.		
Module 3 – Electrical Properties of Materials	**RBT**	**Hrs**
Pre-requisite: Free electron theory of metals, Ohm's Law in terms of current density. **Teaching Component: 3.1 Metals:** Quantum free electron theory – Assumptions, Density of states (qualitative), Fermi energy and Fermi factor, Effect of temperature on fermi factor, Expression for Fermi energy (derivation) at absolute zero temperature and at certain higher temperature (qualitative), effective mass (qualitative). Merits of quantum free electron theory, Numerical Problems. **3.2 Superconductors:** Temperature dependence of resistivity in metals (Matthiessen's rule) and superconducting materials. Effect of magnetic field (Meissner effect). Critical magnetic field and its temperature dependence, Type-I and Type-II superconductors, BCS theory (qualitative). High-temperature superconductors (qualitative). Applications of superconductors – Maglev vehicles,, Numerical problems. **Applications to mention:** SQUIDs, Superconducting magnets, Loss less power transmission, Nuclear Reactors.	**Apply**	**08**
Module 4 – Modern Engineering Materials	**RBT**	**Hrs**
Teaching Component: 4.1 Nano Materials: Introduction to Nano science and Nano materials, Surface to volume ratio, Quantum confinement – Quantum well, Quantum wire, Quantum dot. Synthesis of Nano materials – Top-down approach (Ball milling method) and bottom-up approach (Sol gel method). Carbon Nano tubes - synthesis of CNTs using Arc Discharge Method, types, properties and Applications. Scanning Electron Microscope (SEM), Application of SEM in analysis of pārticle size, Numerical problems. **4.2 Composite Materials:** Introduction to composite materials, Classification of composites based on reinforcement materials and matrix. Advantages and disadvantages of composite materials, Engineering Applications – MEMS (qualitative). **Applications to mention:** Targeted drug delivery system, Nanocomposites and Shape Memory Alloys (SMA).	**Apply**	**08**
Module 5 – Quantum Computing	**RBT**	**Hrs**
Teaching Component: Introduction to quantum computing- Matrix form of wave function, Identity Operator, Determination of I|0> and I|1>, classical information and quantum information, Moore's law, Superposition in quantum computation, concept of Qubit, properties- mathematical representation, representation of qubit by Bloch sphere, Quantum Gates –Single qubit gates (Pauli's X, Y, Z & Hadamard gate), Two qubit gate (CNOT gate), Three qubit gate (CCNOT or Toffoli gate) and difference between classical computing and quantum computing. **Applications to mention:** Quantum simulation, Cryptography,Optimization and Quantum machine learning.	**Apply**	**08**

Lab Experiments (1 Introduction class +2 Demo classes+ 8 Lab sessions + 1 Experimental Demo class +1 Repetition class + 1 Lab Test)	
Sl. No	**List of Experiments**
1	Determination of Planck's constant
2	Verification of Stefan's law
3	Determination of responsivity of a photo diode
4	Determination of wavelength of Laser using Diffraction
5	Determination of Acceptance angle and Numerical Aperture of an Optical fiber
6	Determination of Fermi energy of copper
7	Determination of Resistivity of a metal
8	Determination of size of a Nano particle using diffraction pattern
9	Experimental demonstration on Magnetic levitation (Maglev Vehicle)

Course Outcomes: After completing the course, the students will be able to	
25PHC112/122.1	Apply the concepts of Quantum Mechanics to physical situations and determine parameter related to the concepts.
25PHC112/122.2	Apply principles of Photonics (Lasers and Optical Fibers) to determine optical parameters in the field of engineering.
25PHC112/122.3	Apply the quantum concepts and determine parameters related to electrical properties materials.
25PHC112/122.4	Apply the Concepts of Nano Science and determine parameters related to nano materials.
25PHC112/122.5	Apply the principles of Quantum Mechanics and their applications in Quantum Computing.

Reference Books

1. Principle of Quantum Mechanics: Concepts & Applications, Nouredine Zettili, Wiley, 2nd Edition, 2009.
2. Quantum Computation and Quantum Information, Michael A. Nielsen & Isaac L. Chuang, Cambridge Universities Press, 2010 Edition.
3. Lasers and Non-linear optics, B.B. Laud, New Age International Publishers, 3rd Edition, 2011.
4. Lasers and Optical Instrumentation, S. Nagabhushana and B. Sathyanarayana, I.K. International Publishing House Pvt. Ltd, 2013.
5. Solid State Physics, S.O. Pillai, New Age International Publishers, 9th Edition, 2020.
6. Introduction to Nanoscience and Nanotechnology, Chris Binns, Wiley, 2010.
7. An Introduction to Composite Materials, T.W. Clyne and D. Hull, Cambridge University Press, 3rd Edition, 2019.
8. University Practical Physics by D.C. Tayal, Edited by ILA Agarwal, 2000, Himalaya Publishing House, Mumbai.
9. Applied Physics Laboratory Manual (BNMIT).

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Semester: I/II		
COURSE: Applied Physics **(**for EC, EE & ME stream)		
Course Code: 25PHE112/122	**L:T:P:J: 2:2:2:0**	**CIA Marks:** 50
Credits:	4	**SEA Marks:** 50
Hours:	40 L &14 P	**SEA Duration:** 03 Hours

Course Learning Objectives: The students will be able to

1	Understand and apply the concepts of Quantum Mechanics and their applications in various fields of engineering by gaining practical knowledge to correlate with the theoretical concepts.
2	Demonstrate the engineering applications of Photonics (Lasers and Optical Fibres) by applying basic principles and their realization through experimental approach.
3	Understand and apply electrical properties of Metals using quantum mechanical concepts and Dielectrics by gaining practical knowledge to correlate with the theoretical concepts.
4	Understand the basic properties of Nanomaterials & Composite materials and explore their applications in modern engineering fields by gaining practical knowledge to correlate with the theoretical concepts.
5	Understand and apply the concepts of Semiconductors in engineering applications and their realization through experimental approach.

Module 1 – Quantum Mechanics	**RBT**	**Hrs**
Pre-requisite: Particle nature of Light radiations – Photo electric effect, Black Body Radiation Spectrum and Planck's law of radiation. **Teaching Component:** Need for Quantum mechanics, de-Broglie's hypothesis of Matter Waves and their properties, Heisenberg Uncertainty Principle and its application (Non-existence of electrons inside nucleus). Wave function, properties and its physical significance: probability density and Normalization, Time independent one-dimensional Schrodinger equation (derivation), time dependent (qualitative), Particle in a potential well of infinite height (Eigen values and Eigen functions), Finite well potential and Quantum Tunneling (qualitative), Numerical problems. **Applications to mention:** Quantum Computers and Quantum entanglement.	**Apply**	**08**
Module 2 – Photonics	**RBT**	**Hrs**
Pre-requisite: Concepts of Absorption and Emission, Reflection, Refraction & Total Internal Reflection. **Teaching Component: 2.1: LASER:** Interaction of radiation with matter and characteristic properties of laser, Energy density of a photon at equilibrium in terms of Einstein's coefficients (derivation), Conditions for Laser action, Requisites of a Laser system, Construction and working of CO_2 Laser. Engineering Applications of Lasers: Holography in Data storage – Recording using Wave front division technique and reconstruction of Holograms, Numerical Problems. **Applications to mention**: LIDAR, Laser welding, drilling &cutting. **2.2: Optical fibers:** Introduction to optical fibers, Propagation mechanism in optical fibers, Acceptance angle and Numerical Aperture (derivation), Types of Optical fibers,	**Apply**	**08**

Attenuation in optical fibers (no derivation) and its mechanisms, Engineering Applications of optical fibers – Point to point communication, Numerical problems. **Applications to mention**: Endoscopy, Broad band Internet connection.		
Module 3 – Electrical Properties of Materials	**RBT**	**Hrs**
Pre-requisite: Free electron theory of metals, Ohm's Law in terms of current density. **Teaching Component: 3.1 Metals:** Quantum free electron theory – Assumptions, Density of states (qualitative), Fermi energy and Fermi factor, Effect of temperature on fermi factor, Expression for Fermi energy (derivation) at absolute zero temperature and at certain higher temperature (qualitative), effective mass (qualitative). Merits of quantum free electron theory, Numerical Problems. **3.2 Dielectric Materials:** Polarization and its types, Relation between dielectric constant and polarization (qualitative). Internal field and expression for internal filed in solids for one- dimensional (No derivation) and three-dimensional cases (qualitative). Clausius-Mossotti equation (derivation). Application of dielectrics in transformers. Numerical Problems. **Applications to mention:** Fabricating capacitors, Energy storage devices, Heat sink in PCB. Coolant in thermal plants, Sensors & Actuators.	**Apply**	**08**
Module 4 – Modern Engineering Materials	**RBT**	**Hrs**
Teaching Component: 4.1 Nano Materials: Introduction to Nano science and Nano materials, Surface to volume ratio, Quantum confinement – Quantum well, Quantum wire, Quantum dot. Synthesis of Nano materials – Top-down approach (Ball milling method) and bottom-up approach (Sol gel method). Carbon Nano tubes - synthesis of CNTs using Arc Discharge Method, types, properties and Applications. Scanning Electron Microscope (SEM), Application of SEM in analysis of particle size, Numerical problems. **4.2 Composite Materials:** Introduction to composite materials, Classification of composites based on reinforcement materials and matrix. Advantages and disadvantages of composite materials, Engineering Applications - MEMS (qualitative) **Applications to mention:** Targeted drug delivery system and Nanocomposites.	**Apply**	**08**
Module 5 – Semiconductors and Semiconductor Devices	**RBT**	**Hrs**
Pre-requisite: Types of semiconductors. And P-n junction diode **Teaching Component: 5.1 Semiconductors:** Fermi energy and Fermi level, Fermi level in intrinsic semiconductors, Expression for concentration of electrons in conduction band & holes concentration in valance band (only mention the expression), Law of mass action, Electrical conductivity of a semiconductor (derivation), Hall effect, Expression for Hall coefficient (derivation) and its application. **5.2 Semiconductor Devices:** Photodiode and Power responsivity, Construction and working of Semiconducting Laser and Numerical problems. **Applications to mention:** Phototransistor and Solar cell.	**Apply**	**08**

Lab Experiments (1 Introduction class + 2 Demo classes + 8 Lab sessions + 1 Experimental demo class + 1 Repetition class + 1 Lab Test)	
Sl. No	**List of Experiments**
1	Determination of Planck's constant
2	Verification of Stefan's law
3	Determination of wavelength of Laser using Diffraction
4	Determination of Acceptance angle and Numerical Aperture of an Optical fiber
5	Determination of Fermi energy of copper
6	Determination of Dielectric constant by RC charging and discharging method
7	Determination of Size of a Nano particle using diffraction pattern
8	Determination of responsivity of a photo diode
9	Experimental demonstration on magnetic levitation (Maglev vehicle)

Course Outcomes: After completing the course, the students will be able to	
25PHE112/122.1	Apply the concepts of Quantum Mechanics to physical situations and determine parameter related to the concepts.
25PHE112/122.2	Apply principles of Photonics (Lasers and Optical Fibers) to determine optical parameters in the field of engineering.
25PHE112/122.3	Apply the quantum concepts and determine parameters related to electrical properties materials.
25PHE112/122.4	Apply the Concepts of Nano Science to determine parameters related to nano materials.
25PHE112/122.5	Apply the concepts of Semiconductors to determine parameters related to engineering applications.

Reference Books

1. Principle of Quantum Mechanics: Concepts & Applications, Nouredine Zettili, Wiley, 2nd Edition, 2009.
2. Lasers and Non-linear optics, B.B. Laud, New Age International Publishers, 3rd Edition, 2011.
3. Lasers and Optical Instrumentation, S. Nagabhushana and B. Sathyanarayana, I.K. International Publishing House Pvt. Ltd, 2013.
4. Solid State Physics, S.O. Pillai, New Age International Publishers, 9th Edition, 2020.
5. Introduction to Nanoscience and Nanotechnology, Chris Binns, Wiley, 2010.
6. An Introduction to Composite Materials, T.W. Clyne and D. Hull, Cambridge University Press, 3rd Edition, 2019.
7. University Practical Physics by D.C. Tayal, Edited by ILA Agarwal, 2000, Himalaya Publishing House, Mumbai.
8. Applied Physics Laboratory Manual (BNMIT).

