Sharnbasva University, Kalaburagi.

Sharnbasva University, Kalaburagi.

Course Title:	Engineering Mathematics-1 for CSS		
Course Code:	24MATS101	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T:P)	3:2: 0	Exam Hours	03
Total Hours of Pedagogy	36 Hours Theory and 12 Hours Tutorial/practice	Credits	04

Course objectives: The goal of the course Engineering Mathematics-1 for CSS **(24MATS101)** is to

- Familiarize the importance of successive differentiation and partial differentiation.
- Apply the knowledge of polar curves to trace different types of curves.
- Applications of first order first degree differential equations.
- To develop the knowledge of matrices and linear algebra in a comprehensive manner.
- Apply the modular arithmetic to computer algorithms.

Teaching-Learning Process

Pedagogy (General Instructions):

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop student's theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self–study.
4. Student progress can be monitored through internal assessment by the course teacher.
5. Two assignment problems on each module.
6. Encourage the students for group learning to improve their creative and analytical skills.
7. Show short related video lectures in the following ways:
8. As an introduction to new topics (pre-lecture activity).
9. As a revision of topics (post-lecture activity).
10. As additional examples (post-lecture activity).
11. As an additional material of challenging topics (pre-and post-lecture activity).
12. As a model solution of some exercises (post-lecture activity).

Course outcome (Course Skill Set)

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

CO1	Understand the concepts of partial differentiation to compute rate of change of multivariate functions.
CO2	Learn the notion of calculus to solve problems related to polar curves.
CO3	Analyse the solution of linear and non-linear ordinary differential equations.
CO4	Make use of matrix theory for solving for system of linear equations and compute eigen values and eigen vectors by using computational software.
CO5	Get acquainted and to apply modular arithmetic to computer algorithms

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Bloom's level of the course outcomes:

CO#	Bloom's Level					
	Remember (L1)	Understand (L2)	Apply (L3)	Analyse (L4)	Evaluate (L5)	Create (L6)
CO1	√	√	√			
CO2	√	√	√			
CO3	√	√	√			
CO4	√	√	√			
CO5	√	√	√			

Course Articulation Matrix / Course mapping:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1										1
CO2	3	1										1
CO3	3	3										1
CO4	3	2										1
CO5	3	2										1
AVG	3	1.8										1

Note: 1-Low mapped, 2-Medium mapped, 3-High mapped

MODULE-1 SUCCESSIVE AND PARTIAL DIFFERENTIATION.

Introduction of Successiveand partial differentiation in CS Engineering applications.

Determination of nth order derivatives of Standard functions - Problems. Leibnitz's theorem (without proof) - problems

Definition and simple on partial differentiation problems, Euler's theorem problems, total derivatives, partial differentiation of composite functions, Jacobians-definition and problems, extreme values of functions of two variables.

Self-study / Tutorial: Python program : Evaluating the limits, finding the Partial derivatives of a given function, finding partial derivatives andJacobian and plotting the graph.

Applications: Computation of stress and strain, Errors and approximations, Estimating the critical points and extreme values.

(RBT Levels: L1, L2 and L3) (10 Hours)

MODULE-2 :POLAR CURVES

Introduction to polar coordinates and curvature and its related applications CS Engineering .

angle between the radius vector and tangent, angle between two curves, Pedal equation for polar curves. Derivative of arc length Cartesian, Parametric and Polar forms (without proof) - problems. Curvature and Radius of Curvature – Cartesian, Parametric, Polar and Pedal forms and problems.

Self-study / Tutorial: Python program :2D plots for Cartesian and polar curves, finding angle of intersection between two polar curves and finding radius of curvature of a given curve.
Applications: Angle of elevation and survey engineering.

(RBT Levels: L1, L2 and L3) (09 Hours)

MODULE- 3: LINEAR AND NON-LINEAR ORDINARY DIFFERENTIAL EQUATIONS

Introduction to first order ordinary differential equations pertaining to the applications for CS Engineering.
Solution of first order and first degree differential equations – Exact, reducible to exact and Bernoulli's differential equations. Applications of ODE's – Orthogonal trajectories, Rate of Decay and growth, L-R and C-R circuits. Problems.
Nonlinear differential equations : Equations solvable for p, equations solvable for y, equations solvable for x, general and singular solutions, Clairauit's equations and equations reducible to Clairauit's form.
Self-study / Tutorial: Python program : Solution of first order differential equation and plotting the graphs
Applications of ordinary differential equations: L-R and C-R circuits, Newton's law of cooling, Conduction of heat.
(RBT Levels: L1, L2 and L3) (10 Hours)

MODULE- 4: LINEAR ALGEBRA

Introduction of liner algebra related to CS Engineering applications.
Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigen values and Eigen vectors, Rayleigh's power method to find the dominant Eigen value and Eigen vector. Problems

Self-study / Tutorial:Python Programs : Inverse of asquarematrixbyCayley-Hamilton theorem.**Python program :**Evaluating the rank of matrix, a systemof linear equations byGauss-Seidelmethod.
Applications : Optimum solution
(RBT Levels: L1, L2 and L3) (09 Hours)

MODULE- 5: MODULAR ARITHMETIC

Introduction of modular arithmetic and its applications in Computer Science and Engineering. 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.

Self-study / Tutorial: Python program : Divisibility, GCD, Properties of Prime Numbers, Fundamental theorem of Arithmetic.
Applications: Cryptography, encoding and decoding, RSA applications in public key encryption.
(RBT Levels: L1, L2 and L3)(10 Hours)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 50% of the maximum marks (25 marks out of 50 marks). The minimum passing marks for the SEE is 35% of the maximum marks out of 100 marks (18 marks out of 50 marks).

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

if the student secures not less than 35% (18 Marks out of 50 marks) in the semester-end examination (SEE), and a minimum of 35% (35 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component of the CIE shall be 50 marks.

The CIE marks for the theory component shall be 50 marks and scored will be reduced to 25 marks as below:

- Two Tests as CIE-1 after completion of 50% of syllabus followed with improvement test-1 with the same syllabus of CIE-1 (on the need basis of students) and CIE-2 after completion of remaining 50% of syllabus followed with improvement test-2 with the same syllabus of CIE-2 (on the need basis of students).
- Average of best two performances of the Internaltests shall be considered for 25 marks.
- Session wise assignments for 10 marks
- For relevant other activities (Eg. Seminar, field work, Math Lab, activity report etc) 10 marks
- Attendance 5 marks (95% to 100% of attendance) and 04 marks (85% to 94% of attendance)

Semester End Examination (SEE)

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of three sub questions) from each module
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Text Books

1. **B.S.Grewal**:"Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

1. **V. Ramana:**"Higher Engineering Mathematics" McGraw-Hill Education,11th Ed.,2017
2. **Srimanta Pal &Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
3. **N.P Bali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications,10th Ed.,2022.
4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw–Hill Book Co., New York, 6thEd., 2017.
5. **C.B Gupta, S. R Singh and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
6. **James Stewart: "**Calculus" Cengage Publications, 7thEd., 2019.
7. **David CLay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed.,2018

Sharnbasva University, Kalaburagi.

Course Title:	Engineering Mathematics-1 for EES		
Course Code:	24MATE101	CIE Marks	50
Course Type(Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T:P)	3:2: 0	Exam Hours	03
Total Hours of Pedagogy	36 Hours Theory and 12 Hours Tutorial/practice	Credits	04

Course objectives: The goal of the course Engineering Mathematics-1 for EES**(24MATE101)**is to

- Familiarize the importance of linear and non-linear differential equations.
- Analyse engineering problems applying Partial derivatives and understand the value of limit (continuity) of function by using indeterminate forms.
- Apply the knowledge of polar curves to trace different types of curves.
- Applications of matrices and linear algebra in a comprehensive manner.
- To develop the knowledge series expansions.

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

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop student's theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self–study.
4. Student progress can be monitored through internal assessment by the course teacher.
5. Two assignment problems on each module.
6. Encourage the students for group learning to improve their creative and analytical skills.
7. Show related short video lectures in the following ways:
    - As an introduction to new topics (pre-lecture activity).
    - As a revision of topics (post-lecture activity).
    - As additional examples (post-lecture activity).
    - As an additional material of challenging topics (pre-and post-lecture activity).
    - As a model solution of some exercises (post-lecture activity).

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

CO1	Analyse the solution of linear and non-linear ordinary differential equations.
CO2	Learn the notion of partial differentiation to compute rate of change of multivariate functions.

CO3	Learn the notion of calculus to solve problems related to polar curves.
CO4	Make use of matrix theory for solving for system of linear equations and compute Eigen values and Eigen vectors by using computational software.
CO5	Solve the engineering problems of sequence and series.

Bloom's level of the course outcomes:

CO#	Bloom's Level					
	Remember (L1)	**Understand (L2)**	**Apply (L3)**	**Analyse (L4)**	**Evaluate (L5)**	**Create (L6)**
CO1	√	√	√			
CO2	√	√	√			
CO3	√	√	√			
CO4	√	√	√			
CO5	√	√	√			

Course Articulation Matrix / Course mapping:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1										1
CO2	3	1										1
CO3	3	3										1
CO4	3	2										1
CO5	3	2										1
AVG	3	1.8										1

Note: 1-Low mapped, 2-Medium mapped, 3-High mapped

MODULE-1 LINEAR AND NON-LINEAR ORDINARY DIFFERENTIAL EQUATIONS

Introduction to first order ordinary differential equations pertaining to the applications for EE & EC Engineering.

Solution of first order and first degree differential equations – Exact, reducible to exact and Bernoulli's differential equations. Applications of ODE's – Orthogonal trajectories, Rate of Decay and growth, L-R and C-R circuits. Problems.

Nonlinear differential equations : Equations solvable for p, equations solvable for y, equations solvable for x, general and singular solutions, Clairaut's equations and equations reducible to Clairaut's form.

Self-Study / Tutorial: Python Program: Solution of first order differential equation and plotting the graphs, solving the Linear differential equations.

Applications of ordinary differential equations: L-R and C-R circuits, Newton's law of cooling, Conduction of heat.
(RBT Levels: L1, L2 and L3) (10 Hours)

MODULE-2: INDETERMINATE FORMS AND PARTIAL DIFFERENTIATION

Introduction of Indeterminate forms and partial differentiation in EE & EC Engineering applications.
Indeterminate forms – L-Hospital rule. Problems.
Partial differentiation, total derivative - differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables. Problems.

Self-Study / Tutorial: Python Program: Evaluating the limits, finding the Partial derivatives of a given function, finding partial derivatives, Jacobian and plotting the graph.
Applications: Applications of maxima and minima in EE & EC Engineering.

(RBT Levels: L1, L2 and L3) (10 Hours)

MODULE-3 :POLAR CURVES

Introduction to polar coordinates and curvature relating to EE & EC Engineering applications.
Polar coordinates, Polar curves, angle between the radius vector and tangent, angle between two curves. Pedal equations. Curvature and Radius of curvature - Cartesian, Parametric, Polar and Pedal forms. Problems only.