Semester: I/II		
Applied Chemistry for CSE/AIML/ISE		
Course Code: 25CHC112/122	**L:T:P:J 2:2:2:0**	**CIA Marks:** 50
Credits: 4		**SEA Marks:** 50
Hours: 40L+24P		**SEA Duration:** 03 Hours

Course Learning Objectives: The students will be able to

1	Master the basic knowledge of applied Chemistry in their day to day life, various types of industries and in research and development
2	To develop an intuitive understanding of Chemistry by emphasizing the related branches of engineering
3	To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence

Module-1: Electrochemical Systems	**No. of Hrs**	**RBT**
Teaching component: **Electrode system:** Fundamentals of electrochemistry, Ion-selective electrode – classification, construction, working and application (determination of pH) of glass electrode. Electrolyte concentration cells, numerical problems. **Energy storage systems**: Classification – primary, secondary and reserve batteries. Battery characteristics (Voltage, Capacity, Energy density, electricity storage density, Cycle life and Shelf life), Construction, working and applications of Classical battery – Lead acid battery. Modern laptop battery (Li-ion battery). Recycling of Li-ion battery (Hydrometallurgy & Pyrometallurgy). Future battery -Sodium-ion battery. **Analytical Techniques:** Introduction, principle and instrumentation of Conductometry; its application in the estimation of weak acid. Potentiometry; its application in the estimation of iron in industrial effluent. **Case study**: Batteries used in electronic gadgets	**3** **3** **2**	**Apply**
Module-2: Corrosion Science and Engineering		
Teaching component: **Corrosion:** Fundamentals of corrosion, Importance of corrosion in industry, Electrochemical theory of corrosion, Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of corrosion product, nature of medium – pH. Types of corrosion - Differential metal, differential aeration - pitting and water line). Corrosion control: Anodizing – Anodizing of aluminium and its applications, Cathodic protection (Process & Applications)- sacrificial anode and impressed current methods, Metal coatings- Galvanization (Process & Applications). Corrosion Penetration Rate (CPR) – Introduction and numerical problem **Metal finishing:** Technological importance. Electroplating: Electroplating of chromium (hard and decorative). Electrolessplating: electrolessplating of nickel and its application, electrolessplating of copper and its application in PCB, distinction between electroplating and electrolessplating processes. **Case study**: Material failure	**5** **3**	**Apply**

Module-3: Green Energy		
Green Fuel: Synthesis of biofuel (biodiesel & power alcohol), Production of Hydrogen from Biomass (Pyrolysis) and water (PEM Electrolyzer) **Fuel Cells:** Differences between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 as electrolyte, and polymer electrolyte membrane (PEM) fuel cell. **Solar Energy**: Preparation of solar grade silicon by Union Carbide Process. Photovoltaic cell - construction, working and applications of a PV cell. **Case study**: Renewable energy sources	**3** **3** **2**	**Apply**
Module-4: Sensors & Polymer Technology		
Teaching component: Introduction, construction, working principle and applications of Electrochemical sensors, Thermometric sensors (Thermocouple) and Optical sensors. Electrochemical sensors for the estimation of dissolved oxygen (DO), pharmaceuticals (diclofenac) and hydrocarbons (hydroxypyrene). Electrochemical gas sensors for the detection of air pollutants (SO_2 and NO/NO_2). Disposable sensors for the detection of biomolecule (ascorbic acid) and pesticide (Glyphosate). Optical sensors for the estimation of copper in e-waste **Polymer Technology:** Synthesis, properties and applications of composite polymers - Kevlar. Conducting polymers - Mechanism of conduction in polyacetylene (p & n-doping) and its applications. Biodegradable polymers: Synthesis and properties of Poly lactic acid. Applications of biodegradable polymers in medical industry. **Case study:** Sensors in allied applications	**4** **4**	**Apply**
Module-5: Materials for Memory and Display Systems		
Teaching component: **Memory Devices:** Introduction, Classification of electronic memory devices – based on materials used and data storage, types of organic memory devices - organic molecules (pentacene & perfluoro-pentacene), polymeric materials (aromatic polyimide), organic-inorganic hybrid materials (8-hydroxy quinoline with Au NPs). **Display Systems:** Introduction to Photoactive and electroactive materials and their working principle. Properties and applications of nanomaterials (Silicon nanocrystals) and organic materials (Polythiophenes - P3HT & polyvinylcarbazole - PVK) used in optoelectronic devices. Liquid crystals (LC's) - Introduction, classification of Liquid crystals. Construction, working, properties and applications of Liquid Crystal Displays (LCD), Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's). **Case Study:** Materials in Engineering products	**4** **4**	**Apply**

List of Experiments	RBT Level
Compulsory Experiments	
1. Estimation of Total hardness of water by EDTA Complexometric method	Apply
2. Determination of COD of wastewater sample	Apply
3. Estimation of Iron in rust by external indicator method	Apply
4. Colorimetric estimation of copper in e-waste	Apply
5. Estimation of iodine in salt by Iodometric method	Apply
6. Determination of pKa of vinegar using pH meter	Apply
7. Estimation of ion exchange capacity (IEC) capacity of resin Conductometrically	Apply
8. Estimation of iron in industrial effluents potentiometrically using standard $K_2Cr_2O_7$ solution	Apply
Demonstration Experiments	
1. Determination of acidity of soft drinks using pH sensor	
2. Determination of rate of corrosion of mild steel by weight loss method	
3. Demonstration on Green synthesis of Silver nanoparticles	
Open-Ended Experiments	
1. Synthesis of biodiesel from vegetable oil	
2. Detection of adulteration in food products	
3. Construction of the battery	

Course Outcomes: After completing the course, the students will be able to	
25CHC112/122.1	Describe and explain the fundamental principles involved in electrochemistry, corrosion and its prevention, conventional and renewable energy sources, polymers, sensors, materials, and instrumental methods of analysis.
25CHC112/122.2	Apply the concepts and techniques of chemistry to identify and solve engineering-related problems.
25CHC112/122.3	Apply the knowledge of chemistry to design and construct engineering devices.
25CHC112/122.4	Conduct experiments in Engineering Chemistry, analyse the obtained data, and interpret the results to validate scientific concepts and processes.

Reference Books

1. A textbook of Engineering Chemistry, S. S. Dara, 10th Edition, S Chand & Co., Ltd., New Delhi, 2014
2. Physical Chemistry, P. W. Atkins, Oxford Publications (Eighth edition-2006)
3. Polymer Science, Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar New Age International, 2005
4. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley–Blackwell, 2012.
5. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi: 10.17226/4782.
6. Vogel's Text Book of Quantitative Chemical Analysis G.H.Jeffery, J. Bassett, J.Mendham and R.C.Denney
7. Analytical chemistry, Gary D. Christian, 6th Edition, Wiley India
8. Detect Adulteration with Rapid Test, FSSAI, Ministry of Health and Family Welfare Government of India
9. Chemistry for Engineering Students, B. Jaiprakash, R. Venugopal, Sivakumaraiah and Pushpa

Iyengar, Subhash Publications, Bengaluru, (2017- Edition)
Activity Based Learning
▪ https://www.vlab.co.in/broad-area-chemical-sciences
▪ https://demonstrations.wolfram.com/topics.php

Semester: I/II		
Applied Chemistry for ECE/EEE/ME		
Course Code: 25CHE112/122	**L:T:P:J 2:2:2:0**	**CIA Marks:** 50
Credits: 4		**SEA Marks:** 50
Hours: 40L+24P		**SEA Duration:** 03 Hours

Course Learning Objectives: The students will be able to

1	Master the basic knowledge of applied Chemistry in their day to day life, various types of industries and in research and development
2	To develop an intuitive understanding of Chemistry by emphasizing the related branches of engineering
3	To provide students with practical knowledge of quantitative analysis of materials by classical and instrumental methods for developing experimental skills in building technical competence

Module-1: Electrochemical Systems	**No. of Hrs**	**RBT**
Teaching component: **Electrode system:** Fundamentals of electrochemistry, Ion-selective electrode – classification, construction, working and application (determination of pH) of glass electrode. Electrolyte concentration cells, numerical problems.	**3**	**Apply**
Energy storage systems: Classification – primary, secondary and reserve batteries. Battery characteristics (Voltage, Capacity, Energy density, electricity storage density, Cycle life and Shelf life), Construction, working and applications of Classical battery – Lead acid battery. Modern laptop battery (Li-ion battery). Recycling of Li-ion battery (Hydrometallurgy & Pyrometallurgy). Future battery -Sodium-ion battery.	**3**	
Analytical Techniques: Introduction, principle and instrumentation of Conductometry; its application in the estimation of weak acid. Potentiometry; its application in the estimation of iron in industrial effluent. **Case study**: Batteries used in electronic gadgets	**2**	
Module-2: Corrosion Science and Engineering		
Teaching component: **Corrosion:** Fundamentals of corrosion, Importance of corrosion in industry, Electrochemical theory of corrosion, Factors affecting the rate of corrosion: ratio of anodic to cathodic areas, nature of corrosion product, nature of medium – pH. Types of corrosion - Differential metal, differential aeration - pitting and water line). Corrosion control: Anodizing – Anodizing of aluminium and its applications, Cathodic protection (Process & Applications)- sacrificial anode and impressed current methods, Metal coatings- Galvanization (Process & Applications). Corrosion Penetration Rate (CPR) – Introduction and numerical problem	**5**	**Apply**
Metal finishing: Technological importance. Electroplating: Electroplating of chromium (hard and decorative). Electrolessplating: electrolessplating of nickel and its application, electrolessplating of copper and its application in PCB, distinction between electroplating and electrolessplating processes. **Case study**: Material failure	**3**	

Module-3: Green Energy		
Green Fuel: Synthesis of biofuel (biodiesel & power alcohol), Production of Hydrogen from Biomass (Pyrolysis) and water (PEM electrolyzer). **Fuel Cells:** Differences between conventional cell and fuel cell, limitations & advantages. Construction, working & applications of methanol-oxygen fuel cell with H_2SO_4 as electrolyte, and polymer electrolyte membrane (PEM) fuel cell. **Solar Energy**: Preparation of solar grade silicon by Union Carbide Process. Photovoltaic cell - construction, working and applications of a PV cell. **Case study**: Renewable energy sources	**3** **3** **2**	**Apply**
Module-4: Macromolecules for Engineering Applications		
Teaching component: **Polymer Technology:** Introduction, methods of polymerization (Condensation and Addition). Mechanism of polymerization - Free radical mechanism taking vinyl chloride as example. Molecular weight - number average, weight average, and numerical problems. Conducting polymers- Mechanism of conduction in polyacetylene (p & n-doping) and its applications. **Plastics:** Introduction, synthesis, properties and industrial applications of PMMA and Teflon **Composites:** Synthesis, properties and applications of Kevlar. Introduction, properties and industrial applications of carbon-based reinforced composites (graphene as fillers) and metal matrix polymer composites. **Biodegradable polymers:** Synthesis and properties of Poly lactic acid. Applications of biodegradable polymers in medical industry. **Case study**: Polymers in engineering applications	**4** **4**	**Apply**
Module-5: Advanced Materials and Display Systems		
Teaching component: **Nanomaterials:** Introduction, size dependent properties of nanomaterials (Surface area, Catalytic, Conducting, Thermal), preparation of nanomaterials by sol-gel and co-precipitation method with example. Properties and engineering applications of carbon nanotubes and graphene. **Ceramics:** Introduction, classification based on chemical composition, properties and applications of perovskite ($CaTiO_3$). **Display Systems:** Liquid crystals (LC's) - Introduction, classification of Liquid crystals. Construction, working, properties and applications of Liquid Crystal Displays (LCD), Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's). **Case study**: Materials in display systems	**4** **4**	**Apply**

List of Experiments	RBT Level
Compulsory Experiments	
1. Estimation of Total hardness of water by EDTA Complexometric method	Apply
2. Determination of COD of wastewater sample	Apply
3. Estimation of Iron in rust by external indicator method	Apply
4. Colorimetric estimation of copper in e-waste	Apply
5. Estimation of iodine in salt by Iodometric method	Apply
6. Determination of pKa of vinegar using pH meter	Apply
7. Estimation of ion exchange capacity (IEC) capacity of resin Conductometrically	Apply
8. Estimation of iron in industrial effluents potentiometrically using standard $K_2Cr_2O_7$ solution	Apply
Demonstration Experiments	
1. Determination of acidity of soft drinks using pH sensor	
2. Determination of rate of corrosion of mild steel by weight loss method	
3. Demonstration on Green synthesis of Silver nanoparticles	
Open Ended Experiments	
1. Synthesis of biodiesel from vegetable oil	
2. Detection of adulteration in food products	
3. Construction of battery	

Course Outcomes: After completing the course, the students will be able to	
25CHE112/122.1	Describe and explain the fundamental principles involved in electrochemistry, corrosion and its prevention, conventional and renewable energy sources, polymers, sensors, materials, and instrumental methods of analysis.
25CHE112/122.2	Apply the concepts and techniques of chemistry to identify and solve engineering-related problems.
25CHE112/122.3	Apply the knowledge of chemistry to design and construct engineering devices.
25CHE112/122.4	Conduct experiments in Engineering Chemistry, analyse the obtained data, and interpret the results to validate scientific concepts and processes.

Reference Books

1. A textbook of Engineering Chemistry, S. S. Dara, 10th Edition, S Chand & Co., Ltd., New Delhi, 2014
2. Physical Chemistry, P. W. Atkins, Oxford Publications (Eighth edition-2006)
3. Polymer Science, Vasant R. Gowariker, N. V. Viswanathan, Jayadev Sreedhar New Age International, 2005
4. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley–Blackwell, 2012.
5. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi: 10.17226/4782.
6. Vogel's Text Book of Quantitative Chemical Analysis G.H.Jeffery, J. Bassett, J.Mendham and R.C.Denney
7. Analytical chemistry, Gary D. Christian, 6th Edition, Wiley India
8. Detect Adulteration with Rapid Test, FSSAI, Ministry of Health and Family Welfare Government of India
9. Chemistry for Engineering Students, B. Jaiprakash, R. Venugopal, Sivakumaraiah and Pushpa Iyengar, Subhash Publications, Bengaluru, (2017- Edition)

Activity Based Learning
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▪ https://demonstrations.wolfram.com/topics.php

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<table>
<tr><td colspan="4">Semester: I</td></tr>
<tr><td colspan="4">Course Name : Basic Electrical and Electronics Engineering Course Code: 25BEE113</td></tr>
<tr><td>L: T:P: J</td><td colspan="2">1:2:2:0</td><td>CIA Marks: 50</td></tr>
<tr><td>Credits:</td><td colspan="2">3</td><td>SEA Marks: 50</td></tr>
<tr><td>Hours</td><td colspan="2">40 Hours Theory + 10 lab sessions</td><td>SEA Duration: 03 Hours</td></tr>
<tr><td colspan="4">Pre-Requisites: Physics fundamentals</td></tr>
<tr><td colspan="4">Course Learning Objectives: The students will be able to</td></tr>
<tr><td>1</td><td colspan="3">Understand different number systems and the working of fundamental building blocks of digital circuits.</td></tr>
<tr><td>2</td><td colspan="3">Understand the characteristics, operations, and applications of the Diode, Bipolar junction transistors, and Operational amplifiers in electronic circuits.</td></tr>
<tr><td>3</td><td colspan="3">Understand the principle of Basic Electrical Engineering concepts</td></tr>
<tr><td colspan="4">Module-1: Digital Electronics Fundamentals:</td></tr>
<tr><td colspan="2">Differences between Analog and Digital signals, Number System-Decimal, Binary, Hexadecimal, and Octal Conversion. Boolean algebra, Basic and Universal Gates, Simplification of Sum of Product (SoP), Half and Full adder, Design of simple digital circuits using Basic/Universal Gates (2-variable / 3-variable problems)</td><td>No. of Hrs
8</td><td>Bloom's Cognitive Levels
Apply CO1</td></tr>
<tr><td colspan="4">Module–2: Rectifiers, Zener voltage Regulator and Transistor amplifier</td></tr>
<tr><td colspan="2">Rectifiers: Bridge rectifier –analysis and derivations for Average value, RMS value, Ripple Factor, Peak Inverse Voltage (PIV) and Efficiency, Illustrative Examples.
Zener diode: Working principle, Characteristics, Application as Voltage Regulator.
Bipolar Junction Transistor- Common Emitter (CE) mode input and output characteristics, DC Load line, need for biasing & Q point, Analysis of Voltage divider biasing using exact method (Excluding design), Illustrative Examples, RC Coupled Amplifier.</td><td>8</td><td>Apply CO2</td></tr>
<tr><td colspan="4">Module–3: Operational Amplifier (Op-Amp) Fundamentals</td></tr>
<tr><td colspan="2">Introduction to Op-Amp, Op-Amp Input Modes, Virtual ground and Virtual short concept, Op-Amp Parameters-Common Mode Rejection Ratio (CMRR). Input Offset Voltage and Current, Input Bias Current, Input and Output Impedance, Slew Rate. Applications of Op-Amp: Inverting amplifier, non-inverting inverter, Summer, Voltage follower, Integrator, Differentiator, and Comparator.</td><td>8</td><td>Apply CO3</td></tr>
<tr><td colspan="4">Module–4: AC Circuit</td></tr>
<tr><td colspan="2">Introduction to AC: Generation of single-phase AC and AC signal parameters, Derivation of Average Value, RMS value, Form factor and Crest factor for a sine wave. Analysis of R, L, C, RL, RC, and RLC series circuits for AC signal, Power and power factor, Illustrative examples.</td><td>8</td><td>Apply CO4</td></tr>
</table>

3-phase AC supply: Generation of the 3-phase AC signal, 3-phase connections (Star and Delta), the relation between line and phase quantity,power equations in Star and Delta connection (No Derivations),Illustrative examples		
Module–5: Fundamentals of Electrical wiring and Safety		
Electrical wiring: Connectors and switches, a system of wiring (conduit, casing, and capping), 2-way and 3-way control of lamp, **Electrical Tariff:** Requirement of a good tariff, 2-part tariff, and illustrative examples. **Safety measures:** Fuse, MCB & Earth Leakage Circuit Breaker (ELCB), Definition of Electric Shock, Precautions to avoid Electric shock, Need for Earthing, Plate and pipe Earthing, Specifications of Earthing.	**8**	Understand CO5

Practical Experiments	
Sl. No	**Experiments**
1	Implementation and Verification of Boolean Expression using Logic Gates. (Using Digital IC Trainer Kit)
2	Implementation of half adder and full adder using Basic Gates (using Digital IC Trainer Kit)
3	Determine the parameters of Bridge rectifier.
4	Design of Inverting and Non-Inverting Amplifier using Op Amp
5	Design of Differentiator and Integrator using op-amp
6	Implementation of Comparator using Op-amp
7	Determine power & power factor of Incandescent lamp, fluorescent lamp and LED lamp
8	Domestic wiring
9	Two way & Three way control of lamp
10	Measurement of earth resistance.

Course Outcomes: After completing the course, the students will be able to

24BEE113.1	Design simple combinational circuits using logic gates and understand the concept of number systems.
24BEE113.2	Explain the working of bridge rectifier, Zener regulator and transistor as amplifier
24BEE113.3	Design amplifiers, and mathematical circuits using operational Amplifiers
24BEE113.4	Analyze 1-phase and 3-phase AC circuits
24BEE113.5	Analyze the wiring, tariff and safety measures in an electrical system.

Reference Books

1. Electronic Devices and Circuits, David A. Bell, Oxford University Press, 5th Edition,2008
2. Electrical & Electronic Technology, Edward Hughes, Pearson, 12th edition, 2016
3. Electronic Devices, Thomas L. Floyd, Pearson Education, 9th Edition,2015.

4. Electronic Devices & Circuit Theory, Boylestad & Nashelsky, Pearson Education, 11th Edition,
5. A Textbook of Electrical Technology, B.L.Theraja, S. Chand & Company, reprint edition 2014.
6. Generalized Electric Energy, B R Gupta, S Chand Publications, 7th Edition, 2017
7. Basic Electrical Engineering, Abhijit Chankrabarti, Sudipta Debnath, Chandan Kumar Chanda, Mc-Graw Hill Education, 15th reprint Edition, 2017.

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Semester: II		
Course: Introduction to IOT		
Course Code: 25ETC123	**L: T:P: J: 3:0:2:0**	**CIA Marks: 50**
Credits:	**3**	**SEA Marks: 50**
Hours:	**40+10(Lab)**	**SEA Duration: 03** Hours

Pre-Requisites: Computer Fundamentals

Course Learning Objectives: The students will be able to

1	Understand about the fundamentals of Internet of Things and its building blocks.
2	Understand the application domains of IoT in everyday life.
3	Gain insights about the current trends of Associated IOT technologies.

Module1: Computer Network Fundamentals		
Basics of Networking: Introduction, Network Types, Components, Data representation, Data flow. Network criteria, Physical Structures, Network types: LAN, WAN, MAN, PAN, Switching, The Internet. Layered network models-OSI Model, TCP/IP Protocol Suite, Layered Architecture, Layers in the TCP/IP Protocol Suite, Description of each Layer, Encapsulation and De-capsulation, Addressing, Multiplexing and De-multiplexing, OSI versus TCP/IP.	**No. of Hrs** **8**	**Blooms cognitive Levels** Understand CO1
Module 2: Emergence of IoT and Interfacing of Sensors and Actuators		
Emergence of IoT: Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT networking components Sensors, Sensor Characteristics, Sensorial Deviations, Sensing types, Actuators, Actuator Types, Actuator Characteristics.	**8**	Understand CO2
Module 3: IoT Processing Topologies and Types		
Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing offloading.	**8**	Understand CO3
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	**8**	Understand CO4
Module 5: IoT Case Studies and IoT Analytics		
Agricultural IoT – Introduction, Vehicular IoT-Introduction, Healthcare IoT – Introduction, Case Studies **IoT analytics**: Machine Learning, Advantages of ML, Challenges in ML	**8**	Apply CO5

Sl. No	Lab Experiments
1	**ESP32 Basics-** Understanding ESP32 Board and Components, Installing and work with Arduino IDE,
2	Interfacing LED, push button, buzzer and LCD with ESP32
3	Interfacing sensors with ESP32
4	Interfacing actuators with ESP32
5	Interfacing LCD with ESP32 (Scrolling Display)
6	Interfacing Touch sensor with ESP32
7	Interfacing ESP32 with Bluetooth control LED (HC-05)
8	Interfacing ESP32 with Bluetooth control Buzzer (HC-05)
9	Interfacing ESP32 with Wifi to control LED (Blynk and Google Firebase Cloud)
10	Interfacing ESP32 with Wifi to monitor LDR (Blynk and Google Firebase Cloud)

Course Outcomes: After completing the course, the students will be able to	
25ETC123.1	Describe the Network Types, Layered network models, evolution of IoT, and IoT networking components,
25ETC123.2	Understand the different sensing devices and actuator types used in IoT.
25ETC123.3	Demonstrate the processing in IoT.
25ETC123.4	Explain Associated IoT Technologies
25ETC123.5	Illustrate architecture of IoT Applications
25ETC123.6	Apply the concepts of IoT on ESP 32 using Arduino IDE

Reference Books

1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, “Introduction to IoT”, Cambridge University Press 2021
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.
5. Srinivasa K. G., Siddesh G.M., Hanumantha Raju R. “Internet of Things’ Cengage Learning India Pvt Ltd.
1. 6. Forouzan, “Data Communications and Networking”, 5th Edition, McGraw Hill, 2013, ISBN: 1-25- 906475-3.

B.N.M. Institute of Technology

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Assessment Process:

Professional Core with Integrated Lab (PCI) – Course with Lab

<table>
<tr><th rowspan="2">PCI</th><th rowspan="2">CIA</th><th rowspan="2">SEA</th><th colspan="2">CIA (50)</th><th></th><th rowspan="2">SEA
Conduction: 100 M
Reduced to: 50 M</th></tr>
<tr><th></th><th>I</th><th>II</th><th>III</th></tr>
<tr><td rowspan="5">Conduction</td><td rowspan="5">50</td><td rowspan="5">50</td><td rowspan="2">Written Test</td><td>30</td><td>30</td><td>30</td><td rowspan="4">Five questions with each of 20 marks (with internal choice). Student should answer one full question from each module</td></tr>
<tr><td colspan="3">Average of three tests – 30 marks scaled down to 20 marks</td></tr>
<tr><td>Assignment</td><td colspan="3">Average of 2 Assignments – 10M</td></tr>
<tr><td>Practical</td><td colspan="3">Weekly Assessment – 10 Marks
IA test – 10 Marks</td></tr>
<tr><td colspan="4">Total – 50 Marks</td><td>Total – 50 Marks</td></tr>
</table>

i) CIA: 50%

Theory	**IA Test** (Theory): 3 IA tests - each of 30 Marks Average of 3 tests scaled down to 20 Marks **Assignment** : Average of 2 Assignments – Each of 10 marks	30 Marks
Lab	**Weekly Assessment** – 10 Marks **Practical test (1)** - 10 marks	20 Marks
	Total	**50 Marks**

ii) SEA: 50%

Question Paper:

Theory Exam	5 questions to answer, each of 20 Marks 2 questions from each module with internal choice Student should answer one full question from each module	20 M x 5 = **100 M** **Reduced to 50 M**
	Total	**50 Marks**

B.N.M. Institute of Technology

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Department of Mechanical Engineering

Course Name	**Mechanical and Civil Engineering Technology**	**Credits**	**03**
Course code	**25MCT114/124**	**CIA Marks**	**50**
Number of Lecture Hours/Week	**2L+2T**	**SEA Marks**	**50**
Total Number of Lecture Hours	**40**	**Exam Hours**	**03**

Course Objective:

This course will enable the students

1. Understand the fundamental principles and scope of mechanical and civil engineering
2. Familiarize with product design, manufacturing techniques, and robotics in modern industries
3. Gain insights into conventional and sustainable mobility technologies including electric and hydrogen vehicles.
4. Introduce the role of civil engineering in societal development with emphasis on sustainability and construction practices
5. Apply the basic principles of engineering mechanics to solve simple problems related to force systems and beams

Module 1: Introduction to Mechanical Engineering		
Teaching component: *Introduction:* Domains and applications of mechanical engineering, Role of mechanical engineering in Industry and Society, Softwares used in mechanical engineering and its applications, Sustainable development, UN-SDG, Strategies and Guidelines for achieving sustainable development. *Product design and development*: Product development process, The challenges of product development, Product development organizations.	**8Hrs**	**Apply**

Module 2: Advanced Manufacturing Technologies		
Teaching component: ***CNC Machines****:* Components, advantages and applications of CNC machines, Principle of CNC turning centre. Programming for CNC turning operations. ***Additive manufacturing:*** Steps involved in AM, Stereo lithography, FDM, Metal Jet process. ***Automation:*** Elements of automated systems and types of Automated systems	**8Hrs**	**Apply**
Module 3: Emerging Trends in Robotics and Automotive Technologies		
Teaching component: ***Robotics:*** Robot anatomy, Joints and Links, physical configuration of Robot, Accuracy and Repeatability, End effectors, Sensors and Actuators used in Robot. ***Modern Mobility:*** **IC engines** - Components and Working Principles of 4-Strokes Petrol and Diesel Engines, Application of IC Engines, Simple problems on IP, BP, FP. **Electric vehicles -** Components and Working Principles of Electric and Hybrid Vehicles, Advantages and disadvantages of EVs and Hybrid vehicles. **Hydrogen Engines -** Components and Working Principle of Hydrogen Engines	**8Hrs**	**Apply**
Module 4: Introduction to Civil Engineering and Smart Technologies		
Teaching component: ***Introductions to Civil Engineering*** and its technological advancements, Scope of different branches of Civil Engineering. Pre Engineered Buildings (PEB'S) and Applications of AI in Civil Engineering ***Computer Integration in Civil Engineering*** Software's used in Civil Engineering and its applications 1. Auto CAD 2. Staad Pro 3. ETABS 4. Primavera P6 5. Building Information Modelling (BIM)	**8Hrs**	**Apply**
Module 5: Engineering Mechanics – Statics and Structures		
Teaching component: ***Analysis of concurrent force system:*** Parallelogram law and Method of Resolution, Numerical ***Equilibrium:*** Concept of Free body diagram (FBD), Lamis theorem, Numerical ***Support reaction:*** Different types of Loads, Supports and Beams, Numerical ***Centroid:*** Centre of gravity, Centroid of Plane areas (Rectangle, Triangle, Circle, Semicircle and Quadrant circle) Numerical.	**8Hrs**	**Apply**
Total		**40 Hrs**

Course Outcomes: After completing the course, the students will be able to	
25MCT114.1	Describe the scope and interdisciplinary applications of Mechanical and Civil Engineering in modern industry and society, with emphasis on sustainable development and global goals (UN-SDG).
25MCT114.2	Explain the principles and working of advanced manufacturing systems, including CNC and Additive Manufacturing, and demonstrate basic CNC turning program development.
25MCT114.3	Illustrate the structure and components of robotic systems and various modern mobility technologies such as IC Engines, EVs, and Hydrogen engines with basic performance calculations.
25MCT114.4	Identify technological advancements in Civil Engineering and the role of software tools like AutoCAD, Staad Pro, ETABS, and BIM in planning, design, and execution.
25MCT114.5	Solve basic engineering mechanics problems related to force systems, equilibrium, support reactions, and centroid of plane figures using appropriate methods.