Self-Study / Tutorial: Python Program:2D plots for Cartesian and polar curves, finding of intersection between two polar curves, finding radius of curvature of a given curve.
Applications: Communication signals, manufacturing of microphones and Image processing.
(RBT Levels: L1, L2 and L3) (09 Hours)

MODULE- 4: LINEAR ALGEBRA

Introduction of liner algebra related to EE & EC Engineering applications.
Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigen values and Eigen vectors, Rayleigh's power method to find the dominant Eigen value and Eigen vector. Problems

Self-Study / Tutorial: Python Program: Evaluating the rank of matrix ,Solution of system of equations by Gauss-Siedal method.
Applications of Linear Algebra: Network Analysis, Markov Analysis, Critical point of a networksystem.
Optimum solution.
(RBT Levels: L1, L2 and L3) (09 Hours)

MODULE- 5: SEQUENCE AND SERIES

Introduction of Sequence and series in EE & EC Engineering
Infinite series, tests for convergence/divergence, Limit comparison test, Ratio test, root test, Raabe's test, Alternating series, Absolute convergence and conditional convergence.
Taylor's and Maclurin's series

Self-Study / Tutorial: Python Program: Finding the sum of the series up to infinity, finding the given series convergent and divergent.
Applications: Sequence and Series expansion in communication signals.
(RBT Levels: L1, L2 and L3) (10 Hours)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 50% of the maximum marks (25 marks out of 50 marks). The minimum passing marks for the SEE is 35% of the maximum marks out of 100 marks (18 marks out of 50 marks).

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Continuous Internal Evaluation(CIE):

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The CIE marks for the theory component shall be 50 marks and scored will be reduced to 25 marks as below:

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- Average of best two performances of the Internaltests shall be considered for 25 marks.
- Session wise assignments for - 10 marks
- For relevant other activities (Eg. Seminar, field work, Math Lab, activity report etc) -10 marks
- Attendance (95% to 100% of attendance) and 04 marks (85% to 94% of attendance)- 5 marks

Semester End Examination (SEE)

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of three sub questions) from each module
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Text Books

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Reference Books

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Sharnbasva University, Kalaburagi.

Course Title:	Engineering Mathematics-1 for CES.		
Course Code:	24MATC101	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T:P)	3:2:0	Exam Hours	03
Total Hours of Pedagogy	36 Hours Theory and 12 Hours Tutorial/practice	Credits	04

Course objectives: The goal of the course Engineering Mathematics-1 for CES.**(24MATC101)**is to

- Familiarize the importance of polar curves to trace different types of curves
- Analyse engineering problems applying Partial derivatives and understand the value of limit (continuity) of function by using indeterminate forms.
- Apply the knowledge of series expansion and vector calculus.
- Applications of first order first degree differential equations.
- To develop the knowledge of matrices and linear algebra in a comprehensive manner.

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

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop student's theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self–study.
4. Student progress can be monitored through internal assessment by the course teacher.
5. Two assignment problems on each module.
6. Encourage the students for group learning to improve their creative and analytical skills.
7. Show short related video lectures in the following ways:
    - As an introduction to new topics (pre-lecture activity).
    - As are vision of topics (post-lecture activity).

- As additional examples (post-lecture activity).
- As an additional material of challenging topics (pre-and post-lecture activity).
- As a model solution of some exercises (post-lecture activity).

Course outcome (Course Skill Set)

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

CO1	Understand the concepts of calculus to solve problems related to polar curves.
CO2	Learn the notion of partial differentiation to compute rate of change of multivariate functions.
CO3	Apply multivariate calculus to solve engineering problems.
CO4	Analyse the solution of linear ordinary differential equations and reduction formula.
CO5	Make use of matrix theory for solving for system of linear equations and compute Eigen values and Eigenvectors by using computational softwares.

Bloom's level of the course outcomes:

CO#	Bloom's Level					
	Remember (L1)	**Understand (L2)**	**Apply (L3)**	**Analyze (L4)**	**Evaluate (L5)**	**Create (L6)**
CO1	√	√	√			
CO2	√	√	√			
CO3	√	√	√			
CO4	√	√	√			
CO5	√	√	√			

Course Articulation Matrix / Course mapping :

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
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CO2	3	1										1
CO3	3	3										1
CO4	3	2										1
CO5	3	1										1
AVG	3	1.6										1

Note: 1-Low mapped, 2-Medium mapped, 3-High mapped

Sharnbasva University, Kalaburagi.

MODULE-1 : POLAR CURVES

Introduction to polar coordinates and curvature in Civil Engineering applications.

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

Self-study / Tutorial:Python program :2D plots for Cartesian and polar curves, finding angle of intersection between two polar curves and finding radius of curvature of a given curve.
Applications: Angle of elevation and survey engineering.
(RBT Levels: L1, L2 and L3) (10 Hours)

MODULE-2 : INDETERMINATE FORMS AND PARTIAL DIFFERENTIATION

Introduction to Indeterminate forms and Partial differentiation relating to Civil Engineering.
Indeterminate forms – L -Hospital rule. Problems.
Partial differentiation, total derivative - differentiation of composite functions. Jacobian's and problems. Maxima and minima for a function of two variables. Problems.
Self-study / Tutorial: Python program : Evaluating the limits, finding the Partial derivatives of a given function, finding partial derivatives andJacobian's and plotting the graph.
Applications: Computation of stress and strain, Errors and approximations, Estimating the critical points and extreme values.
(RBT Levels: L1, L2 and L3) (09 Hours)

MODULE-3: SERIES EXPANSION AND VECTOR DIFFERENTIATION

Introduction to Series expansion and Vector Calculus in Civil Engineering applications.
Taylor's and Maclaren's series expansions for one variable (statements only)- Problems
Vector Differentiation: Scalar and vector fields. Gradient, directional derivative, divergence and curl - physical interpretation, solenoid and irrotational vector fields. Problems.
Self-study / Tutorial:Python program :Find curl of vector point, gradient of scalar point and divergence.
Applications: Heat and mass transfer, oil refinery problems, environmental engineering.
(RBT Levels: L1, L2 and L3) (10 Hours)

MODULE- 4: BASIC CALCULUS (DIFFERENTIATION AND INTEGRATION)

Introduction to first order ordinary differential equations pertaining to the applications for Civil engineering.
Exact and reducible to exact differential equations -Integrating factors type-1. , linear and reducible linear. Applications of ODE's – Orthogonal trajectories, Conduction of heat, Newton's law of cooling. Problems.
Reduction formula, $\int_0^{\frac{\pi}{2}} \sin^n x\, dx$, $\int_0^{\frac{\pi}{2}} \cos^n x\, dx$, $\int_0^{\frac{\pi}{2}} \tan^n x\, dx$ and its examples.
Self-study / Tutorial:Python program : Solution of first order differential equation and plotting the graphs**Applications of ordinary differential equations:** Rate of Decay and growth.
(RBT Levels: L1, L2 and L3) (10 Hours)

Sharnbasva University, Kalaburagi.

MODULE- 5: LINEAR ALGEBRA
IntroductionoflineralgebrarelatedtoCivilEngineeringapplications. Elementary row transformation of a matrix, Rank of a matrix. Consistency and solution of a systemof linear equations - Gauss-Jordan method and approximate solution byGauss-Seidelmethod.EigenvaluesandEigenvectors,Rayleigh'spowermethodtofindthedominantEigenvalueandEigenvector. **Self-study / Tutorial:Python Programs :**Inverse of asquarematrixbyCayley-Hamilton theorem.**Python program :**Evaluating the rank of matrix, a systemof linear equations byGauss-Seidelmethod. **Applications** of Linear Algebra: Optimum solution. (RBT Levels: L1, L2 and L3) (09 Hours)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 50% of the maximum marks (25 marks out of 50 marks). The minimum passing marks for the SEE is 35% of the maximum marks out of 100 marks (18 marks out of 50 marks).

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Continuous Internal Evaluation(CIE):

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The CIE marks for the theory component shall be 50 marks and scored will be reduced to 25 marks as below:

- Two Tests as CIE-1 after completion of 50% of syllabus followed with improvement test-1 with the same syllabus of CIE-1 (on the need basis of students) and CIE-2 after completion of remaining 50% of syllabus followed with improvement test-2 with the same syllabus of CIE-2 (on the need basis of students).
- Average of best two performances of the Internaltests shall be considered for 25 marks.
- Session wise assignments for 10 marks
- For relevant other activities (Eg. Seminar, field work, Math Lab, activity reportetc) 10 marks
- Attendance 5 marks (95% to 100% of attendance) and 04 marks (85% to 94% of attendance)

Semester End Examination (SEE)

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of three sub questions) from each module
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Sharnbasva University, Kalaburagi.

Suggested Learning Resources:

Text Books

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Reference Books

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16. **Srimanta Pal &Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
17. **N.P Bali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications,10th Ed.,2022.
18. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw–Hill Book Co., New York, 6thEd., 2017.
19. **C.B Gupta, S. R Singh and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
20. **James Stewart: "**Calculus" Cengage Publications, 7thEd., 2019.
21. **David CLay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed.,2018

Course Title:	Engineering Physics for CSS		
Course Code:	24PHYS102	CIE Marks	50
Course Type (Theory/Practical)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L+T)	3+1	Exam Hours	03
Total Hours of Pedagogy	50 hrs	Credits	04

Course objectives

- Gain a fundamental understanding of lasers and Optical fibers and their applications in Engineering.
- Develop fundamental understanding of quantum mechanics and their applications.
- Acquire an understanding of electrical properties of materials, especially superconductors.
- Gain fundamental understanding of the principles of quantum information and quantum computing including their concepts and applications.
- Gain an understanding of quantum gates and oscillations focusing on their fundamental principles and practical applications.

Teaching-Learning Process

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

1. Flipped Class
2. Smart Class Room
3. Blended Mode of Learning
4. Interactive Simulations and Animations
5. Assignments based learnings

6. NPTEL and Other Videos for theory topics
7. Lab Experiment Videos

Module-1 **(10 Hours)**

PHOTONICS

LASER: Basic properties of a LASER beam, Interaction of Radiation with Matter, Einstein's A and B Coefficients, Laser Action & Population Inversion, Metastable State, Requisites of alaser system, Construction and working of a Semiconductor Diode Laser (Ga-As), Applications:Barcodescanner, CD writing/reading. Numerical Problems.

Optical Fiber : Principle and structure, Acceptance angle and Numerical Aperture (NA), Expression for NA (derivation)& Numerical Problems, Types of Optical Fibers, Attenuation and Fiber Losses, Applications of Optical Fibers: Local Area Network (LAN) and Fiber Optic Communication (Basics of point to point communication system).