Text Books

1. K.R. Gopalkrishna, "A Text Book of Elements of Mechanical Engineering"- Subhash Publishers, Bangalore
2. Mechanics for Engineers: Statics by Ferdinand P. Beer and E. Russet Johnston Jr., McGraw-Hill Book Company, New York.
3. Non-Conventional Energy Resources, B H Khan, Second Edition, Tata McGraw-Hill Education Pvt Ltd, New Delhi
4. Additive Manufacturing Innovations, Advances, and Applications, T.S. Srivatsan • T.S. Sudarshan. CRC Press Taylor & Francis Group,
5. Elements of Civil Engineering (IV Edition) by S.S. Bhavikatti, Vikas Publishing House Pvt. Ltd., New Delhi.

Reference Books

1. Elements of Mechanical Engineering by K.P Roy S.K Hajra and Choudhary, Nirjhar Choudhary, Media Promoters and Publishers Pvt Ltd
2. Fundamental of Mechanical Engineering by G.S. Sawhney, PHI Publication New Delhi.
3. Additive Manufacturing Technologies, Ian Gibson, David Rosen, Brent Stucker, Second Edition, Springer Publication
4. Automation, Production Systems & CIM, Mikell P.Groover, PHI.
5. M.N. Shesha Prakash and Ganesh B.Mogaveer "Elements of Civil Engineering and Engineering Mechanics" PHI Learning

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Department of Mechanical Engineering

Course Name	Engineering Graphics& Design	Credits	03
Course code	25EGD114/124	CIA Marks	50
Number of Lecture Hours/Week	2L+2P	SEA Marks	50
Total Number of Lecture Hours	40	Exam Hours	3 hours

Course Objective:

This course will enable the students

1. To create awareness and emphasize the need for Engineering Graphics
2. To follow basic drawing standards and conventions
3. To understand the concepts of orthographic and isometric projections
4. To use the techniques, skills, and modern engineering tools necessary for engineering practice
5. To use the CAD software for creating 2-D and 3-D Models for engineering applications

Pre-requisite: Basics Geometrical constructions, orientation of straight lines, Conic sections, reading of 2D Drawing and Visualization of 3D Object, Computer skills and knowledge of material properties.

Module-I: Drawing Standards, Orthographic Projections & CAD soft ware

Teaching component: **Introduction:** Principles of Engineering Graphics and their significance, usage of Drawing Instruments, Dimensioning, **Orthographic Projections of points:** Introduction to Orthographic projections, Orthographic projections of points in all the quadrants. **Introduction to CAD software** (Solid edge): Coordinate system and reference plane HP, VP, RPP and LPP of 2D and 3D environment. Commands and its application.	**6Hrs**	**Apply**

Module-2: Projections of Straight Lines and Plane Surfaces		
Teaching component: **Projections of Straight Lines:** Line inclined to both HP &VP with respect to first quadrant only. **Projection of Planes:** Orthographic projection of plane surfaces like triangular, square, pentagonal, hexagonal, rectangluar and circular surfaces. Planes can be resting on HP/VP/PP and inclined to HP/VP. Planes in different position by using change of position method only.	**8Hrs**	**Apply**
Module-3: Projections of Solids		
Teaching component: **Projections of Right regular solids**: Introduction, Prisms and pyramids (Triangular, square, rectangular, pentagonal, and hexagonal), cones, cube and tetrahedron with axis inclined to both HP and VP (Solid resting on HP only). Freely suspended problems on Prisms and pyramids	**8Hrs**	**Apply**
Module-4: Development of Surfaces and Isometric Projections		
Teaching component: **Development of lateral Surfaces of solids:** Introduction to section of solids and sectional views. Development of solids like Prisms, Cylinder, Pyramids and Cones resting with base on HP only. **Isometric Projections:** Principles of Isometric projection – Isometric Scale, Isometric Views, Conventions; Isometric projection of simple plane figures, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two solids. Conversion of Isometric Views to Orthographic Views and Vice-versa.	**8Hrs**	**Apply**
Module – 5 : Computer Aided Drafting &Design		
Teaching component: **Computer Aided Design (CAD)** software modeling of parts and assemblies. Use of solid-modeling software for creating associative models at the component and assembly levels; Basic building drawing-floor plans that include: windows, doors, and fixtures. Electronic drawing – PCB drawing.	**10Hrs**	**Apply**
Total	**40 Hrs**	

Course Outcomes: After completing the course, the students will be able to	
25EGD124.1	Apply standard engineering drawing conventions, orthographic projection principles, and basic CAD tools to visualize and communicate design concepts effectively
25EGD124.2	Analyze and construct the projections of straight lines and plane surfaces in different orientations using fundamental projection techniques
25EGD124.3	Interpret and develop projections of solid objects under different spatial conditions, enhancing 3D visualization skills
25EGD124.4	Develop the lateral surfaces of solids and apply isometric projection techniques to create pictorial views of objects
25EGD124.5	Utilize Computer-Aided Drafting (CAD) tools for precise technical drawing, modeling, and design representation in engineering applications.

TextBooks

1. Luzadder Warren J., Duff John M., "Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production", Eastern Economy Edition, Prentice-Hall of India Pvt. Ltd., New Delhi.
2. K.R. Gopalakrishna, "Computer Aided engineering Drawing", Subash Publishers Bangalore
3. SOLIDWORKS 2021 Reference Guide Published April 6, 2021 By David C.SDC Publications.
4. N.D.Bhatt&V.M.Panchal, "Engineering Drawing", 48th edition, 2005- Charotar Publishing House, Gujarat.
5. S.Trymbaka Murthy, "Computer Aided Engineering Drawing", Universities Press(India) Pvt. Ltd., Hyderabad, 4th Edition.

Reference Books

1. Engineering and Technical Drawing Using Solid Edge Version 19, SDC Publications, Published August 15, 2007
2. Engineering Graphics with SOLIDWORKS 2021 Published February 19, 2021 By David C.
3. Agrawal B. & Agrawal C. M. (2012), Engineering Graphics, TMH Publication
4. Narayana, K.L. & P Kannaiah (2008), Text book on Engineering Drawing, Scitech Publishers

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
25EGD124.1	3	2	-	-	3	-	-	-	-	2	1
25EGD124.2	3	3	-	-	2	-	-	-	-	1	-
25EGD124.3	3	2	-	-	3	-	-	-	-	1	-
25EGD124.4	3	2	-	-	3	-	-	-	-	1	-
25EGD124.5	3	2	-	-	3	-	-	-		2	1

Engineering Graphics& Design (21EGD115/125)

Continuous Internal Assessment (CIA) Procedure:

i. The CIA marks awarded for I year Engineering Graphics and Design course shall be based on
   a. Class work for **30 marks** (Sketching and Computer Aided Engineering Drawing).
   b. One class test similar to SEA will be conducted after completion of the syllabus for 100 marks and scaled down to **20 marks**

ii. The final CIA marks awarded for Engineering Graphics and Design course shall be the sum of class work marks (a) and test marks (b).

Semester End Assessment (SEA)

i. SEA shall be conducted and evaluated for maximum of 100 Marks obtained shall be accounted for SEA final marks, reducing it by 50%.

ii. Module -1 and Module -5 are for practice and CIA and not for SEA.

iii. Separate question paper shall be set and made available for each batch as per the schedule.

iv. A maximum of THREE questions will be set as per the following pattern (No mixing of questions from different Modules).

Scheme of evaluation:

Q. No.	From Modules	Marks Allotted
1	Module 2 [Choice between (Projection of Lines or Planes)]	**25**
2	Module 3 [Projection of Solids]	**45**
3	Module 4 [Choice between (Development of Surfaces or Isometric Projections)]	**30**
Total		**100**

Q. No.	Solutions and sketching in the sketch book	Computer display and printout	Total Marks
1	**15**	**10**	**25**
2	**25**	**20**	**45**
3	**20**	**10**	**30**
Total	**60**	**40**	**100**

BNM Institute of Technology

Dept. of Computer Science and Engineering

Choice Based Credit System (CBCS and Outcome Based Education (OBE)

Semester: I

Course Name: Python Programming and Applications		**Course Code: 25PPA115**
L: T: P: J	2:0:2:0	**CIA Marks:** 50
Credits:	**3**	**SEA Marks:** 50
Hours/Week (Total)	**4**	**SEA Duration:** 03 Hours

Course Learning Objectives: The students will be able to

1	Take a new computational problem and develop a plan to solve it through problem understanding and decomposition.
2	Follow a design creation process that includes specifications, algorithms, and testing.
3	Code, test, and debug a program in Python, based on your design.

Module-1: Introduction to Python	**No. of Hours**	**Blooms Cognitive Levels with CO mapping**
Introduction to Python: Variables, expressions and statements, Conditional execution, Functions, Iteration. A Short Program: Guess the Number	**8**	**Apply CO1**

Sample Programs:

1. Develop a python code to check whether the given input is odd or even number.
2. Develop a python code to compare two number using nested conditionals.
3. Develop a python code to find out the largest of 3 numbers.
4. Develop a python code to find the factorial of a given number.
5. Develop a python code to generate the Fibonacci series up to n numbers.

Module-2: Data Structures		
Lists, Dictionaries, Tuples, Regular Expressions.	**8**	**Apply CO2**

Sample Programs:

1. Ask user to give name and marks of 10 different students. Store them in dictionary.
2. Take a list containg only strings. Now, take a string input from user and rearrange the elements of the list according to the number of occurence of the string taken from user in the elements of the list. E.g.-LIST : ["no bun","bug bun bug bun bug bug","bunny bug","buggy bug bug buggy"] STRING TAKEN : "bug" OUTPUT LIST:["bug bun bug bun bug bug","buggy bug bug buggy","bunny bug","no bun"].
3. Count the number of occurrence of each letter in word "MISSISSIPPI". Store count of every letter with the letter in a dictionary.
4. Take 10 integer inputs from user and store them in a list. Again ask user to give a number. Now, tell user whether that number is present in list or not. (Iterate over list using while loop).

Module-3: Strings and Files		
Manipulating Strings: Working with Strings, Useful String Methods, Project: Password Locker. **Reading and Writing Files:** Files and File Paths, The os.path Module, The File Reading/Writing Process, print.format() Function.	**8**	**Apply CO3**

Sample Programs:

1. Develop a code to convert binary to decimal number, pass input as parameter to the function.
2. Develop a code to print calendar of a given month pass input as parameter to the function.
3. Develop a code to find the length of the string & “refrigerator” without using len function.
4. Write a program that takes your full name as input and displays the abbreviations of the first and

middle names except the last name which is displayed as it is. For example, if your name is Pathireddy Santosh Reddy, then the output should be P.S.Reddy.
5. Develop a code to find the line starts with "T" from the file.
6. Write a program to read the contents of the file. If the file does not exist then raise appropriate exception.

Module-4: Classes & Objects		
Classes and objects, Classes and functions, Classes and methods.	**8**	**Apply CO4**

Sample Programs:
1. Develop a definition for a class named Circle with attributes center and radius, where center is a Point object and radius is a number. Instantiate a Circle object that represents a circle with its center at (150, 100) and radius 75.Write a function named point_in_circle that takes a Circle and a Point and returns True if the Point lies in or on the boundary of the circle.
2. Develop a python code to Calculate the Arc Length of an Angle by Assigning Values to the Radius and Angle Data Attributes of the class ArcLength.

Module-5: NumPy and Pandas		
Introduction to NumPy: creating Array in NumPy, Accessing of Array Elements, NumPy Array Shape, Iterating Arrays, NumPy Built in Functions, NumPy ufuncs, Creating own ufunc, Arithmetic Functions, Rounding Decimals, Finding LCM and GCD. **Introduction to Pandas:** Series, Key/Value as Series, Data Frames, Loading a file into Data Frame, Viewing Data, Cleaning Data, Data Visualization using Matplotlib package.	**8**	**Apply CO5**

Sample Programs:
1. Develop a code to create a series from a list, NumPy array and dictionary.
2. Develop a code for the following functions using pandas.
    1. head() #Print starting 5 lines of information.
    2. tail() #Print last 2 lines of information.
    3. info() #Print the information.
3. Develop a code to multiply and add a 2D array.
4. Develop a python to plot a graphs(Scatter, Histogram, Bar, Pie) for any given dataset.

Course Outcomes: After completing the course, the students will be able to	
25PPA115.1	Apply the Python Syntax and Semantics to understand the flow controls.
25PPA115.2	Develop python programs using core data structure.
25PPA115.3	Apply the concepts of Strings and file systems for problem solving.
25PPA115.4	Apply the OOP concepts for Application using python.
25PPA115.5	Apply the NumPy and Pandas concepts for analysis and visualizations.