Prerequisite:Propertiesoflight

Self-learning: Total Internal Reflection & Propagation Mechanism (Optical Fibers)

Module-2 **(10 Hours)**

QuantumMechanics:

Inadequacies of Classical Mechanics (Blackbody radiation & Photo electric effect), de Broglie Hypothesis and Matter Waves, de Broglie wavelength of electrons (derivation), Heisenberg's Uncertainty Principle and its application (Non existence of electron inside the nucleus-Non Relativistic) & Numerical Problems, Wave Function, Physical Significance of a wave function, Time independent Schrodinger wave equation, Eigen functions and EigenValues, Motion of a particle in a one dimensional potential well of infinite depth.

Pre requisite: Wave–Particle dualism;

Self-learning: deBroglie Hypothesis

Module-3 **(10 Hours)**

Electrical Conductivity in metals :

Concept of Resistivity and Mobility, Numerical Problems on resistivity and mobility, Assumptions and failures of Classical Free Electron Theory, Assumptions and success of Quantum Free Electron Theory, Fermi Energy (Qualitative), Fermi factor, Variation of Fermi factor with temperature and energy. Numerical Problems.

Superconductivity:

Introduction toSuperconductors,Temperaturedependenceofresistivity,MeissnerEffect,CriticalField,TemperaturedependenceofCriticalfield & Numerical Problems, TypesofSuperconductors,BCStheory(Qualitative),HighTemperature superconductivity, Josephson Junctions(Qualitative), Applications of superconductors - Maglev vehicle, SQUID's (Qualitative).

Prerequisites: BasicsofElectricalconductivity

Self-learning: Resistivity and mobility

Module-4 **(10 Hours)**

Quantum Information & Quantum Computing:

Principles of Quantum Information & Quantum Computing: Introduction to Quantum Computing, Moore's law &its end. Single particle quantum interference, Differences betweenclassical&quantumcomputing, conceptofqubit and its properties. Representation of qubit by Bloch sphere. Single and Two qubits. Extension to N qubits.

Dirac representation and matrix operations: Introduction to Matrices, Matrix representation of 0 and 1 states,Identity Operator I, Determination of I|0> and I|1>,Pauli Matrices and its operations on |0> and |1> states, Explanation of i) Conjugate of a matrix ii) Transpose of a matrix. Unitary Matrix U, Examples: Rowand ColumnMatricesandtheir multiplication(InnerProduct).

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Prerequisites: Matrices
Self-learning:Moore'slaw

Module-5 **(10 Hours)**

QuantumGates&Oscillations

QuantumGates:

Single Qubit Gates: Quantum Not Gate , Pauli –Z Gate, Hadamard Gate, Phase Gate (or S Gate), T-Gate

Multiple Qubit Gates: Controlled gate, CNOT Gate, (Discussion for 4 different input states). Representation of Swapgate, Controlled –Z gate, Toffoli gate.

Oscillations:

Simple Harmonic motion (SHM) and characteristics, differential equation for SHM, series andparallel combination of springs (Derivation), Dampedoscillations and equation of motion for damped oscillation(derivation), Forced oscillations and differential equation of forced oscillation (derivation. NumericalProblems.

Prerequisites:Motioninonedimension
Self-learning:SHM

Courseoutcome(CourseSkillSet)

Attheend ofthecoursethestudentwillbeableto:

CO1	Describe the fundamental principles of lasers and Optical fibers, highlighting their properties and real world applications.
CO2	Describe the core principles of quantum mechanics including its fundamental concepts and applications.
CO3	Provide concise overview of conductors and superconductors highlighting their characteristics, differences and applications.
CO4	Explain about quantum information and computing, focusing on matrix operations.
CO5	Explain the principles and operations of quantum gates along with their significance in quantum computing and oscillatory systems.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 45% of the maximum marks (22.5 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination (SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component shall be 50 marks.

- Two Tests each of 25 Marks; after the completion of the syllabus of 50%and 100% respectively. The improvement of CIE-1 and CIE-2

are conducted for weak students and the students who want to improve their marks scored in CIE-1 and CIE-2. Average of Best Two performances of the Internal Tests shall be considered for 25 Marks.

- Session wise assignments for 10 marks
- For Seminar work 10 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

Semester End Examination(SEE)

1. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
2. The question paper will have ten full questions carrying equal marks.
3. Each full question carries 20 marks.
4. There will be two full questions (with a maximum of three sub questions) from each module
5. Each full question will have sub questions covering all the topics under a module.
6. The students will have to answer five full questions, selecting one full question from each module.

SuggestedLearningResources:

Books(TitleoftheBook/Nameoftheauthor/Nameofthepublisher/EditionandYear)

1. SolidStatePhysics,SOPillai,NewAgeInternationalPrivateLimited,8th Edition,2018,.
2. EngineeringPhysicsbyGupta andGour,DhanpatRaiPublications,2016(Reprint).
3. ConceptsofModernPhysics,AurthurBeiser,McGrawhill,6th Edition,2009.
4. LasersandNonLinearOptics, BBLoud,Newageinternational,2011 edition.
5. AtextbookofEngineeringPhysicsbyM.N.Avadhanulu,PG.KshirsagarandTVSArunMurthy,Eleventhedition,SChandandCompanyLtd. NewDelhi-110055.
6. QuantumComputationandQuantumInformation,MichaelA.Nielsen&IsaacL.Chuang,CambridgeUniversitiesPress,2010Edition.
7. QuantumComputing,VishalSahani,McGrawHillEducation,2007Edition.
8. EngineeringPhysics,SPBasavaraj,2005Edition,
9. PhysicsforAnimators,MicheleBousquetwithAlejandroGarcia,CRCPress,Taylor&Francis,2016.
10. QuantumComputationandLogic:HowQuantumComputersHaveInspiredLogicalInvestigations,MariaLuisaDallaChiara, Roberto Giuntini,Roberto Leporini,GiuseppeSergioli,TrendsinLogic,Volume48,Springer.
11. StatisticalPhysics:BerkelyPhysicsCourse,Volume5,F.Reif,McGrawHill.

WeblinksandVideoLectures(e-Resources):

Web links:

1. **LASER** :www.youtube.com/watch?v=WgzynezPiyc
2. **Superconductivity :**https://www.youtube.com/watch?v=MT5Xl5ppn48
3. **OpticalFiber:**www.youtube.com/watch?v=N_Ka8EpCUQo
4. **QuantumMechanics**:https://www.youtube.com/watch?v=p7bzE1E5PMY&t=136s
5. **QuantumComputing:**https://www.youtube.com/watch?v=jHoEjvuPoB8
6. **PhysicsofAnimation:**www.youtube.com/watch?v=kj1kaA_8Fu4
7. **NPTEL Superconductivity:** https://archive.nptel.ac.in/courses/115/103/115103108/

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8. **NPTEL Quantum Computing :**https://archive.nptel.ac.in/courses/115/101/115101092
9. **Virtual LAB :**https://www.vlab.co.in/participating-institute-amrita-vishwa-vidyapeetham
10. **VirtualLAB**:https://vlab.amrita.edu/index.php?sub=1&brch=189&sim=343&cnt=1

ActivityBasedLearning(SuggestedActivitiesinClass)/ PracticalBasedlearning

http://nptel.ac.inhttps://swayam.gov.in
https://virtuallabs.merlot.org/vl_physics.
Htmlhttps://phet.colorado.edu
https://www.myphysicslab.com

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

COs	Pos											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2										1
CO2	3	2										1
CO3	3	2										1
CO4	3	2										1
CO5	3	2										1
Avg	3	2										1

Level 3 - Highly Mapped, Level 2- Moderately Mapped, Level 1 – Low Mapped

Note: The CO-PO mapping values are indicative. The course co-ordinator can alter the mapping using Competency and performance Indicators mentioned in the AICTE Exam reforms.

Sub:Engg.Physics for CES/24PHYC102

COURSE OBJECTIVE:

This course will enable the students to

- Gain knowledge of different types of oscillations and shock waves, their generation and pratical applications.
- Develop comprehensive understanding of elastic properties of materials, their limitations and causes of elastic failure.
- Gain knowledge of acousticsincluding sound behaviour, control and oplimization of various architectural applications.
- Gain a fundamental understanding of lasers and Optical fobers and their applications in Engineering.
- Gain an understanding of various natural hazards and safety measures required to miligate their impact.

COURSE OUTCOME:

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

CO1.Analyze the principles of oscillations and shock waves, their generation processes and their diverse applications.

CO2. Examine the concepts elasticity, properties of elastic materials and the factors leading to their failures.

CO3. Provide concise overview of building acoustics, including sound behavior, control techniques and their architectural significance.

CO4. Describe the core principles of lasers and Optical fibers, highlighting properties and their applications.

CO5.Explain different types of natural hazards and outline the prevention of strategies and safety measures to miligate their impact.

Module 1-Oscillations and Shock Waves

Oscillations: Simple Harmonic motion (SHM), differential equation for SHM &Numericals, series and parallel combination of springs (Derivation) &Numericals, Damped oscillations and equation of motion for damped oscillation (derivation),Tuned Mass Damper (TMD) (Qualitative), Forced oscillations and differential equation of forced oscillation (derivation), Resonance, sharpness of resonance.

Shockwaves: Mach number and Mach Angle, Mach Regimes, definition and characteristics of Shockwaves, Laws of conservation of mass, momentum and energy, Construction and working of Reddy shock tube, Applications of Shock Waves in treatment of dry borewell, Wood Preservation.

Pre-requisites: Basics of Oscillations
Self-learning: Simple Harmonic motion, differential equation for SHM (10hrs)

Module 2- Elasticity

Elasticity, Types of stress and strain, Hooke's law & stress-strain diagram, Elastic Moduli &Numericals, Poisson's ratio, Failures of Engineering materials – ductile fracture, brittle fracture, Fatigue and factors affecting fatigue (Qualitative explanation) Beams, bending moment of a beam (derivation),Cantilever and Young's modulus of a single cantilever (derivation) and its Engineering Application (Cantilever Bridge), Torsion of a cylinder (derivation) &Numericals.

Prerequisites: Elasticity, Stress & Strain

Self-learning: Stress-Strain Curve (10hrs)

Module 3- Acoustics

Acoustics: Introduction to acoustics, Types of Acoustics, reverberation and reverberation time &Numericals, absorption power and absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (derivation &numericals), Measurement of absorption coefficient, factors affecting the acoustics and remedial measures, Noise and its Measurements, Sound Insulation and its measurements. Impact of Noise in Multi-storied buildings, Case study on Acoustics (CIE component only).

Prerequisites: Basics of Sound, Waves & light properties
Self-learning: Introduction to acoustics

Module 4- Laser& Optical Fiber

Laser:Properties of a LASER Beam, Interaction of Radiation with Matter, LASER action, Population Inversion, Metastable State, Requisites of a LASER System, Types of Lasers, Gallium-Arsenide LASER construction and working, LASER in Surveying and Ranging, Bridge deflection, Road Profiling. Numerical Problems.

Optical Fiber: Principle and Construction of Optical Fibers, Acceptance angle and Numerical aperture (NA), Expression for Numerical Aperture (derivation &numericals), Types of Optical fibers, Modes of Propagation, Attenuation and Fiber Losses & Numerical Problems, Fiber Optic Displacement Sensor.

Prerequisite: Properties of light

Self-learning: Propagation Mechanism & TIR in optical fiber (10hrs)

Module 5-Natural hazards and Safety

Introduction, Earthquake, (general characteristics, Physics of earthquake, Richter scale of measurement and earthquake resistant measures), Landslide (causes such as excess rain fall, geological structure, human excavation etc, types of land slide, adverse effects, engineering solution for landslides). Fire hazards and fire protection, fire-proofing materials, fire safety regulations and fire fighting equipment –Prevention and safety measures. Building materials – Composite materials (Polymer composites, Ceramic composites and Metal composites), Case study (CIE component only).

Pre requisite: Oscillations

Engineering Physics

COs and POs Mapping 2024-25

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

Level 3 - Highly Mapped, Level 2- Moderately Mapped, Level 1 – Low Mapped

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Note: The CO-PO mapping values are indicative. The course co-ordinator can alter the mapping using Competency and performance Indicators mentioned in the AICTE Exam reforms.

BASIC ELECTRICAL ENGINEERING

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the Academic Year 2024-25)

Course Code: 24ELE103/203	**Marks:50**
Contact Hours/Week: 03	**SEE Marks: 50**
Total Hours: 40	**Exams. Hours: 03**
Semester: I/II	**Credits: 03**

Course Objectives: The main objective of the course is to understand:

1. The analysis of DC circuits and basics of Electromagnetic Induction.

2. The construction and working of DC Machines.

3. The concept of Single phase and three-phase AC circuits.

4. Theconstruction and operation of Single-phase transformer and three phase Induction motor.

5. Theconstruction and working of three phase alternator and circuit protective schemes.

MODULE I:

DC Circuits: Analysis of Series, Parallel and Series-Parallel circuits with DC excitation,Kirchhoff's laws.

Electromagnetic Induction: Faraday's Laws of Electromagnetic Induction, Types of induced EMF, Self-Inductance, Mutual -Inductance and Coefficient of coupling. **08 Hours**

MODULE II:

DC Generator: Introduction, construction, working and emf equation. Classification of DC generator.

DC Motor: Back emf and its significance, Torque equation. Classification of motors, 3-point starter **08 Hours**

MODULE III

Single phase AC Circuits: Generation of AC voltage, Phase, Phase Difference, Peak value, Average value and RMS value, Phasor representation of alternating quantity. Analysis of single-phase AC circuits consisting of R, L, C, RL, RC, RLC series circuits. Real power, Reactive power, Apparent power, Power factor.

Three phase AC Circuits: Introduction, Necessity and advantages of three phase systems, generation of three phase power. Definition of Phase sequence, balanced supply and balanced load. Relation between line and phase values of voltages and currents in a balanced star and delta connections. Measurement of Three phase power by Two-wattmeter method.

08 Hours

MODULE IV:

Single Phase Transformer:

Introduction, Necessity of transformer, Principle of operation and construction of single-phasetransformers (core and shell types). EMF equation, losses, efficiency, Voltage regulation.

Three Phase Induction Motor:

Concept of rotating magnetic field, Principle of operation, constructional features of motor. Types of Induction motor:Squirrel cage and Wound rotor, slip, significance of slip, applications.

08Hours

MODULE V:

Three Phase Alternator: Introduction, Construction, working, Concept of Pitch factor and Distribution factor (Excluding derivation), Emf equation.

Measuring Instruments &Domestic wiring: Construction and working of Dynamometer type wattmeter & Induction type energy meter, Concealed and Conduit wiring, Two way and Three-way control of a lamp.

Safety Measures: Fuse, MCB, Necessity and types of earthing, Electric shock and precautions against it. **08 Hours**

Course outcomes:

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

CO1: Analyze DC circuits and explain the concept of Electromagnetic Induction

CO2: Explain the construction and working of DC Machines.

CO3: AnalyzeSingle phase and three phase Circuits.

CO4: Explain the working principles of transformers and Three Phase Induction Motor.

CO5: Explain the working of Three phase Alternator and concept of Circuit protective devices,

Reference Books :

1. D. P. Kothari and I. J. Nagrath, "Basic Electrical Engineering", Tata McGraw Hill,2010.
2. D. C. Kulshreshtha, "Basic Electrical Engineering", McGraw Hill, 2009.
3. L. S. Bobrow, "Fundamentals of Electrical Engineering", Oxford University Press, 2011.
4. E. Hughes, "Electrical and Electronics Technology", Pearson, 2010.
5. V.K Mehata, Rohit Mehta "Principles Electrical Engineering and Electronics "S Chand and Company, 2nd edition, 2015

Question Paper Pattern:

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of four sub questions) from each module
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

CO/PO Mapping:

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3	3			1						1
CO2	3	2										1
CO3	3	3	3									1
CO4	3	2										1
CO5	3	2				2						1

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Sharnbasva University
B. Tech First year Scheme of Teaching and Examinations
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic Year-2024-25, Scheme 2024)
First/ Second Semester

ENGINEERINGGRAPHICS AND DESIGN						
Course Code	**24EGD104/24EGD204**				**CIE Marks**	**50**
Teaching Hours/Week	**L**	**T**	**P**	**Total**	**SEE Marks**	**50**
	1	**0**	**4**	**5**	**Total Marks**	**100**
Total Hours of Teaching	**60**				**Exam Hours**	**03**
Credits-03						

Course Category: Foundation
Preamble: The course "Engineering Graphics and Design" is fundamental for all engineering students, especially in mechanical, civil, and all related fields. It equips students with essential skills in engineering drawing and introduces them to modern computer-aided design (CAD) tools, which have become the industry standard for design and visualization. This course aims to develop the ability to create, interpret, and modify engineering drawings, which are crucial for designing and manufacturing processes. The course also emphasizes the importance of standard drawing practices and provides an understanding of graphical communication used in engineering.
Pre-requisite, if any: Nil

Course Objectives:

- Students will be able to understand the basic principles and conventions of engineering drawing to analyze and draw the projections of points and lines.
- Students will be able to analyze and draw the orthographic projection of planes.
- Students will be able to understand the projection concepts in solids and apply concepts in the area of design.
- Students will be able to visualize the components isometric projection.
- Students will be able to develop the lateral surfaces.

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Module No.	Topics	Teaching Hours	RBT Levels
Module-1	**Introduction to Engineering Drawing:** Importance of Engineering Drawing, Drawing instruments and their uses, Types of lines, lettering, and dimensioning, Scales, Introduction to computer-aided drawing (CAD), Co-ordinate system and reference planes HP, VP,RPP & LPP of 2D/3D environment. Construction of polygons (triangle, square, pentagon, hexagon, etc.), Construction of circles, tangents, arcs, and ellipses, Curves used in engineering practices like conic sections (ellipse, parabola, hyperbola). Cycloids, involutes, and spirals. **Orthographic Projections:** Principle of orthographic projections, Projections of points, and lines. (lines Placedin First quadrant only).	**10**	**L1,L2,L3**
Module-2	**Projection of planes:**Projection of planes (inclined and perpendicular to reference planes) viztriangle,square,rectangle,pentagon, hexagon, and circular lamina.	**12**	**L1,L2,L3**
Module-3	**Projection of solids:**Projection of solids (Prisms, Cylinders, Pyramids, Cones Cubes &Tetrahedron.) in various orientations. (Solids Resting on HP only)	**14**	**L1,L2,L3**
Module-4	**Isometric Projections:** Isometric scale and isometric projections, Isometric views of lines, planes, and solids, Conversion of isometric views to orthographic projections and vice versa	**14**	**L1,L2,L3**
Module-5	**Development of Surfaces:** Development of lateral surfaces of simple and truncated solids (cylinder, cone, prism, pyramid), Development of surfaces for practical applications (ducts, boxes, containers)	**10**	**L1,L2,L3**

Text Books:	1. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt.Limited, 2019. 2. K. R. Gopalakrishna, & Sudhir Gopalakrishna: Textbook Of Computer Aided Engineering Drawing,39thEdition, Subash Stores, Bangalore,2017.
Reference Books:	1. S.N. Lal, & T Madhusudhan:, Engineering Visualization, 1st Edition, Cengage, Publication 2. Parthasarathy N. S., Vela Murali, Engineering Drawing, Oxford University Press,2015.
E-RESOURCES:	1. https://nptel.ac.in/courses/112105294 2. https://vtu.ac.in/en/study-material/

Conduct of CIE and SEE Examination:

Continuous Internal Evaluation (CIE):

The weightage of Continuous Internal Evaluation (CIE) is 50% (50 marks) and for Semester End Exam (SEE) is 50% (50 marks).
Continuous Internal Evaluation (CIE) marks Break up is as follows:

S.No	Particulars	Type	Max. Marks
1	Continuous Internal Evaluation (CIE) (CIE – I and CIE – II)	Test	25
2	Assignment	Classwork	10
3	Attendance	Classwork	05
4	Relevant Other Activities (Seminar, Field Work, etc.)	Classwork	10
Total			**50**

- CIE-I test will be conducted for 2.5 Modules and CIE – II will be for the remaining 2.5 Modules. CIE shall be evaluated for max. marks of 50 and later the same shall be scaled-down to 25 marks as detailed below:

The final CIE = Test marks + Class work marks

Semester End Examination (SEE):

- SEE shall be conducted and evaluated for maximum marks 100. Marks obtained shall be accounted for SEE final marks, reducing it by50%.
- Question paper shall be set jointly by both Internal and External Examiners and made available for each batch asper schedule.
- Questions are to be set preferably from the TextBooks.
- Evaluationshallbecarried jointlybybothexaminers.

SchemeofEvaluation:

- Tobedefinedbytheexaminersjointlyandthesameshallbesubmittedto the university along with question paper.
- One full question shall be set from each of Modules 1, 2, 3, 4, and 5, as per the weightage details provided in the table below:

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QuestionpaperPattern

No.	Module	Marksallotted
	Module1or2	30
	Module3	40
	Module4 or 5	30

SchemeofEvaluation

Q. No.	SolutionsandSketchingonsketchbook	Computerdisplayand Printout	Total Marks
1	10 Marks	20 Marks	30
2	15 Marks	25 Marks	40
3	15 Marks	15 Marks	30
Total	**40 Marks**	**60 Marks**	**100**

-

Teaching-Learning Process (General Instructions)

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Use any suitable Engineering graphics and design/CAD software.
3. Show videos/animation films to explain concepts.
4. Encourage collaborative (Group Learning) learning in the class.
5. Ask at least three Higher-Order Thinking questions in the class, which promotes critical thinking.
6. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
7. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

COURSE OUTCOMES: At the end of the course the student will be able to:	
CO.1	Apply the principles of orthographic projection to project points and lines placed in the first quadrant, developing the ability to visualize and represent 3D objects in 2D space, and alsodemonstrate proficiency in basic computer-aided drawing (CAD) tools.
CO.2	Apply principles of projection to visualize and accurately draw planes (such as triangles, squares, rectangles, pentagons, hexagons, and circular lamina) inclined or perpendicular to the reference planes (HP and VP).
CO.3	Project various solid objects (prisms, cylinders, pyramids, cones, cubes, and tetrahedrons) in different orientations, focusing on solids resting on the horizontal plane (HP), and create accurate 2D representations from 3D models.
CO.4	Apply isometric projection principles to convert 3D objects into isometric views using the isometric scale, and vice versa, converting isometric

	views into orthographic projections.
CO.5	Develop lateral surfaces of simple and truncated solids (such as cylinders, cones, prisms, and pyramids) and apply these techniques to practical applications, including the development of surfaces for ducts, boxes, and containers.