Textbooks

1. Al Sweigart, **"Automate the Boring Stuff with Python",** 1st Edition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at https://automatetheboringstuff.com/)
2. Allen B. Downey, "Think Python: How to Think Like a Computer Scientist", 2 nd Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at http://greenteapress.com/thinkpython2/thinkpython2.pdf

Reference Books

1. Gowrishankar S, Veena A, "Introduction to Python Programming", 1st Edition, CRC Press/Taylor & Francis, 2018. ISBN-13: 978-0815394372
2. Jake VanderPlas, "Python Data Science Handbook: Essential Tools for Working with Data", 1 st Edition, O'Reilly Media, 2016. ISBN-13: 978-1491912058
3. Charles Dierbach, "Introduction to Computer Science Using Python", 1 st Edition, Wiley India Pvt Ltd, 2015. ISBN-13: 978-8126556014
4. Wesley J Chun, "Core Python Applications Programming", 3rd Edition, Pearson Education India, 2015. ISBN-13: 978-9332555365

Marks Distribution for Assessment:

CIA	Component	Description	Marks
50	Test	Total Number of Test: 2 Each Theory test will be conducted for 30 Marks Average of 2 tests = 30 Marks	30
	Weekly Assignment	Lab Record	10
		Performance	5
		Viva	5
		Total Marks	**50**
SEA	**Component**	**Description**	**Marks**
50	Theory Exam	5 Questions to answer of 20 Marks (6M * 5= 30M) 2 Questions from each module with internal choice. Student should answer one full question from each module.	30
	Execution Part	Execution-40 Marks Write up – 20 Marks Viva Voce – 10 Marks	70
		Total marks for the Course	**100**

B.N.M. Institute of Technology

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Department of Computer Science & Engineering

Semester: I

COURSE: Problem Solving Using C	**Course Code:25PSC125**	
L:T:P:J:	**2:0:2:0**	**CIE Marks:**50
Credits:	3	**SEE Marks:**50
Hours:	40	**SEE Duration:** 03 Hours

Course Learning Objectives: The students will be able to

1	To provide practical exposures like designing flowcharts, algorithms, how to debug programs etc.
2	To understand basic principles of C programming language.
3	Learn and use syntax of C programming language to solve basics science and engineering problems.
4	Use of arrays and functions to build solutions to variety of problems.
5	Effectively utilize memory using pointers.

Module 1 – Introduction to C	**No. Of Hours**	**BLL, CO**
Art of Programming through Algorithms and Flowcharts; Overview of C; C tokens; Constants, Variables and Data Types; Operators and Expressions; Managing Input and Output Operations. **Codetantra Platform:** **Unit 1 – Lesson No 1 to Lesson No 3** **Unit 2 – Lesson No 1 to Lesson No 20**	**8**	**Understand**
Module 2 – Branching and Looping Statements		
Introduction; Decision making with if, if else, Nesting of if else , else if ladder, switch statement and ?: operator; Looping Statements- while, do and for loop; Nested Loops Unconditional Branching / Jumps in Loops – goto, break , continue and return. **Codetantra Platform:** **Unit 3 – Lesson No 1 to Lesson No 12**	**8**	**Apply**
Module 3 – Functions		
Introduction; Library Functions; Need for User Defined Functions; Elements of User Defined Functions; Category of Functions; Scope Visibility and Lifetime of Variables; Parameter Passing Techniques. **Codetantra Platform:** **Unit 4 – Lesson No 1 to Lesson No 9**	**8**	**Apply**
Module 4 – Arrays and Strings		
Introduction; One Dimensional Arrays; Two- Dimensional Arrays; Strings- Introduction, Declaration, Reading and Writing Strings, Character Manipulation functions, String Handling Functions, Passing Arrays to Functions; Passing Strings to Functions; **Codetantra Platform:** **Unit 5 – Lesson No 1 to Lesson No 16**	**8**	**Apply**

Module 5 – Pointers and Structures		
Introduction to pointers; Declaration; Pointer Expressions and Pointer Arithmetic; Pointers to Functions; Pointers to Arrays; Pointers to Strings;S tructures-Introduction, Definition and Declaration Initialization and Accessing Structure variables, Copying and Comparing Structure Variables, Array of Structures, Arrays within Structures, Structures within structures, Structures and functions, unions. **Codetantra Platform:** **Unit 6 – Lesson No 1 to Lesson No 11**	**8**	**Apply**

Course Outcome: After completing the course, the students will be able to		
25PSC125.1	Understand the basic principles of programming in C language.	Understand
25PSC125.2	Apply programming constructs of C language to solve the real world problem	Apply
25PSC125.3	Develop programs in a modular manner using functions.	Apply
25PSC125.4	Apply arrays to store, sort, and search lists and tables of values.	Apply
25PSC125.5	Apply concepts of pointers and structures for effective programming practices.	Apply

Reference Books

1. E. Balaguruswamy, Programming in ANSI C, 8th Edition, Tata McGraw-Hill
2. Computer Fundamentals and Programming in C - Reema Thareja: Oxford University Press, Second Edition
3. Jacqueline Jones & Keith Harrow: Problem Solving with C, 1st Edition, Pearson 2012.
4. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
5. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Web links and Video Lectures (e-Resources):

1. https://nptel.ac.in/courses/106105171
2. http://lms.vtu.ac.in/econtent/courses/BS/14CPL16/index.php

Codetantra Platform:

Course Name: Problem Solving Using C-24PSC115- I Year-I Sem-2024-2025
Website link: https://bnmit.codetantra.com.

Marks Distribution for Assessment:

CIA	Component	Description	Marks
50	Test	Total Number of Test: 2 Each Theory test will be conducted for 30 Marks Average of 2 tests = 30 Marks	30
	Weekly Assesment	Lab Record/Viva/Performance	20
		Total Marks	**50**
SEA	**Component**	**Description**	**Marks**
50	Theory Exam	5 Questions to answer of 6 Marks (6M * 5= 30M) 2 Questions from each module with internal choice. Student should answer one full question from each module.	30

	Execution Part	Execution – 40Marks Writeup– 20 Marks Viva- 10Marks	70
		Total marks for the Course	**100**

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Semester: I/II		
COURSE: Environmental Science		
Course Code: 25EVS117/127	**L:T:P:J: 0:2:0:0**	**CIA Marks:** 50
Credits:	**1**	**SEA Marks: 5 0**
Hours:	**15 Sessions**	**SEA Duration:2Hrs**

Course Learning Objectives: The students will be able to	
1	To identify the major challenges in environmental issues and evaluate possible solutions.
2	Develop analytical skills, critical thinking and demonstrate socio-economic skills for sustainable development.
3	To analyse an overall impact of specific issues and develop environmental management plan.

Module 1 – Environment	**RBT**	**Hrs**
a) Environment: Definition, **b) Ecology and Ecosystems:** (i) Biomes (ii) Ecosystems & Sustainable Ecosystem (iv) Human Activities & Environment. **c) Human activities and their Impact on Environment:** (i) Agriculture (ii) Industry (iii) Transport (iv) mining. (i) Environmental Impact Assessment (EIA) (ii) Sustainable Development	1,2	**6**
Module 2 – Natural Resources	**RBT**	**Hrs**
Natural Resources **a) Forest Resources:** (i) Forest wealth and its conservation (ii)Wood–Major renewable resources (iii) Biodiversity **b) Water resources and its uses:** (i) Quality (ii) Impurities – Fluoride etc **c) Water borne diseases** **d) Energy:** (i) Conventional (ii) Non-conventional (iii) Wind, Solar, Tidal, Hydro Electric, Biomass & Biogas (iv) Alternate source – Hydrogen, Bio fuel, Hybrid & semi hybrid vehicles, etc **e) Life on Earth:** (i) Wild life management, Nature, Genetically Modified (GM Crops), Balance of Nature – Nature pyramid, Floods and droughts	**1,2**	6
Module 3 – Environmental Pollution and Current Global Issues	**RBT**	**Hrs**

a) **Environmental Pollution:** (Sources, Impacts, Corrective and Preventive measures, Relevant Environmental Acts, case Studies): Air Pollution, Surface and Ground Water Pollution; Noise pollution; Soil Pollution. b) **Current Global Environmental issues:** Carbon footprint, Climate change, Ozone depletion (Chloro Floro carbon), Global warming, Greenhouse effect and Acid Rain.	**1,2**	6
Module 4 – Sustainable development	**RBT**	**Hrs**
Sustainable development : (i) Solid waste, E-waste and Bio-Medical waste management. (ii) Waste Water treatment, Encouraging Green buildings. (iii) Vermicompost, organic farming, adopting Subhash Palekar farming methods.	**1,2**	6
Module 5 – Environmental Policies, Protection & Laws	**RBT**	**Hrs**
Environmental policies, Protection & Laws **Regulations & Laws** (i) Forest, Wildlife, Water and Air. (ii) Environmental movements, NGO's – Chipko, Silent valley, Narmada (iii) Environmental Ethics. (v) Role of individual in sustainable development. **Fieldwork/Practical work** 1. Visit an environmental Engineering Laboratory or green building or water treatment plant or wastewater treatment plant: Ought to be followed by an understanding of the process and its documentation 2. Visit a local area to document environmental assets/ecosystems/Rivers/Forests/Grassland/Mountain 3. To identify the sources of Air/water/soil/Noise pollution in your area 4. Visit a health center for recording of common Water/Air/Foodborne diseases in your area 5. Waste management system in your locality 6. Field visit to a local area to document environmentally appropriate behavior.	**1,2, 3**	6

Textbook/s

Sl. No.	Title of the Book	Name of the Author/s	Name of the Publisher	Edition and Year
1	Environmental Studies	Anil Kumar De, Arnab Kumar De	New Age International (P) Limited, Publishers	2018
2.	Environmental Studies	Benny Joseph	Tata Mc Graw – Hill.	2nd Edition, 2012
3.	Environmental Science working with the Earth	G.Tyler Miller Jr.	Thomson Brooks /Cole,	11th Edition, 2006

Course Outcomes: After completing the course, the students shall	
25EVS117/127.1	CO1: Understand the concepts of ecology, environment and biodiversity and the consequences of their destruction.
25EVS117/127.2	CO2: Gain awareness about the advances in energy systems as well ways to manage natural resources.
25EVS117/127.3	CO3: Understand the different kinds of pollution, their impact and manage waste through recycling.
25EVS117/127.4	CO4: Gain awareness about the current environmental issues and their global impact on various aspects.
25EVS117/127.5	CO5: Develop critical thinking and apply them to analyze a problem or question related to the environment.

Class Internal Assessment

IA1	30marks	Average of 2 IA will be taken 30Marks
IA2	30Marks	
Assignment	20 Marks	20 Marks
	Total CIA	**50 Marks**

Semester End Assessment

Semester end Exam	Objective type questions	50 Marks
	Total SEA	**50 Marks**

Final Marks = CIA + SEA = 50+50 = 100 Marks

Faculties:

Sri. Narayan Rao R Maanay, Secretary, BNMIT

Dr.Prathibha B S, HoD, Chemistry Dept.

B.N.M. Institute of Technology

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Semester: I/II		
COURSE: ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ (ಕನ್ನಡ ಬಲ್ಲ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ)		
Course Code: 25KAN1171/1271	**L:T:P:J: 1:0:0:0**	**CIA Marks:** 50
Credits:	**1**	**SEA Marks: 5 0**
Hours:	**15 hrs**	**SEA Duration: 2Hrs**

Course Learning Objectives: The students will be able to

1	ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡದ ಜೊತೆಗೆ ಕ್ರಿಯಾತ್ಮಕ ಕನ್ನಡವನ್ನು, ಕನ್ನಡ ಸಾಹಿತ್ಯ, ಸಂಸ್ಕೃತಿ ಮತ್ತು ನಾಡು ನುಡಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2	ಆಧುನಿಕ ಪೂರ್ವ ನಡುಗನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಮುಖ ಸಾಹಿತ್ಯ ಪ್ರಕಾರಗಳಾದ ವಚನ ಸಾಹಿತ್ಯ ಮತ್ತು ಕೀರ್ತನ ಸಾಹಿತ್ಯ ಇವೆರಡರ ಮಹತ್ವವನ್ನು ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
3	ಆಧುನಿಕ ಕಾವ್ಯಭಾಗದಲ್ಲಿ ಅನೇಕ ಪ್ರಮುಖ ಕವಿಗಳು ಇದ್ದರಾದರೂ ಇಲ್ಲಿ ಸಾಂಕೇತಿವಾಗಿ ಈ ನಾಲ್ಕು ಕವಿಗಳ ಸಮಕಾಲೀನ ಪ್ರಜ್ಞೆಯಿಂದ ಕೂಡಿದ ಕವನಗಳನ್ನು ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
4	ಕನ್ನಡದ ತಾಂತ್ರಿಕ ವಿಜ್ಞಾನ ಕ್ಷೇತ್ರದ ಅಸ್ತಿಭಾರ ಹಾಕಿದ ಸರ್ ಎಂ ವಿಶ್ವೇಶ್ವರಯ್ಯನವರ ಬಗ್ಗೆ ಜನಮಾನಸದಲ್ಲಿರುವ ನೆನಪಿನ ಪ್ರಸಂಗಗಳನ್ನು ಇಟ್ಟುಕೊಂಡು ಕರ್ನಾಟಕಕ್ಕೆ ಅವರು ಮಾಡಿದ ಸೇವೆಯನ್ನು ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
5	ಕನ್ನಡ ಭಾಷಾಭ್ಯಾಸ,ಸಾಮಾನ್ಯ ಕನ್ನಡ ಹಾಗೂ ಆಡಳಿತ ಕನ್ನಡದ ಪದಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು

Module 1 – ಕನ್ನಡ ನಾಡು ನುಡಿ ಮತ್ತು ಸಂಸ್ಕೃತಿಗೆ ಸಂಬಂಧಿಸಿದ ಲೇಖನಗಳು	**RBT**	**Hrs**
ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪನಾಗರಾಜಯ್ಯ ಕರ್ನಾಟಕದ ಏಕೀಕರಣ, ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಪ್ರೊ ಜಿ ವೆಂಕಟಸುಬ್ಬಯ್ಯ ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ – ಡಾ||ಎಲ್ ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ.ವಿ ಕೇಶವಮೂರ್ತಿ	**1,2**	**3**
Module 2 – ಕಾವ್ಯಭಾಗ (ಆಧುನಿಕ ಪೂರ್ವ)	**RBT**	**Hrs**
ವಚನಗಳು: ಜೇಡರ ದಾಸಿಮಯ್ಯ, ಅಲ್ಲಮಪ್ರಭು, ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ ಕೀರ್ತನೆಗಳು : ಪುರಂದರದಾಸ, ಕನಕದಾಸ	**1,2**	3
Module 3 – ಕಾವ್ಯಭಾಗ (ಆಧುನಿಕ)	**RBT**	**Hrs**
ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗ : ಡಿ.ವಿ.ಜಿ. ಕುರುಡು ಕಾಂಚಣಾ : ದ.ರಾ. ಬೇಂದ್ರೆ ಹೊಸ ಬಾಳಿನ ಗೀತೆ : ಕುವೆಂಪು ಚೋಮನ ಮಕ್ಕಳ ಹಾಡು : ಸಿದ್ಧಲಿಂಗಯ್ಯ	**1,2**	**3**
Module 4 – ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿ ಪರಿಚಯ	**RBT**	**Hrs**
ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ - ಸರ್ ಎಂ ವಿಶ್ವೇಶ್ವರಯ್ಯ - ವ್ಯಕ್ತಿ ಮತ್ತು ಐತಿಹ್ಯ - ಎ ಎನ್ ಮೂರ್ತಿರಾವ್	**1,2**	**3**
Module 5 – ತತ್ವಜ್ಞಾನ ಮತ್ತು ತಂತ್ರಜ್ಞಾನ	**RBT**	**Hrs**
ಭಗವದ್ಗೀತೆಯ ಸಾರ, ಭಗವದ್ಗೀತೆಯಲ್ಲಿ ಬರುವ ಗುರು ಶಿಷ್ಯ ಸಂಬಂಧ. ತಾಂತ್ರಿಕ ಪದಕೋಶ - ತಾಂತ್ರಿಕ ಹಾಗೂ ಪಾರಿಭಾಷಿಕ ಕನ್ನಡ ಪದಗಳು	**1,2**	**3**

Reference Books

1. **"ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ"** ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯದ ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ
   ಪ್ರಧಾನ ಸಂಪಾದಕರು - ಕುಲಪತಿಗಳು ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ ಬೆಳಗಾವಿ
   ಸಂಪಾದಕರು –
   ಡಾ\|\| ಹಿ. ಚಿ. ಬೋರಲಿಂಗಯ್ಯ, ಕುಲಪತಿಗಳು ಕನ್ನಡ ವಿಶ್ವವಿದ್ಯಾಲಯ ಹಂಪಿ

ಡಾ|| ಎಲ್ ತಿಮ್ಮೇಶ , ಪ್ರಾಧ್ಯಾಪಕರು ಸರ್ಕಾರಿ ಇಂಜಿನಿಯರಿಂಗ್ ಕಾಲೇಜ್, ಹಾಸನ

1. To introduce cultural Kannada, functional Kannada, Kannada literature, culture and Language.
2. To introduce the significance of both Vachana Sahitya and Kirtana Sahitya, the major literary genres of pre-modern Nadugannada literature.
3. Although there are many important poets in modern poetry, here it is symbolic to introduce the contemporary consciousness of these four poets, D V Gundappa, Da.Ra,Bendre, Kuvempu and Siddalingaiah.
4. To introduce the service rendered by Sir M Visvesvaraya, who laid the foundation of Kannada's field of technical science.
5. To introduce the words of Kannada language, general Kannada and administrative Kannada

B.N.M. Institute of Technology

An Autonomous Institution under VTU

Semester: I/II		
COURSE: Balake Kannada (For non Karnataka students)		
Course Code: **25KAN1172/1272**	**L:T:P:J: 1:0:0:0**	**CIA Marks:** 50
Credits:	**1**	**SEA Marks: 5 0**
Hours:	**15 hrs**	**SEA Duration: 2Hrs**

Course Learning Objectives: The students will be able to	
1	The course will enable the non Karnataka students to understand speak read and write Kannada language and communicate or Converse in Kannada language in their daily life with Kannada speakers
2	

Module 1 – SPOKEN KANNADA	**RBT**	**Hrs**
i. Interaction in Hostel / College. ii. Conversation in a Bus. iii. Conversation between friends. iv. Conversation with Teachers. v. Telephonic Conversation. vi. Conversation with shopkeeper**.** vii. Conversation with Auto and Cab Driver.	**1,2**	**5**
Module 2 – READ AND WRITE	**RBT**	**Hrs**
Vowels, Initial forms & Secondary forms Yogavahas Classified consonants, Un-classified consonants.	**1,2**	**4**
Module 3 – HISTORY OF KARNATAKA	**RBT**	**Hrs**
Royal Dynasties of Karnataka	**1,2**	**2**
Module 4 – LITERATURE AND TOURIST PLACES OF KARNATAKA	**RBT**	**Hrs**
The Birds view of Kannada Literature Karnataka's Tourist Paradise	**1,2**	**2**
Module 5 – KANNADA LANGUAGE	**RBT**	**Hrs**
History of Kannada Language	**1,2**	**2**

Reference Books

1. **"ಬಳಕೆ ಕನ್ನಡ"** ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯದ ಕನ್ನಡ ಮಾತೃಭಾಷೆ ಅಲ್ಲದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ.
   ಪ್ರಧಾನ ಸಂಪಾದಕರು - ಕುಲಪತಿಗಳು ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ ಬೆಳಗಾವಿ
   ಸಂಪಾದಕರು –
   ಡಾ|| ಎಲ್ ತಿಮ್ಮೇಶ , ಪ್ರಾಧ್ಯಾಪಕರು ಸರ್ಕಾರಿ ಇಂಜಿನಿಯರಿಂಗ್ ಕಾಲೇಜ್, ಹಾಸನ

Class Internal Assessment

IA1	25marks	Average of 2 IA will be taken 25Marks
IA2	25Marks	
Assignment 1	15 Marks	15 Marks
Assignment 2	10 Marks	10 Marks
	Total CIA	**50 Marks**

Semester End Assessment

Semester end Exam	Objective type questions	50 Marks
	Total SEA	**50 Marks**

Final Marks = CIA + SEA = 50+50 = 100 Marks

Faculties:

Sri. Chandrashekar

Dr. Chandravathi

B.N.M. Institute of Technology

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Semester: I/II		
COURSE: Professional Communication Skills		
Course Code: 25PCS116	**L:T:P:J: 1:0:1:0**	**CIA Marks:** 50
Credits:	**1**	**SEA Marks:** 50
Hours:	**30-hrs**	**SEA Duration:** 03 Hours

Course Learning Objectives: The students will be able to	
1	Comprehend the formal messages
2	Enhance English pronunciation, vocabulary, and language proficiency
3	Develop formal pieces writing with coherence and cohesion

Module 1 – Sounds of English	**RBT**	**Hrs**
Listening: https://thesoundofenglish.org/ Writing: Speech Sounds - Vowels and Consonants, Reading: Idioms and Phrases Speaking: https://www.speechactive.com/listen-english-vowels-and-consonant-sounds/ Activity: Tongue twisters with consonants Lab Component: Applied Grammar and Indianisms, Phonetics	**Apply**	**6**
Module 2 – Networking	**RBT**	**Hrs**
Listening: Active listening and conversation skills Writing and grammar: 7C's of Communication, Application of 7C's in Professional Communication Activity: The six most important words & Communication games Reading: Analyzing LinkedIn profiles with Speaking: Professional Networking Lab Component: Fundamentals of Communication	**Apply**	6
Module 3 – Composition	**RBT**	**Hrs**
Writing and Grammar: Techniques of Paragraph Writing- Topic sentence, Supporting sentence, Coherence and Cohesion, Types- Narrative, Descriptive, Argumentative Activity: Analysis and identification of paragraphs Reading: Pick a company/organization. Find information about the selected company/organization by using marketing research techniques. Lab Component: The Power of Concision	**Apply**	**6**
Module 4 – Comprehension	**RBT**	**Hrs**
Writing and Grammar: Note Taking- Note making, Active Voice – Passive Voice, Punctuation Speaking: Elevator Pitch Activity: One strength and One weakness Lab Component: Grammar: Essentials	**Apply**	**6**
Module 5 – Conversation	**RBT**	**6Hrs**

Speaking: Cue cards (IELTS) Writing and Grammar- Direct and Indirect Speech Activity: Paraphrasing conversations Paired Activity: Situational Dialogues & JAM Lab Component: Public Speaking	**Apply**	**6**

Course Outcomes: After completing the course, the students shall	
25PCS116.1	Identify the sounds of English and enhance their pronunciation
25PCS116.2	Understand the fundamentals of English communication
25PCS116.3	Apply the techniques of formal writing with coherence and cohesion
25PCS116.4	Apply the reading techniques
25PCS116.5	Interpret and communicate the ideas with grammatical range and accuracy

Reference Books

1. Raman, Meenakshi. Sharma, Sangeetha. *Technical Communication: Principles and Practice.* Oxford University Press, New Delhi. 2015.
2. Carley, Paul, Inger M. Mees, and Beverley Collins. English phonetics and pronunciation practice. Routledge, 2017.
3. Hart, Steve. Nari, Aravind R. and Bhambhani, Veena. *Embark: English for Undergraduates.* New Delhi; Cambridge University Press, 2016
4. Sharma, RC and Mohan, Krishna. *Business Correspondence and Report Writing.* New Delhi: Tata MacGraw Hill Education, 2017
5. Raman, Meenakshi. Sharma, Sangeetha. *Fundamentals of Technical Communication* Oxford University Press, New Delhi. 2014.
6. Wren, P. C., and H. Martin. "English grammar and Composition." New Delhi: S Chand & Company Ltd (2017).

Class Internal Assessment

IA1	Subjective type questions 30marks	Average of 2 IA will be taken 30Marks
IA2	Subjective type questions 30Marks	
Academic journal	30 Marks	15 Marks
Assignment 1	10 Marks	5 Marks
	Total CIA	**50 Marks**

Semester End Assessment

Semester end Exam	Subjective type questions	100 Marks
	Total SEA	**50 Marks**

Final Marks = CIA + SEA = 50+50 = 100 Marks

Faculties:

Sudeshna Pandey, Asst Prof, Dept of Humanities

Dr. Payal Mukherjee, Asst Prof, Dept of Humanities

Vaishnavi Dogne, Asst Prof, Dept of Humanities

B.N.M. Institute of Technology

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Semester: I/II		
COURSE: Scientific Foundation of Health and Yoga		
Course Code: 25SFH119/129	**L:T:P:J: 1:0:0:0**	**CIA Marks: 5 0**
Credits:	**NCMC**	**SEA Marks: 50**
Hours:	**15 hrs**	**SEA** duration: 2Hr

Course Learning Objectives: The students will be able to	
1	To understand Health and wellness (and its Beliefs)
2	To positively fight against harmful diseases for good health through positive mindset.
3	To inculcate and develop the healthy lifestyle habits for good health
4	To create healthy and caring relationships to meet the requirements of MNC and LPG world
5	To adopt positive methods to avoid risks from harmful habits within and outside the campus

MODULE 1: GOOD HEALTH	**RBT**	**Hrs**
What is Health, Why Health is very important now? What influences your Health? Health and behavior, Healthy beliefs and Advertisement. Advantages of good Health. How to maintain good Health, Changing habits for good Health. Psychological disorders (Stress and Health - Stress management), counselling for overcoming peer pressure and metal health.	**1,2,3**	**3**
MODULE 2: HEALTHY LIFESTYLES	**RBT**	**Hrs**
Developing a healthy diet for good health, Food and Health, Nutritional guidelines for good health. Obesity and overweight disorders and its management. Eating disorders, proper exercises for its maintenance (physical activities for health). How to reduce risks for good health? Process of infections and reasons for it.	**1,2,3**	**3**
MODULE 3: AVOIDING RISKS AND HARMFUL HABITS	**RBT**	**Hrs**
Characteristics of health compromising behaviors, Recognizing and avoiding addiction, How addiction develops and addictive behaviors, Types of Addictions, Influencing factors for Addictions, Difference between addictive people and non-addictive people and behaviors with the society, Effects and Health hazards from Addictions and How to recover from addictions.	**1,2,3**	**3**
MODULE 4: YOGA: PRACTICES, BENEFITS AND LIMITATIONS	**RBT**	**Hrs**
Definition of Yoga, Significance of Yoga, Elements in Yoga, Limbs of Yoga, Benefits and contra-indications of Yoga, Astanga Yoga. Introduction to the Asana's- Standing, Sitting, Prone and Supine, Preparatory practice of Yoga (loosening exercises), Introduction of Surya Namaskara, Practice of Surya Namaskara. Introduction to Pranayama, Benefits and Limitations of Pranayama, Preparatory practices for Pranayama. Practice of Pranayama. Introduction to Meditation. Importance and Benefits of Meditation.	**1,2,3**	**3**

MODULE 5: MUDRA YOGA AND INTRODUCTION TO KRIYAS	RBT	Hrs
Introduction of Mudra, definition of Mudra, Rules in Mudra, Benefits and Limitations of Mudra. Demonstration and practice of Mudra Yoga. Introduction of Kriyas; Benefits and limitations. Practice of different kriyas – Jala Neti, Trataka – Jatru Trataka, Jyothi Trataka, Bhrumadhya Trataka and Nasagra Trataka.	**1,2,3**	**3**

Course outcome: At the end of the course the student will be able:

CO 1: To understand Health and wellness (and its Beliefs)

CO 2: To acquire Good Health and its balance for positive mindset

CO 3: To inculcate and develop the healthy lifestyle habits for good health.

CO 4: To create healthy and caring relationships to meet the requirements of MNC and LPG world

CO 5: To adopt positive methods to avoid risks from harmful habits within and outside the campus.

CO 6: To positively fight against harmful diseases for good health through positive mindset and Yoga.