Mapping of the Course Outcomes for Course Code 24EGD104 / 24EGD204 to Program Outcomes

24EGD104/ 24EGD204	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO.2	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO.3	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO.4	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-
CO.5	3	-	-	-	3	-	-	-	-	-	-	-	-	-	-

1-Low, 2- Medium, and 3- High

SYLLABUS:English for Technical Writing

Course title	English For Technical Writing		
Course Code	24ETW105	CIE Marks	50
Course Type	Theory	SEE Marks	50
		Total Marks	100
Semester	I/II		
Teaching Hours/Week	3	Exam Hours	3
Total Hours Of Pedagogy	40 hours	Credits	03

Course Objective

1	To assist the students to identify internal structure of the words and form a new word
2	To assist the students to carry on the tasks and activities through guided instructions and materials
3	To provide structure formation rules to avoid common errors in writing
4	To integrate efficiently English language learning with employability skills and training.
5	To provide hands-on experience through case studies, mini projects, group and individual presentation
6	To make the students to acquire basic proficiency in English including speaking and listening skills.

MODULE I: Vocabulary Building

1. Basics of effective communication skills- meaning, process, types, importance and flow of communication, barriers to communication skills

2. The concept of word formation –meaning, types of morphemes, derivational affixes, inflectional affixes, general morphological process in the formation of new words, word formation process
3. Acquaintance with prefixes and suffixes from foreign language in English to form derivatives
4. Synonyms, antonyms and standard abbreviation

Module II : Basic Writing Skills

1. Sentence structure

2. Use of phrases and clauses in sentences
3. Importance of proper punctuation
4. Conjunction
5. Organizing principles of paragraphs in documents
6. Techniques for writing precisely

Module III : Identifying Common Errors in writing

1. Subject-verb agreement
2. Noun-pronoun Agreement
3. Misplaced Modifiers
4. Articles
5. Prepositions
6. Usage of Tense
7. Usage of Modal auxiliaries

Modal IV : Nature and style of Technical writing

1. Notice
2. Memo
3. E-mail
4. Resume
5. General Applications

Module v: Writing Practices

1. Comprehensions
2. Précis Writing
3. Report Writing

Module VI : Oral Communication

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(This Module involves interactive practice sessions in Language Lab)

1. Pronunciation, Intonation, Stress and Rhythm
2. Common Everyday situations, Conversations and Dialogues
3. Communication at Workplace
4. Interviews
5. Formal Presentations

Text/Reference Book

1. AICTE'S Prescribed Textbook: English (with Lab Manual), Khanna Book Publishing Co.
2. Effective Communication Skills. Kul Bhushan Kumar, Khanna Book Publishing,
3. Practical English Usage. Michael Swan. OUP. 1995
4. Remedial English Grammar. F.T.Wood. Macmillan.2007
5. On Writing Well. William Zinsser. Harper Resource Book, 2001.
6. Study Writing Liz Hamp-Lyons and Ben Heasly. Cambridge University Press. 2006.
7. Communication Skills. Sanjay Kumar and PushpLata. Oxford University Press. 2011
8. Exercise in Spoken English. Parts. l-lll. CIEF, Hyderabad. Oxford University press.

Course Outcomes
At the end of course the students will be able to
CO1. Identify the internal structure of words and form a new words.
CO2. carry activities on task and activities regarding comprehension in English
CO3. avoid common mistakes in writing
CO4. integrate efficiently language learning with employment skills and training.
CO5. Get communication experience through case-studies, mini-projects, group and individual presentation.
CO6. Acquire proficiency in English including speaking and listening skills.

Cos and POs Mapping (Individual teacher has to fill up)

PO												
	P01	**P02**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**P010**	**P011**	**P012**
C01								**01**		**03**	**01**	**01**
C02								01	01	01		02
C03								01		02		01
C04									01	02	02	02
C05								01	01	03		02
C06												

English for Technical Writing

Course Outcomes :

Sharnbasva University, Kalaburagi.

At the end of course the students will be able to
CO1. Identify the internal structure of words and form a new words.
CO2. carry activities on task and activities regarding comprehension in English
CO3. avoid common mistakes in writing
CO4. integrate efficiently language learning with employment skills and training.
CO5. Get communication experience through case-studies, mini-projects, group and individual presentation.

Cos and POs Mapping (Individual teacher has to fill up)												
PO												
	P01	**P02**	**P03**	**P04**	**P05**	**P06**	**P07**	**P08**	**P09**	**P010**	**P011**	**P012**
C01								**01**		**03**	**01**	**01**
C02								**01**	**01**	**01**		**02**
C03								**01**		**02**		**01**
C04									**01**	**02**	**02**	**02**
C05								**01**	**01**	**03**		**02**

ENGINEERING PHYSICS LAB

COURSE LEARNING OBJECTIVES:

This course (24PHL106/24PHL206) Will enable students to

1. To realize experimentally, the mechanical, electrical and thermal properties of materials, concept of waves and oscillations.
2. Design simple circuits and hence study the characteristics of semiconductor device.

CORSE OUTCOMES:

1. Determine spring constants in series and parallel and Youngs modulus of a beam by single cantilever experiment.
2. Obtain I-V characteristics of Zener diode and Photodiode.
3. Determine acceptance angle and numerical aperture of an optical fibre and also wavelength of semiconductor laser.
4. Obtain Transistor characteristics and also calculate Dielectric charging and discharging.
5. Estimate the Fermi energy of copper and Stefans law of radiation.

1. Determination of Spring Constants in Series and Parallel Combination.
2. n and I by Torsional Pendulum (Radius of wire, mass and dimensions of the regular bodies to be given)
3. Youngs modulus of a beam by Single Cantilever Experiment.
4. Study of I-V characteristics of Zener diode and determine the knee voltage and the break-down voltage.
5. Study series and parallel LCR resonance and hence calculate the inductance, bandwidth and quality factor using series LCR resonance.
6. Determine Acceptance angle and Numerical aperture of an optical fiber.
7. Determine Wavelength of semiconductor laser using Laser Diffraction by Calculating grating constant.
8. Estimation of Fermi energy of copper.
9. Study of input and output Transistor characteristics and hence calculate input resistance and output resistance.

10. Draw I-V characteristics of photodiode and calculate power responsivity.
11. Calculation of Dielectric constant by RC Charging and Discharging.
12. Stefans Law of Radiation.

Engineering Physics Lab

COs and POs Mapping 2024-25

COs	Pos											
	1	2	3	4	5	6	7	8	9	10	11	12
CO1	3	2							3			1
CO2	3	2							3			1
CO3	3	2							3			1
CO4	3	2							3			1
CO5	3	2							3			1
Avg	3	2							3			1

Level 3 - Highly Mapped, Level 2- Moderately Mapped, Level 1 – Low Mapped

Note: The CO-PO mapping values are indicative. The course co-ordinator can alter the mapping using Competency and performance Indicators mentioned in the AICTE Exam

BASIC ELECTRICAL ENGINEERING LAB

[As per Choice Based Credit System (CBCS) scheme]
(Effective from the Academic Year 2024-25)

Course Code:24ELL107/207 **Marks: 50**
Contact Hours/Week: 02 **SEE Marks: 50**
Total Hours:24 **Exams. Hours: 03**
Semester: I/II **Credits: 01**

Course Objectives: The main objective of the course is to:

1. Verify Kirchhoff's laws and measure power in various lamps to understand electrical laws and power consumption.
2. Analyze voltage and current in series and parallel circuits, and measure coil resistance and inductance using the three-voltmeter method.
3. Implement two-way and three-way lamp control and measure three-phase power with the two-wattmeter method.

4. Determine phase and line quantities in Star and Delta loads, and evaluate single-phase transformer efficiency.
5. Operate energy meters and assess fuse and MCB characteristics for managing energy consumption and circuit safety.

LIST OF EXPERIMENTS

1. Verification of Kirchhoff's laws.
2. Power measurement of different types of lamps.
3. Analysis of voltage and current in series and parallel circuits, using three lamps.
4. Measurement of resistance and inductance of a coil using three-volt meter method.
5. Two-way and three-way control of a lamp.
6. Measurement of three phase power by two wattmeters.
7. Determination of phase and line quantities in three phase Star and Delta connected loads.
8. Determination of efficiency of single phase transformer.
9. Determination of percentage error of given energy meter.
10. Obtain characteristics of Fuse & MCB.

Course outcomes:

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

CO1: Demonstrate Kirchhoff's laws and power measurement techniques to solidify understanding of basic electrical principles and power usage.

CO2: Conduct voltage and current analysis in circuits, and assess coil resistance and inductance using the three-voltmeter method for better circuit characterization.

CO3: Perform lighting control through two-way and three-way switches, and accurately measure three-phase power with the two-wattmeter method.

CO4: Analyze phase and line quantities in Star and Delta connections, and assess the efficiency of single-phase transformers for system performance evaluation.

CO5: Operate and understand energy meters and evaluate fuse and MCB functions to manage electrical consumption and ensure safety in circuits.

CO/PO Mapping:

Sharnbasva University, Kalaburagi.

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	3							3	2		1
CO2	3	3							3	2		1
CO3	3	3							3	2		1
CO4	3	3							3	2		1
CO5	3	3				3			3	2		1

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First/Second Semester

DESIGN THINKING						
Course Code	**24DTL108/24DTL208**				**CIE Marks**	**50**
Teaching Hours/Week	**L**	**T**	**P**	**Total**	**SEE Marks**	**50**
	0	**0**	**2**	**2**	**Total Marks**	**100**
Total Hours of Teaching	**24**				**Exam Hours**	**03**
Credits-01						

Course Category: Foundation

Preamble: This course introduces the basic concepts and techniques of engineering and reverses engineering, the process of design, analytical thinking and ideas, basics and development of engineering drawing, application of engineering drawing with computer aide.

Pre-requisite, if any: Nil

Course Objectives:

- To equip students with knowledge about different learning styles (Kolb's Learning Styles) and memory processes, along with techniques to enhance memory and retention.
- To familiarize students with the need, objectives, and stages of the Design Thinking process, from empathy to prototyping and testing, using real-world examples.
- To teach the engineering product design process andTrain students in the rapid prototype development process, testing methodologies.
- To focus on customer-centric design through Design Thinking.
- To incorporate user feedback into the design process for continuous improvement and present innovative

engineering solutions through creative problem-solving and design.

Module No.	Topics	Teaching Hours	RBT Levels
Module-1	**An Insight to Learning:** Understanding the Learning Process, Kolb's Learning Styles, Assessing and Interpreting **Remembering Memory**: Understanding the Memory process, Problems in retention, Memory enhancement techniques. **Experiments:** 1. Identifying and Assessing Learning Styles using Kolb's Model. 2. Enhancing Memory Retention using Memory Techniques.	**04**	**L1, L2, L3**
Module-2	**Emotions:** Experience & Expression Understanding Emotions: Experience & Expression, Assessing Empathy, Application with Peers **Basics of Design Thinking:** Definition of Design Thinking, Need for Design Thinking, Objective of Design Thinking, Concepts & Brainstorming, Stages of DesignThinking Process,Empathize, Define, Ideate, Prototype, Test. **Experiments:** 1. Assessing Empathy and Emotional Experience in Peer Interactions. 2. Design Thinking Process: Empathy to Prototyping.	**05**	**L1, L2, L3**
Module-3	**Being Ingenious & Fixing Problem:** Understanding Creative thinking process, Understanding Problem Solving, Testing CreativeProblem Solving **Process of Product Design:** Process of Engineering Product Design, Design Thinking Approach, Stages of Product Design, Examples of best product designs and functions, Assignment – Engineering Product Design **Experiments:** 1. Testing Creative Problem Solving. 2. Engineering Product Design Using the Design Thinking Approach.	**05**	**L1, L2, L3**

Module-4	**Prototyping & Testing:** What is Prototype? Why Prototype? Rapid Prototype Development process, Testing, Sample Example, Test Group Marketing. **Celebrating the Difference:** Understanding Individual differences & Uniqueness, Group Discussion and Activities to encourage the understanding, acceptance and appreciation of Individual differences **Experiments:** 1. Prototyping and Testing a Simple Mechanical/Electronic/Electrical/Apps. 2. Celebrating Diversity through Inclusive Design Workshop.	**05**	**L1, L2, L3**
Module-5	**Design Thinking & Customer Centricity:** Practical Examples of Customer Challenges, Use of Design Thinking to Enhance Customer Experience, Parameters of Product experience, Alignment of Customer Expectations with Product Design. **Feedback, Re-Design & Re-Create:** Feedback loop, Focus on User Experience, Address "ergonomic challenges, User focused design, rapid prototyping & testing, final product, Final Presentation – "Solving Practical Engineering Problem through Innovative Product Design & Creative Solution". **Experiments:** 1. Customer-Centric Product Design. 2. Designing a User-Friendly Ergonomic Tool	**05**	**L1, L2, L3**

Text Books:	3. E Balaguruswamy (2022), Developing Thinking Skills (The way to Success), Khanna Book Publishing Company
Reference Books:	3. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage",Harvard Business Press , 2009. 4. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand –Improve– Apply", Springer, 2011. 5. Maurício Vianna, Ysmar Vianna, Isabel K. Adler, Brenda Lucena, Beatriz Russo, "Design thinking: Business Innovation" MJV Press, 2011 6. Jeanne Liedtka , Andrew King, Kevin Bennett , "Book - Solving Problems with Design Thinking- Ten Stories of What Works" (Columbia Business School Publishing), 2013

Conduct of CIE and SEE Examination:
Continuous Internal Evaluation (CIE):
The weightage of Continuous Internal Evaluation (CIE) is 50% (50 marks) and for Semester End Exam (SEE) is 50% (50 marks).
Continuous Internal Evaluation (CIE) marks Break up is as follows:

S.No	Particulars	Type	Max. Marks
1	Continuous Internal Evaluation (CIE)	Test	25
2	Assignment	Classwork	10
3	Attendance	Classwork	05
4	Relevant Other Activities (Seminar, Field Work, etc.)	Classwork	10
Total			**50**

Semester End Examination (SEE):
Conduct of Practical Examination:
1. All laboratory experiments are to be included for practical examination.
2. Breakup of marks and the instructions printed on the cover page of answer script to be strictly adhered by the examiners.
3. Students can pick one experiment from the questions lot prepared by the examiners.
4. Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

Scheme of Semester End Examination (SEE):
ONE question from Module1 or Module 2:20 Marks
ONE question from Module3 or Module 4or module 5:30 Marks
Viva –Voice :10 Marks
Total :50 Marks

Teaching-Learning Process (General Instructions)
These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.
1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain concepts.
3. Encourage collaborative (Group Learning) Learning in the class.
4. Ask at least three HOTS (Higher-Order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develops thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

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COURSE OUTCOMES: At the end of the course the student will be able to:	
CO.1	Compare and classify the various learning styles and memory techniques and apply them intheir engineering education.
CO.2	Analyze emotional experience and inspect emotional expressions to better understand userswhile designing innovative products.
CO.3	Develop new ways of creative thinking and learn the innovation cycle of Design Thinking process for developing innovative products
CO.4	Propose real-time innovative engineering product designs and choose appropriate frameworks, strategies, techniques during prototype development
CO.5	Perceive individual differences and its impact on everyday decisions and further Create a better customer experience

Mapping of the Course Outcomes for Course Code 24DTL108/24DTL208 to Program Outcomes														
24DTL108 /24DTL208	**PO 1**	**PO 2**	**PO 3**	**PO 4**	**PO 5**	**PO 6**	**PO 7**	**PO 8**	**PO 9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO.1	3	-	-	-	-	-	-	-	-	-	-	3	1		
CO.2	3	3	-	3	3	-	-	-	-	-	-	-	1		
CO.3	3	-	3	-	3	3	-	-	-	-	-	-	1		
CO.4	3	-	3	-	3	-	-	-	-	-	-	-	1		
CO.5	3	-	-	-	3	3	3	3	3	-	-	-	1		
1-Low, 2- Medium, and 3- High															

`Sharnbasva University
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Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic Year-2024-25, Scheme 2024)
First/Second Semester

IDEA LAB						
Course Code	**24IDL109/24IDL209**				**CIE Marks**	**100**
Teaching Hours/Week	**L**	**T**	**P**	**Total**	**SEE Marks**	**-**
	1	**0**	**3**	**4**	**Total Marks**	**100**
Total Hours of Teaching	**48**				**Exam Hours**	**--**
Credits-0						

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Course Objectives:

- To provide foundational knowledge and hands-on experience with essential tools, materials, components, and software, equipping learners with the skills and confidence to effectively utilize these resources in practical and professional settings.
- To equip learners with practical expertise in traditional machining processes, CAD-based design techniques, circuit prototyping, and PCB assembly, preparing them for real-world engineering and manufacturing applications.
- To develop expertise in advanced manufacturing technologies, environmental analysis, efficient power system design, sensor-integrated circuit building, IoT-driven programming, and intellectual property utilization to foster innovation and practical engineering solutions.
- To engage first-year engineering students in the IDEA Lab through hands-on mini projects that emphasize creativity, teamwork, and foundational engineering concepts, while providing practical exposure to problem-solving and innovation.
- To develop first-year engineering students' technical, analytical, and communication skills by documenting their mini-projects comprehensively through detailed reports and video presentations that highlight the project development process and outcomes.

Module No.	Topics	Teaching Hours	RBT Levels
Module-1	Exploring the operational techniques, applications, and safety measures associated with essential manual and power tools. Examining the properties, applications, and selection criteria of construction materials, along with an overview of advanced building tools. Understanding the classification, functionality, and practical implementation of electronic and electrical components in circuit design. Introduction to Doxygen, Google Dox, Git &Github.	**10**	**L1, L2**
Module-2	A comprehensive overview of traditional machining operations, including turning, milling, drilling, and grinding, focusing on their mechanisms and industrial applications. Understanding the fundamental AutoCAD commands for precise drafting, modeling, and design workflows in engineering applications. Hands-on prototyping using (a) breadboards for temporary circuit assembly and testing, and (b) Zero PCBs for semi-permanent circuit layouts. Familiarization with single-sided and double-sided Printed Circuit Boards (PCBs), emphasizing their design considerations and assembly techniques. Introduction to Overleaf version control.	**10**	**L1, L2**
Module-3	Comprehensive coverage of Computer Numerical Control (CNC) machining techniques and advanced prototyping methods, including 3D printing processes. Detailed exploration of methodologies for water testing and soil testing, emphasizing environmental assessment and compliance standards. Understanding the principles and development of linear and switching power supply systems for efficient energy conversion and regulation. Study of electronic circuit building blocks, incorporating the integration and functionality of common sensors in practical applications. Hands-on programming of Arduino and Raspberry Pi platforms for innovative automation and IoT (Internet	**10**	**L1, L2**

	of Things) solutions. Introductory concepts of IPR and patents, with practical guidance on accessing and leveraging patent information within the IDEA Lab for innovation-driven projects.		
Module-4	**Discussion and implementation of a mini project:** For first-year students in an IDEA Lab, mini-projects should be simple yet impactful, fostering creativity, collaboration, and basic engineering principles. Below are a few experiment ideas that can form the basis of a mini-project aimed at first-year engineering students **Sample types of mini projects:** 1. Simple Hydraulic Arm. 2. Wind Turbine Power Generator. 3. Smart Watering System. 4. Miniature Bridge Design and Load Testing. 5. solar-powered charger. 6. Electric Go-Kart Design Challenge. 7. Any other mini projects.	**10**	**L1, L2**
Module-5	**Documentation of the mini project (Report and video):** For first-year engineering students, the **documentation of a mini project**—both through written reports and video recordings—is essential for capturing the entire project development process, reinforcing their technical and communication skills. Below are structured **experiments/lab activities** that focus on documentation for the IDEA Lab. **Experiments/ Lab activities:** 1. Write reports based on mini-projects (e.g., hydraulic arm, solar-powered charger, etc.). The report must include diagrams, data tables, and photos taken during the project development process. 2. Record short clips documenting different phases of their project, such as planning, construction, and testing. Each group will compile a 3-5-minute video showcasing the process and results of their project Students will narrate their video, explaining each step clearly, and must include a demonstration of the working prototype.	**08**	**L1,L2**

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Mapping of the Course Outcomes for Course Code 24DTL108/24DTL208 to Program Outcomes															
24DTL108/ 24DTL208	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**	**PSO3**
CO.1	3	-	-	-	2	-	-	-	-	-	-	-	2	1	1
CO.2	3	-	-	-	3	-	-	-	-	-	2	-	2	-	1
CO.3	3	-	-	-	3	-	2	-	-	-	-	-	-	1	1
CO.4	3	-	-	2	3	-	2	-	2	2	2	2	1	1	1
CO.5	3	-	-	-	2	-	-	2	2	2	-	2	1	1	2
1-Low, 2- Medium, and 3- High															

Text Books:	1. AICTE's Prescribed Textbook: Workshop / Manufacturing Practices (with Lab Manual), ISBN: 978-9391505332.
Reference Books:	1. All-in-One Electronics Simplified, A.K. Maini; 2021. ISBN-13: 978-9386173393, Khanna Book Publishing Company, New Delhi. 2. 3D Printing & Design, Dr. Sabrie Soloman, ISBN: 978-9386173768, Khanna Book Publishing Company, New Delhi. 3. The Big Book of Maker Skills: Tools & Techniques for Building Great Tech Projects. Chris Hackett. Weldon Owen; 2018. ISBN-13: 978-1681884325. 4. The Total Inventors Manual (Popular Science): Transform Your Idea into a Top-Selling Product. Sean Michael Ragan (Author). Weldon Owen; 2017. ISBN-13: 978-1681881584. 5. Make: Tools: How They Work and How to Use Them. Platt, Charles. Shroff/Maker Media. 2018. ISBN-13: 978-9352137374 6. Practical Electronics for Inventors. 4th edition. Paul Sherz and Simon Monk. McGraw Hill. ISBN-13: 978-1259587542. 7. Programming Arduino: Getting Started with Sketches. 2nd edition. Simon Monk. McGraw Hill. ISBN-13: 978-1259641633. 8. Make Your Own PCBs with EAGLE: From Schematic Designs to Finished Boards. Simon Monk and Duncan Amos. McGraw Hill Education. ISBN-13 : 978-1260019193. 9. Ian Gibson, David W Rosen, Brent Stucker., "Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing", Springer, 2010.