Reference Books

Suggested Learning Resources:

1. **Health Psychology** (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor –Published by Routledge 711 Third Avenue, New York, NY 10017.
2. **Health Psychology - A Textbook, (**Fourth Edition) by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press
3. **Health Psychology** (Ninth Edition) by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press
4. **Scientific Foundations of Health (Health & Wellness) -** General Book published for university and colleges references by popular authors and published by the reputed publisher.
5. **Lights on Yoga –** BKS Iyengar

SWAYAM / NPTL/ MOOCS/ We blinks/ Internet sources/ YouTube videos and other materials

Class Internal Assessment

IA1	30marks	30Marks
Assignment	20 Marks	20 Marks
	Total CIA	**50 Marks**

Semester End Assessment

Semester end Exam	Objective type questions	50 Marks
	Total SEA	**50 Marks**

Final Marks = CIA + SEA = 50+50 = 100 Marks

Faculties:

Smt. Deepika B N

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Semester: II		
COURSE: Technical Communication Skill		
Course Code: 25TCS126	**L:T:P:J: 1:0:1:0**	**CIA Marks:** 50
Credits:	**1**	**SEA Marks:** 50
Hours:	**30-hrs**	**SEA Duration:** 03 Hours

Course Learning Objectives: The students will be able to	
1	Acquire essential Technical communication skills
2	Comprehend and write the technical aspects of the domain
3	Build competency to communicate proficiently at the work place.

Module 1 – Basics of Technical Communication	**RBT**	**Hrs**
Listening: Listening for Gist Writing: Notice, Agenda, Minutes of the meetings. Reading: Reading Advertisements. Speaking: Retell Lectures Grammar: Synonyms and Antonyms Lab Component: Emails and Other Writings	**Apply**	**6**
Module 2 – Presentation Skills	**RBT**	**Hrs**
Writing: Dos and Don'ts of Presentation. Mini-presentations on a business theme. Reading: Reading for Gist (Research Articles) Speaking: Data Interpretation Grammar: One-word substitution, Prefix and Suffix Lab Component: Dynamics of Professional Presentations	**Apply**	**6**
Module 3 – Communication at Workplace	**RBT**	**Hrs**
Reading: Reading job advertisements Writing: Understanding the job specifications, requirements in application forms (for job or higher studies) Email Writing, Cover Email, Resume Speaking: Mock Interview Lab Component: Non-verbal Communication, Job Interviews	**Apply**	**6**
Module 4 – Report Writing-I	**RBT**	**Hrs**
Listening : News report on 'Tipping'(Source file) - Asking and giving information Reading: News Analysis Writing: Elements of Report, Types of report Grammar: Error identification of tenses Speaking: Shorter than a tweet. Lab component: Reports and Proposals I	**Apply**	**6**
Module 5 – Report Writing II	**RBT**	**Hrs**

Listening: Listening to 'How It's Made' Reading: Understanding User Manuals Writing: Inspection Report, Interpretative Reports, Informative Report Grammar: Content Vocabulary Speaking**:** Product Description Lab Component: Reports and Proposals II	**Apply**	**6**

Course Outcomes: After completing the course, the students shall	
25TCS126.1	**Understand** the formal modes of communication
25TCS126.2	**Articulate** their logical ideas and well organized presentations
25TCS126.3	**Execute** the formal messages with reference to workplace.
25TCS126.4	**Understand** the basics elements of report writing
25TCS126.5	**Chart** the technical reports using the content vocabulary

Reference Books

1. Raman, Meenakshi. Sharma, Sangeetha. *Technical Communication: Principles and Practice.* Oxford University Press, New Delhi. 2015.
2. McCarthy, Michael, and Felicity O'dell. Academic vocabulary in use edition with answers. Cambridge University Press, 2016.
3. Hart, Steve. Nari, Aravind R. and Bhambhani, Veena. *Embark: English for Undergraduates.* New Delhi; Cambridge University Press, 2016
4. Cunningham, Patricia M. Prefixes and Suffixes, Grades 3-8: Systematic Sequential Phonics and Spelling. Carson-Dellosa Publishing, 2008.
5. Sharma, RC and Mohan, Krishna. *Business Correspondence and Report Writing.* New Delhi: Tata MacGraw Hill Education, 2017
6. Raman, Meenakshi. Sharma, Sangeetha. *Fundamentals of Technical Communication* Oxford University Press, New Delhi. 2014.

Class Internal Assessment

IA1	Subjective type questions 30marks	Average of 2 IA will be taken 30Marks
IA2	Subjective type questions 30Marks	
Academic journal	30 Marks	15 Marks
Assignment 1	10 Marks	5 Marks
	Total CIA	**50 Marks**

Semester End Assessment

Semester end Exam	Subjective type questions	100 Marks
	Total SEA	**50 Marks**

Final Marks = CIA + SEA = 50+50 = 100 Marks

Faculties:

Sudeshna Pandey, Asst Prof, Dept of Humanities

Dr. Payal Mukherjee, Asst Prof, Dept of Humanities

Vaishnavi Dogne, Asst Prof, Dept of Humanities

B.N.M. Institute of Technology

An Autonomous Institution under VTU
Department of Humanities

Liberal & Creative Arts

Year 2025-26

Course Name	Music Production L:T:P:J: 0:0:2:0	Credits	01
Course Code	25LCA1181/1281	CIA Marks	50
Number of Lecture Hours/Week	2	SEA Marks	50
Total Number of Lecture Hours	26	SEA Duration	2 hours

Course Objectives:

- To introduce music theory and Staff notation
- To introduce MIDI Programming and editing in DAW
- To compose and produce melodies and rhythms
- To introduce sound engineering and post production of music

Pre-requisites: Basics of singing or any instruments. Laptop, Logic pro/ garage band

Course Outcomes:

- After studying this course, students will be able to:
- Understand the Staff Notation
- Compose Music independently
- Edit and Mix the tracks.
- Produce a full-fledged mastered song.

Module-1:	
Music Theory and Practice, Staff notation reading, writing. singer exercise, Keyboard interface, Midi programming, Melody composition, Instrument arrangements.	**10**
Module–2:	
Software tools for music composition (Ex:Logic Pro) Midi Editing, audio recording and editing, Rhythm/drums/Indian beats programming.	**10**
Module–3:	
Synthesizer, sampling and sound engineering. Oscillators, filters, EQ, compressor, reverbs, Mixing and mastering.	**6**

Instructor		
1	**Mr. Hemadri Srinivas**	**Visiting Faculty**

B.N.M. Institute of Technology

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Department of Humanities

Liberal & Creative Arts
Year 2025-26

Course Name	Dance Production	**Credits**	**01**
Course Code	**25LCA1182/1282** **L:T:P:J: 0:0:2:0**	**CIA Marks**	**50**
Number of Lecture Hours/Week	2	**SEA Marks**	**50**
Total Number of Lecture Hours	26	**SEA Duration**	**2 hrs**

Course Objectives:

- To learn Dance theory
- To know the history of Indian Dance Style
- To know free style and contemporary dance form
- To learn basics of Costume and Makeup
- To learn the concept of lighting for dance
- To choreograph dance

Pre-requisites: Basics of Dance.

Course Outcomes: After studying this course, students will be able to:

- Understand the history of Dance
- Compose dance for the given style
- Emote the expressions (Navarasa through Dance)
- Choreograph / Produce the dance

Module-1:	
History of Indian Dance, Free style and contemporary dance, primary experiences of creative thought processes, movement invention, creation, and composition; --creation of phrases; --initial development of vision and values; --beginnings of overall compositional form within the making of solos.	**10**
Module–2:	
Create a light design, find or create music or sound, decisions regarding set, take decisions regarding costume or fashion. Duet, Trio and Group Dance composition.	**6**
Module–3:	
Concept of emotion. Study of different kinds and styles of emotion. Practicing the techniques and skills in emotion including dance and movement. Analysis and preparation for building a character. Process of preparation of dancer. Understanding what Choreography, Concept and principles of Choreography is. Understanding the process of Choreography for various styles and forms. Dance Production.	**10**

Instructor		
1	**Ms Kalyani S Kumar**	**Faculty**

B.N.M. Institute of Technology

An Autonomous Institution under VTU
Department of Humanities
Liberal & Creative Arts
Year 2025-26

Course Name	Theatre Arts	Credits	1
Course Code	25LCA1183/1283 L:T:P:J: 0:0:2:0	CIA Marks	50
Number of Lecture Hours/Week	2	SEA Marks	
Total Number of Lecture Hours	26	SEA Duration	2 hrs

Course Objectives: This course will enable the students to

- Learn different origins and history of theatre.
- Understand the techniques of voice culturing.
- Understand the concept and Principles in set design, Lighting, costume design and make-up.
- Understand different kinds and styles of acting and Process of building a character.
- Understand the Concept, principles of direction and the process of directing plays.

Pre-requisites:NIL

Course Outcomes: After studying this course, students will be able to:

- Analyze and apply the knowledge of theater history and voice modulation techniques in stage performances.
- Apply the concept and Principles of set design, Lighting, costume design and make-up in performances.
- Apply the concepts of various techniques and styles of acting to build a character.
- Understand and interpret the process of writing and directing a play.

Module-1: Theatre History & Voice Culturing	
Theatre History: A Glance at Origin of theatre history & development of theatre. Introduction to theatre traditions and forms including world theatre, Asian theatre Classic and Modern Indian Theatre and Folk Theatre. **Voice Culturing:** Understanding the insights of voice culturing. Introduction to the techniques of voice training. Understanding the word and process of pronunciation. Process of speech and problems in speech. Practicing various methods of effective speech. Designing effective process of speech for performing on stage.	**10**
Module–2: Stage Craft & Theatre Technique	
Set and Costume Design: Basic concept, Principles and methods of scenic design. Stage technique and set construction. Designing set models and set execution. Study of elements and principals of costume design such as Color schemes, textures, shapes etc. Process of desigining costumes for various styles of play and their execution. **Lighting and Make-Up:** Study of concept of stage lighting, Functions and principles of lighting. Understanding the process of light designing, study of special effects in light designing. Execution of light for plays.	**06**
Module–3: Acting & Direction	
Acting: Concept of acting. Study of different kinds and styles of acting. Practicing the techniques and skills in acting including dance and movement. Analysis and preparation for building a character. Process of preparation of an actor. **Direction and Play Writing:** Understanding what is direction, Qualities of a director and Importance of a director in play production. Concept and principles of direction. Understanding the process of directing plays for various styles and forms. Introduction to various types and styles of play writing. Understanding the process of play writing and execution.	**10**

Instructor		
1	**Mr.Purushotham**	**Faculty**

B.N.M. Institute of Technology

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Department of Humanities
Liberal & Creative Arts
Year 2025-26

Course Name	**Fine Arts** **L:T:P:J: 0:0:2:0**	**Credits**	**01**
Course Code	**25LCA1184/1284**	**CIA Marks**	**50**
Number of Lecture Hours/Week	**2**	**SEA Marks**	**50**
Total Number of Lecture Hours	**26**	**SEA Duration**	**2 hrs**

Course Objectives:

- Acquire basic foundation skills in fine arts
- Working Knowledge on the art forms of drawing & painting
- Demonstrate the process and model of sculpt art
- Apply knowledge in the field of communication media

Pre-requisites:

- Interest in the creative process of developing a content applicable to the visual life and society

Course Outcomes: After studying this course, students will be able to:

- Apply basic understanding of coloring, drawing and painting and ability to apply them to a specific aesthetic content.
- Apply Knowledge and skills in the use of basic tools, techniques, and processes to work from concept to finished product.
- Clearly communicate the content, context, and process of their applied art visually, orally and in writing.

Module-1: Drawing & Painting	
Abstraction and Stylization, Foreshortening, perspective, eyelevel, fixed point of view, sketching, drawing, light and shade, land-scape, (Cartridge, handmade canvas and Hard- board Handmade, etc.), Pencil, Watercolor, Acrylic Painting.	**10**
Module–2: Sculpture & Carving	
Pottery Making, Modelling with Clay, terra-cotta, Carving in wood, stone, Plaster of Paris and Metal welding and Art.	**10**
Module–3: Applied Art	
Book cover design and illustration, Cartoon, Poster Design, Advertisements, Newspaper and Magazines, Animation, Computer-Graphic.	**06**

Instructor		
1	**Mr. Channakeshava**	**Visiting Faculty**

B.N.M. Institute of Technology

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Department of Humanities
Liberal & Creative Arts - Year 2025-26

Course Name	**Photography** **L:T:P:J: 0:0:2:0**	**Credits**	**1**
Course Code	**25LCA1185/1285**	**CIA Marks**	**50**
Number of Lecture Hours/Week	**2**	**SEA Marks**	**50**
Total Number of Lecture Hours	**26**	**SEA Duration**	**2Hr**

Course Objectives: This course will enable the students to,

- Develop the skill & knowledge of Digital Photography.
- Understand and develop the various methods of image capture.
- Develop the method of basic image editing techniques.
- Develop various post-production and retouching techniques.

Pre-requisites: NIL

Course Outcomes: After studying this course, students will be able to:

- Apply the knowledge of Digital Photography technique in photography.
- Capture an Image using various capturing methods for different types of photography.
- Apply various post-production and retouching techniques to the photographs.