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Conduct of Continuous Internal Evaluation (CIE):
The weightage of Continuous Internal Evaluation (CIE) is 100% (100 marks).
Continuous Internal Evaluation (CIE) marks Break up is as follows:

S.No	Particulars	Type	Max. Marks
1	Project/work done at IDEA Lab	Prototype/ Simulation	50
2	Report writing	Written/typed	50
Total			**100**

COURSE OUTCOMES: At the end of the course the student will be able to:	
CO.1	To equip learners with foundational technical skills, safe tool usage, material selection expertise, circuit design knowledge, and proficiency in essential documentation and collaboration tools.
CO.2	To develop learners' proficiency in machining processes, CAD design, circuit prototyping, and PCB assembly, preparing them for practical engineering tasks and innovation.
CO.3	To equip learners with advanced technical competencies in CNC machining, 3D printing, environmental testing, power systems design, sensor-integrated circuits, IoT programming, and intellectual property utilization for innovative engineering solutions.
CO.4	To enhance first-year engineering students' creativity, teamwork, and problem-solving skills by engaging them in impactful and hands-on mini-projects that apply basic engineering principles in innovative and practical ways.
CO.5	Document mini projects thoroughly using technical writing tools (Google Docs, Overleaf) and version control (GIT, GitHub), culminating in project reports and video presentations.

SHARNBASVA UNIVERSITY
ENGINEERING CHEMISTRY FOR ELECTRICAL AND ELECTRONICS ENGINEERING STREAM

Syllabus

Semester:I

Course Title:	**Engineering Chemistry for EES**		
Course Code:	**24CHEE102**	CIE Marks	50
Course Type	(Theory)	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L/T)	3	ExamHours	03
Total Hours of Pedagogy	40 hours	Credits	03

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Course objectives

- To enable students to acquire knowledge on principles of chemistry for engineeringapplications.
- To develop an intuitive understanding of chemistry by emphasizing the relatedbranches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solvesocietal problems.

Teaching-Learning Process

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

- Flipped class
- Smart class room
- Blended mode of leaning
- Interactive simulations and animation
- Tutorial & remedial classes for needy students (not regular T/R)
- Conducting Makeup classes
- Demonstration of concepts either by building models or by industry visit
- Experiments in laboratories shall be executed in blended mode (conventional or non–conventional methods)
- Use of ICT – Online videos, online courses
- Daily learning through assignments

MODULE 1: Conducting Materials and polymers (8hr)

Conductors and Insulators: Introduction, principle with examples.

Semiconductors: Introduction, production of electronic grade silicon-Czochralski process (CZ) and Float Zone (FZ) methods.

Polymers: Introduction, Molecular weight - Number average, Weight average and numerical problems. Conducting polymers – synthesis and conducting mechanism of polyacetylene. Preparation, properties and commercial applications of graphene oxide.

PCB: Electroless plating – Introduction, Electroless plating of copper in the manufacture of double-sided PCB.

MODULE 2: Battery Technology and Sensors(8hr)

Batteries: Introduction to batteries, construction, working and applications of Ni-MH battery, Lithium ion and Sodium ion batteries.

Fuel Cells: Introduction, construction, working and applications of methanol–oxygen and

1. NOTE: Wherever the contact hours is not sufficient, tutorial hour can be converted to theory hours

polymer electrolyte membrane (PEM) fuel cell.

Sensors: Introduction, working principle and applications of Conductometric sensors, Electrochemical sensors, Thermometric sensors, and Optical sensors. Sensors for the measurement of dissolved oxygen (DO). Electrochemical gas sensors for SOx and NOx.

MODULE 3: Corrosion Science and Energy Conversion Systems (8hr)

Corrosion Chemistry: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal and differential aeration. Corrosion control - galvanization, anodization and sacrificial anode method. Corrosion Penetration Rate (CPR) - Introduction and numerical problem.

Electrode System: Introduction, types of electrodes. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode – construction, working and applications of calomel electrode. Concentration cell– Definition, construction and Numerical problems.

Solar Energy: Introduction, importance of solar PV cell, construction and working of solar PV cell, advantages and disadvantages.

MODULE 4: Display and Memory Systems (8hr)

Display Systems: Photoactive and electroactive materials, Nanomaterials and organic materials used in optoelectronic devices. Liquid crystals (LC's) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application of Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's), Lightemitting electrochemical cells.

Memory : Introduction, Basic concepts of electronic memory, History of organic/polymer electronic memory devices, Classification of electronic memory devices, types of organic memory devices (organic molecules, polymeric materials, organic- inorganic hybrid materials).

MODULE 5: Nanomaterials, E-Waste Management and Analytical Techniques (8hr)

Nanomaterials : Introduction, size dependent properties of nanomaterials (surface area, catalytic and electrical), preparation of NPs by sol-gel and precipitation methods

E-Waste: Introduction, sources of e-waste, Composition, Characteristics, and Need of e- waste management. Toxic materials used in manufacturing electronic and electrical products, health hazards due to exposure to e-waste. Recycling and Recovery: Different approaches of recycling (separation, thermal treatment)

Analytical Techniques: Introduction, principle and instrumentation of Colorimetric sensors; its application in the estimation of copper, Potentiometric sensors; its application in the estimation of iron.

Course outcome (Course Skill Set)

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

CO1.	Identify the terms and processes involved in scientific and engineering applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineering Processes
CO3.	Solve for the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties andprocesses
CO5.	Analyze properties andprocesses associated with chemical substances in multidisciplinary situations

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 50% of the maximum marks (25 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The suggested components of CIE for Theory course are:

The CIE marks for the theory component shall be 50 marks is as detailed below:

- Four tests each of 25 Marks; (Third and fourth tests are improvement tests, Average of best of first or third CIE and Second or fourth CIE is considered).
- CIE will be conducted by the university as per scheduled time table with question papers for the subject (duration of 1 hour 30 minutes)
- Session wise assignments for 10 marks
- Activities 10 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

Semester End Examination (SEE)

1. Theory SEE will be conducted by University as per the scheduled time table, with question papers for the subject **(duration 03 hours)**
2. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
3. The question paper will have ten full questions carrying equal marks.
4. Each full question carries 20 marks.
5. There will be two full questions (with a maximum of four sub questions) from each module.

6. Each full question will have sub questions covering all the topics under a module.
7. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

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

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
2. Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
3. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
4. Essentials of Physical Chemistry, Bahl&Tuli, S.Chand Publishing
5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley
6. Engineering Chemistry – I, D. GrourKrishana, Vikas Publishing
7. A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd.,12thEdition, 2011.
8. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I. K. International Publishing house. 2nd Edition, 2016.
9. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
10. Nanotechnology A Chemical Approach to Nanomaterials, G.A. Ozin& A.C. Arsenault, RSCPublishing, 2005.
11. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
13. OLED Display Fundamentals and Applications, TakatoshiTsujimura, Wiley–Blackwell , 2012
14. Supercapacitors: Materials, Systems, and Applications, Max Lu, Francois Beguin, ElzbietaFrackowiak, Wiley-VCH; 1st edition, 2013.
15. “Handbook on Electroplating with Manufacture of Electrochemicals”, ASIA PACIFIC BUSINESS PRESS Inc., 2017. Dr. H. Panda,
16. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The

National Academies Press. doi: 10.17226/4782.
17. Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022
18. High Performance Metallic Materials for Cost Sensitive Applications, F. H. Froes, et al. John Wiley & Sons, 2010
19. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyanarayanan, NiraliPrakashan, 2020
20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020
21. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers, 4th Edition, 2021
22. Engineering Chemistry, P C Jain & Monica Jain, Dhanpat Rai Publication, 2015-16th Edition.
23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition,2002.
24. Nanotechnology Principles and Practices, Sulabha K Kulkarni, Capital Publishing Company, 3rd Edition 2014
25. Principles of nanotechnology, Phanikumar, Scitech publications, 2nd Edition, 2010.
26. Chemistry for Engineering Students, B. S. Jai Prakash, R. Venugopal, Sivakumaraiah& Pushpa Iyengar., Subash Publications, 5th Edition, 2014
27. "Engineering Chemistry", O. G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.
28. Chemistry of Engineering materials, Malini S, K S Anantha Raju, CBS publishers Pvt Ltd.,
29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.

Web links and Video Lectures (e-Resources):

- http://libgen.rs/
- https://nptel.ac.in/downloads/122101001/
- https://nptel.ac.in/courses/104/103/104103019/
- https://ndl.iitkgp.ac.in/
- https://www.youtube.com/watch?v=faESCxAWR9k
- https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWh
- https://www.youtube.com/watch?v=j5Hml6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo
- https://www.youtube.com/watch?v=1xWBPZnEJk8
- https://www.youtube.com/watch?v=wRAo-M8xBHM

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

- https://www.vlab.co.in/broad-area-chemical-sciences
- https://demonstrations.wolfram.com/topics.php
- https://interestingengineering.com/science

COs and POs Mapping (Individual teacher has to fill up)												
	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1				1					
CO2	3	1	1				1					
CO3	3	1	1				1					
CO4	3	1	1				1					
CO5	3	1	1				1					

BASIC ELECTRONICS ENGINEERING

[As per NEP, Outcome based Education (OBE), and Choice Based Credit System (CBCS) Scheme]

SEMESTER-I

Course Code	24ELN103/203	CIE Marks	
Number of Lecture Hour/Week	3	SEE Marks	
Course Type Theory/Practical/Integrated	Theory	Exam Hours	
Number of Lecture Hours	40	Credits	

CREDITS-03

Course Objectives: Students will be taught to:

- Characteristics operation and application of PN- Junction diode and its application derivation of current, voltage components, efficiency and ripple factor.
- Basics of embedded system, applications, difference between embedded system and general computing system.
- Basics of differentnumbersystems,conversion between number systems, binary addition, subtraction, workingoffundamental building blocks of digital circuits, and implementation of simple digital circuits.
- Basics of transducers, its classification and measurement of frequency and phase using CRO.Basic principle of communication system.