Module-1: Digital Photography and Basics	
Understanding film and paper photography. Learning about the digital revolution. Advantages and disadvantages of digital photography over film photography. Digital method of storing and processing digital image. Representation of digital image**:** Resolution – Pixel Depth– Pixel Aspect Ratio – Dynamic Colour Range – File Size– Colour Models – Image Compression – File Formats –Calculating image resolution for outputs.	**10**
Module–2: Digital Capture and Types of Photography	
Understanding digital cameras, Image Sensors and different capturing methods. Understanding camera lens, additional equipment, filters, lights, films, accessories, positioning, depth of field and exposure. Introduction to most popular types of photography including portrait photography, landscape photography, wildlife photography, Macro photography and High-speed photography etc.	**10**
Module–3: Digital Retouching, Image Enhancement and Digital Output	
Understanding the selection of tools and techniques for image enhancement. Learn the use of layers and Photo mounting techniques. Applying selective effects to images like filters, masks and different digital effects.	**06**

Instructor		
1.	**Mr. Madhu Channaiah**	**Faculty**

B.N.M. Institute of Technology

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Department of Humanities
Liberal & Creative Arts - Year 2025-26

Course Name	**Japanese** **L:T:P:J: 0:0:2:0**	**Credits**	**1**
Course Code	**25LCA1186/1286**	**CIA Marks**	**50**
Number of Lecture Hours/Week	**2**	**SEA Marks**	**50**
Total Number of Lecture Hours	**26**	**SEA Duration**	**2Hr**

Course Objectives: This course will enable the students,

- to develop an understanding of and appreciation for Japanese culture and to develop language knowledge and skills to facilitate significant interaction in Japanese society personally and professionally.
- to help learners develop sound thinking and effective communication skills, as well as a sense of historical perspective and global awareness relative to Japan
- to foster an understanding of and respect for the meaning and significance of life as a Japanese

Pre-requisites: NIL

Course Outcomes: After studying this course, students will be able to:

- analyze and discuss salient aspects of Japanese thought and their effect on language, behavioral patterns, and interpersonal relationships.
- apply critical thinking skills and write well in English and Japanese (in various genres).
- converse and act in Japanese in linguistically, socially, and culturally appropriate ways on a broad variety of topics in a wide range of settings.
- read and engage effectively texts of various genres.
- demonstrate self-managed learning skills that will facilitate life-long learning.

Module-1:	
Hiragana (Japanese script/alphabets), Katakana (Japanese script/alphabets), Self-Introduction, Basic Greetings, Reading Practice of Hiragana and Katakana alphabets, L-1 Nouns, prepositions, conversation practice, Practice exercises, listening exercises, L-2 How to use this and that, how to make questions/answers, conversation practice, practice exercises, listening exercises.	**8**
Module–2:	
L-3 How to address the places, conversation practice, practice exercises, listening exercises, L-4 past tenses, from, till , conjunctions, conversation practice, practice exercises, listening exercises, L-5 Introducing verbs, action verbs: go, come, return , conversation practice, practice exercises, listening exercises, L-6 Prepositions, expressions, conversation practice, practice exercises, listening exercises.	**8**
Module–3:	
L-7 How to construct sentences with give, receive with grammar explanation, conversation practice, practice exercises, listening exercises, L-8 Introducing adjectives, grammar explanation to use those adjectives, conversation practice, practice exercises, listening exercises, L-9 Introducing particle「が」, grammar explanation to use those adverbs, conversation practice, practice exercises, listening exercises, L-10 Directions, existence of places, objects, conversation practice, practice exercises, listening exercises.	**10**

B.N.M. Institute of Technology

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Department of Humanities
Liberal & Creative Arts - Year 2025-26

Course Name	**Video Production** **L:T:P:J: 0:0:2:0**	**Credits**	**1**
Course Code	**25LCA1187/1287**	**CIA Marks**	**50**
Number of Lecture Hours/Week	**2**	**SEA Marks**	**50**
Total Number of Lecture Hours	**26**	**SEA Duration**	**2Hr**

Course Objectives: This course will enable the students to,

- ❖ Develop Technical Skills in Video Production.
- ❖ Master the Fundamentals of Storytelling and Scriptwriting.
- ❖ Understand and Apply Industry Best Practices in Production and Post-Production.

Pre-requisites:NIL

Course Outcomes: After studying this course, students will be able to:

- ❖ Demonstrate proficiency in using video production equipment, including cameras, lighting, and audio equipment
- ❖ Craft and produce videos with clear and engaging narratives.
- ❖ Effectively use video editing software to complete post-production tasks, including editing footage, applying color correction, and mixing audio.

Module-1: Basics and Pre-Production	
Understanding the basics of film making. Concept development and project proposal. Learning the art of Screenplay, Scripting and revising. Understanding Visual storytelling and storyboarding, Developing shooting schedules, Location, Set, budget and costume design.	**6**
Module–2: Video Capture and Production	
Understanding basic camera operation (Video imaging techniques: Camera shots, Camera movement-1) Pans & tilts, 2) Zooms & pull outs. Composition & rule of thirds. Camera angles & blocking. Single camera shoots. Multiple camera shoots) and tripods/camera stabilization devices. Learn Lighting Principles & Techniques (Choosing a light source, Light quality & color temperature, Elements of three-dimensional lighting-1) Three point lighting, 2) Key & fill lighting) Understanding the Audio and sound effects (Microphone types, Placement, Metering, Technical aspects-1) Sample rates,2) Bit depth,3) Proper levels), Knowing shot composition & maintaining shot log sheets	**10**
Module–3: Post Production and Output	
Editing- The techniques of joining of shots using Adobe Premier Pro and other softwares. Learn the basic techniques of rough cut editing (A/B roll, Timeline, Basic editing) and fine cut editing (Advanced editing-1.Insert & overwrite edits, 2.Fit to fill & superimpose edits, 3.Split edits, 4.Trim edits, 5.Key framing, 6.Transitions, 7.Importing graphics / video clips, 8.Titles, 9.Overlays, 10.Animations and 11.Special Effects- Plug-ins / filters & Chroma Key). Enhancing the video using ADR - additional dialogue recording, color grading and A/V effects. Learn to Render and export videos in different formats.	**10**

1	**Prof. Praveen Jois**	**Faculty**

Class Internal Assessment

IA1	30marks	30 Marks
Assignment	20 Marks	20 Marks
	Total CIA	**50 Marks**

Semester End Assessment

Semester end Exam	Practical	50 Marks
	Total SEA	**50 Marks**

Final Marks = CIA + SEA = 50+50 = 100 Marks

I & II Semester

INNOVATION and DESIGN THINKING			
Course Code : 25IDT118/128		CIA Marks	50
Teaching Hours/Week (L:T:P: S)	0:2:0:0	SEA Marks	50
Total Hours of Pedagogy	2	Total Marks	100
Credits	01	Exam Hours	-

Course Category: Foundation

Preamble: This course provides an introduction to the basic concepts and techniques of engineering and reverse engineering, process of design, analytical thinking and ideas, basics and development of creative ways of thinking of every problem the students face in their life,.

Course objectives:

1. To explain the concept of design thinking for product and service development
2. To explain the fundamental concept of innovation and design thinking
3. To discuss the methods of implementing design thinking in the real world.

Module-1(6 hours)

Empathy For Design Thinking

Why Empathy?, How to feel?, Visualization of 6 phases of the design thinking process, Journey Mapping, Look outside your context, The power of Storytelling in Empathy.

Define for Design Thinking

Analysis & Synthesis, Empathy Mapping, Problem Statement, User: Insight, How might We?, Real Time interactions.

Pedagogy	• **Introduction about the design thinking particularly Empathy : Presentation mode** • **Empathy mapping**

Module-2 (6 Hours)

Ideate for Design Thinking

Introduction of Ideation - Create Thinking - Generating Design Ideas - Brainstorming - Mind mapping - SCAMPER - Analytical Thinking - Group Activities Recommended

Pedagogy	• **Case studies on design thinking and business acceptance of the design**

Module-3 (6 Hours)

Prototype for Design Thinking

Types of Prototyping , Guidelines of prototyping, Low Fidelity, High Fidelity Prototyping, Rapid prototyping, Scenario based Prototyping, MVP or Prototyping.

Mini Workshops/Presentations/Video Case studies

Pedagogy	• **Business model examples of successful designs** • **Simulation on the role of virtual eco-system for collaborated prototyping** • **MVP and Prototyping through live examples and ideas**

Module-4 (6 Hours)

Testing

Compare Alternatives, Users experience, Observe, Follow ups , Popular Design Frameworks

Pedagogy	• **4 hours design thinking workshop cum competition.** • **Live project on design thinking in a group of 4/5 students**

Module-5 (6 Hours)

Entrepreneurship Development

Meaning of entrepreneur, Evolution of the concept, Functions of an Entrepreneur, Types of Entrepreneurs, Intrapreneur

Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available- Start Up India scheme, Venture Capitalist & Angel investors

Pedagogy	• **Presentation & Interaction from Entrepreneurs**

Course Outcomes:

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Appreciate various design process procedure	L3
CO2	Generate and develop design ideas through different technique	L4
CO3	Experience design thinking process in real	L6
CO4	Demonstrate an understanding of the concept and evolution of entrepreneurship and evaluate the role of government initiatives, incentives, and financial support systems	L4

Sl.No.	Learning Level	Knowledge Level
1	Remember	K1
2	Understand	K2
3	Apply	K3
4	Analyse	K4
5	Evaluate	K5
6	Create	K6

Assessment Details (both CIA and SEA)

(Methods of CIA need to be define topic wise i.e.- MCQ, Quizzes, Open book test, Seminar or micro project)

The weightage of Continuous Internal Assessment (CIA) is 100%

Continuous Internal Evaluation:

1. Methods suggested: Test, Open Book test, Written Quiz, Seminar, report writing etc.
2. The class teacher has to decide the topic for MCQs, closed book test, open book test, Written Quiz, Live Project and Seminar. In the beginning only teacher has to announce the methods of CIA for the subject.

CO-PO/PSO Mapping:

CO No.	Statement	Bloom's Cognitive level	POs
CO1	To explain the students about the concept of design thinking for product and service development.	Analyzing	1, 4, 5, 6, 9, 12
CO2	To explain and make the students understand the fundamental concept of innovation and design thinking.	Analyzing	3, 4, 10
CO3	To discuss various methods of implementing design thinking in the real world and make the students understand the importance of design thinking in various sectors.	Creating	1, 2, 3, 6
CO4	To Demonstrate an understanding of the concept and evolution of entrepreneurship and evaluate the role of government initiatives, incentives, and financial support systems	Analyzing	1, 4, 5, 6, 9, 12

Level 1 – Understanding, Level 2 – Applying, Level 3 – Analyzing, Level 4 – Evaluating, Level 5 – Creating

CO- PO mapping

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
21IDT118 1.1	2			3	3	3	2		3			2
21IDT118 1.2			3	3						3		
21IDT118 1.3	2	2	3			3					2	
21IDT118 1.4	2			3	3	3	2		3			2
Average	2	2	3	3	3	3	2	0	3	3	2	2

CO-PO/PSO	Justification
CO1->PO1(1),PO4(3), PO5(3), PO6(3), PO7(2), PO9(3), PO12(2)	Students will be able to get the knowledge based on Concepts of Design Thinking. With their basic knowledge of Engineering and Research capability and with the help of modern tools used in design thinking along with societal, environmental and sustainability concerns , students will work in groups to achieve a lifelong learning.
CO2->PO3(3),PO4(3), PO10(3)	Students will be able to use the Design / Development of Solutions by investigating complex problems in a very creative manner and communicating the same thing in a very effective presentation to others.
CO3->PO1(2), PO2(2), PO3(3), PO6(3), PO11(2)	Students will be able to apply their engineering knowledge by identifying the problems in a right manner and develop solutions by knowing various implementation strategies thinking as an societal engineer and effectively manage the projects.
CO4->PO1(1),PO4(3), PO5(3), PO6(3), PO7(2), PO9(3), PO12(2)	Students will be able to get the knowledge based on Entrepreneurship. With their basic knowledge of Engineering and Research capability and with the help of modern tools used in design thinking along with societal, environmental and sustainability concerns, students will work in groups to achieve a lifelong learning.

Assessment processes:

i. Internal test / MCQs
ii. Assignment
iii. Presentation
iv. Class interactions
v. Simulations
vi. Chart Presentations
vii. Class Activities
viii. Mini Prototype Development

Assessment tool:

i. Green books
ii. Mini Prototype evaluation
iii. Class Activity Assessment

iv. Assessment plan:

Suggested Learning Resources:

Text Books :

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 Mote, "Design Thinking for Strategic Innovation: What They Can't Teach You at Businessor Design School", John Wiley & Sons 2013.
5. Entrepreneurship, Donald F. Kuratko and Richard M. Hodgetts, South-Western, 2012.
6. Entrepreneurship Development, Gupta S.L., Arun Mittal, International Book House, 2012

References:

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

Web links and Video Lectures (e-Resources):

1. www.tutor2u.net/business/presentations/. /**product lifecycle**/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com › Home › Marketing › Product Development
4. https://www.mindtools.com/brainstm.html
5. https://www.quicksprout.com/. /how-to-**reverse-engineer**-your-competition
6. www.vertabelo.com/blog/documentation/**reverse-engineering**
   https://support.microsoft.com/en-us/kb/273814
7. https://support.google.com/docs/answer/179740?hl=en
8. https://www.youtube.com/watch?v=2mjSDIBaUlM thevirtualinstructor.com/foreshortening.html
   https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf
   https://dschool.stanford.edu/use-our-methods/ 6. https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process 7. http://www.creativityatwork.com/design-thinking-strategy-for-innovation/ 49 8. https://www.nngroup.com/articles/design-thinking/ 9. https://designthinkingforeducators.com/design-thinking/ 10. www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf
   https://dschool.stanford.edu/groups/k12/wiki/c0be1/Prototype.html
   https://www.nngroup.com/articles/ideation-in-practice/
   https://www.interaction-design.org/courses/design
   https://onlinecourses.swayam2.ac.in/cec20_mg19/preview

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning http://dschool.stanford.edu/dgift/

CO (Cognitive Level)	Class Activities	Assignment	Prototype Presentation	MCQ
CO1- Understand, Apply, Analyse	Understand, Apply,			Understand, Apply
CO2- Understand, Apply, Analyse	Understand, Apply, Analyse			Understand, Apply
CO3- Evaluate, Create		Understand, Apply	Evaluate, Create	Understand, Apply
CO4- Understand, Apply, Analyse	Understand, Apply,			Understand, Apply