Module -1	**Teaching Hours**
Semiconductors and Diodes: Conductors, Semiconductors, n-type and p-type semiconductor, diode	08 Hours

Theory: basic ideas, The ideal diode, forward and reverse bias, diode equation, V-I Characteristic, diode approximation. **Rectifiers:** Half-wave Rectifier, Full-wave and Bridge Rectifier, derivation of ripple factor, efficiency of Half-wave, full-wave and bridge rectifiers, rectifier application. Text:1-1.3,1.4,1.6,1.7,2.1,2.2,2.3,2.9,3.1,3.2.	
Module -2	
Embedded Systems – Definition, Embedded systems vs general computing systems, Classification of Embedded Systems, Major application areas of Embedded Systems, Elements of an Embedded System, Core of the Embedded System, Microprocessor vs Microcontroller, RISC vs CISC, Harvard vs Von-Neumann, Classification of RAM and ROM, Text 2: 1.1, 1.2, 1.4, 1.5, 2.1.1.4, 2.1.1.6, 2.1.1.7, 2.2, 2.2.1,2.2.2.	08 Hours
Module -3	
Number Systems: Decimal Number System, Binary Number System, Octal Number System, Hexadecimal NumberSystem.**Number base conversions:** Binary to Decimal, Decimal to Binary, Binary to Octal, Octal to Binary, Binary to Hexadecimal, Hexadecimal to Binary, Decimal to Octal, Octal to Decimal, Decimal to Hexadecimal, Hexadecimal to Decimal, Octal to Hexadecimal, Hexadecimal to octal. Complement of Binary Numbers, Binary addition, Binary subtraction. Boolean Laws, De Morgan's theorem. **Logic gates:** Basic and Universal gates, Algebraic Simplification of Boolean Expression and implementation using logic gates, Universal properties of NAND and NOR gates,Half adder and Full adder Implementations.Text 3: 10.2, 11.2, 11.3,11.4,10.3,10.4,11.7,11.8.	08 Hours
Module -4	
Transducers and Measurements: Transducers: Electrical Transducers, Resistive transducers, Strain Gauges, Thermometer, Thermistor, LVDT, Piezo electrical transducers, Numerical as applicable. Text 4: , 13.1, 13.2, 13.4, 13.6, 13.7,13.8,13.11, 13.15, Measurements: CRT, CRO, Measurements of frequency and phase using Lissajous method. Text 4: 7.2,7.4,7.5,7.20, 7.26	08 Hours
Module -5	
Communication System: Introduction, Block diagram of communication system, Modulation, Need for Modulation, Types of modulation, Analysis of AM and FM, Generation and detection of AM and FM, Comparison between amplitude and frequency modulation schemes.Text 3: 18.1, 18.2,18.3.1,18.3.2,18.3.3,18.3.4.	08 Hours
Course Outcomes: **CO1**: Explain and analyze the application of diode in rectifier circuits. **CO2**:Understand the basics of embedded system and identify the difference between microprocessor and microcontroller. **CO3**: Understand number system conversions and design basic digital circuits using logic gates. **CO4**: Develop the knowledge of various transducers and measurement of frequency and phase using the CRO. **CO5**: Understand the principles of communication system and analyze various modulation techniques.	

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CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2	PSO.3
CO1	3	2	2	-	-	-	-	-	-	-	-	-	3	-	-
CO2	3	1	-	-	-	-	-	-	-	-	-	-	3	-	-
CO3	3	3	3	-	-	-	-	-	-	-	-	-	3	-	-
CO4	3	-	-	-	-	-	-	-	-	-	-	-	3	-	-
CO5	3	2	-	-	-	-	-	-	-	-	-	-	3	-	-

Text Books:

1. David A. Bell, "Electronic Devices and Circuits", Oxford University Press, 5th Edition,2008.
2. K V Shibu, 'Introduction to Embedded Systems', 2nd Edition, McGraw Hill Education (India), Private Limited, 2016.
3. D P Kothari, I J Nagrath, Basic Electronics, McGraw Hill Education, ISBN:978-93-329-0158-2, 2014.
4. H S kalasi, Electronic Instrumentation, 3rd Edition, 2011.

Department of Computer Science and Engineering

Subject Title	Programming for Problem Solving (UG Programme)		
Subject Code	24PPS104	CIE Marks	50
Number of Lecture Hrs / Week	03	SEE Marks	50
Total Number of Lecture Hrs	40	Exam Hours	03

1.0 Course Objectives:

- Gain the knowledge of the basic principles of Problem solving.
- Learn how to use C programming language to specify data and operations on data.
- Understand the concept of decision-making types through programming
- Understand the concept of modularization via functions and 1D and 2-D array
- Understand and explore systematic techniques and approaches for constructing C Programs using string manipulation functions

2.0 Course Outcomes:

Having successfully completed this course, the student will be able to

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Sl. No.	Course Outcome:
CO1	Identify the basic elements of Computing Systems and C Programming Constructs.
CO2	Demonstrate the use of Operators & Expressions, Decision Making and Looping Statements.
CO3	Explore Arrays and User-Defined Functions in Implementing Solutions to Real world Problems
CO4	Illustrate the usage of Storage Classes, Strings and Pointers in Problem Solving.
CO5	Demonstrate the use of Modular Programming Constructs involving Files, Structure & Unions.

3.0 Course Content

Module 1- Introduction to computers: Computer Languages, algorithm and flow charts, Creating and Running Programs, System Development. Introduction to C programming: Background, Structure of C Program, C-Tokens, Identifiers, Data Types, Variables, Constants, Input/ Output. Formatting Input/Output. Library Functions, Single Character Input –The getchar() , Single Character Output-The putchar.(8 hours)

Module 2- Operators and Expressions: Arithmetic operators, Unary operators, Relational and Logical Operators, Assignment Operators, Conditional Operators. Expressions, Precedence and Associativity, Evaluating Expressions, Type Conversion. Selection - Making Decision: Two Way Selection, Multiway Selection, Repetition: Concepts of a loop, Pretest and Post-test Loops, Initialization and Updating, Loops in C:

The while loop, the do. while loop,The for loop, The break and continue statement, the goto statement.(8hours)

Module 3- Arrays: Concepts, using arrays in C: Declaration and Definition, Accessing Elements in Array, Storing Values in Arrays, processing an array, Sorting and Searching. Two Dimensional Arrays, Functions in C: A brief Overview, defining a Function, User Defined Functions, Function Prototypes, Passing Arguments to a Function, Scope-global and local; Recursion .(8 hours)

Module 4- Storage Classes: automatic variables, external (global) variables, static variables Strings: String Concepts, defining a String, Declaring Strings, Initializing String, Arrays of Strings, String Manipulations Functions Pointers: Pointer Concepts, Pointer Declaration and Definition, Initialization of Pointer Variables, Passing Pointers to a Function, Pointers and Array.(8 hours)

Module 5-Derived Types: Enumerated Types: Declaring an Enumerated Type, Operations on Enumerated Types, Initializing Enumerated Constants. Structures and Unions: Structure Type Declaration, Initialization, Accessing Structures, Structures Containing Arrays, Array of Structures. Unions and Structures. File Handling: Using Binary Files, Reading and Writing a Data File.(8 hours)

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4.0 Books Recommended to Students

Textbooks:

1. Behrouz A. Forouzan, Richard F. Gilberg - Computer science a structured programming approach using C, Cengage Learning, and ISBN: 9788131503638, 8131503631, 3rd edition, 2007.
2. A M Padma Reddy -C programming Techniques

Reference Books:

1. E. Bala Guruswamy - Programming in ANSI C, Tata McGraw-Hill, 7th edition,
2. 2. Reema Thareja - Computer fundamentals and programming in C, Oxford University, 2nd edition, 2017.
3. Brian W. Kernighan and Dennis M. Ritchie - The 'C' Programming Language, Prentice Hall of India.

Additional Study material & e-Books

1. NPTEL notes and Videos

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	3	2	1	-	1	-	-	-	-	-	-	-	3	3	-
CO2	3	3	2	1	2	-	-	-	-	-	-	-	3	3	-
CO3	3	3	3	2	2	-	-	-	-	-	-	-	3	3	-
CO4	3	2	2	2	2	-	-	-	-	-	-	-	3	2	-
CO5	3	3	3	2	2	-	-	-	-	-	-	-	3	3	-

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UNIVERSAL HUMAN VALUES-II

[As per NEP, Outcome Based Education (OBE) and Choice Based Credit System (CBCS) Scheme]

SEMESTER-I/II

Subject Code	24UHV105/205	CIE Marks	
Number Lecture Hour/Week	2L+1T	SEE Marks	
Number of Lecture Hours	4	Exam Hours	

CREDITS-03

Course Objectives: Students will be taught to:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity which are the core aspirations of all human beings.
2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.
3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behavior and mutually enriching interaction with Nature.

Module -1	**Teaching Hours**
Introduction to Value Education: Lecture 1: Right Understanding, Relationship and Physical Facility (Holistic Development and the Role of Education) **Lecture 2:** Understanding Value Education **Tutorial 1**: **Practice Session PS1** Sharing about Oneself **Lecture 3:** Self-exploration as the Process for Value Education **Lecture 4:** Continuous Happiness and Prosperity – the Basic Human Aspirations **Tutorial 2: Practice Session PS2** Exploring Human Consciousness **Lecture 5:** Happiness and Prosperity – Current Scenario **Lecture 6:** Method to Fulfill the Basic Human Aspirations **Tutorial 3: Practice Session PS3** Exploring Natural Acceptance	**8 Hours**
Module -2	
Module 2 – Harmony in the Human Being (6 lectures and 3 tutorials for practice session) **Lecture 7:** Understanding Human being as the Co-existence of the Self and the Body **Lecture 8:** Distinguishing between the Needs of the Self and the Body **Tutorial 4:** Practice Session PS4 Exploring the difference of Needs of Self and Body **Lecture 9:** The Body as an Instrument of the Self **Lecture 10:** Understanding Harmony in the Self **Tutorial 5:** Practice Session PS5 Exploring Sources of Imagination in the **Self** **Lecture 11:** Harmony of the Self with the Body **Lecture 12:** Programme to ensure self-regulation and Health **Tutorial 6:** Practice Session PS6 Exploring Harmony of Self with the Body	**8 Hours**

Module -3	
Harmony in the Family and Society (6 lectures and 3 tutorials for practice session) **Lecture 13:** Harmony in the Family – the Basic Unit of Human Interaction **Lecture 14:** 'Trust' – the Foundational Value in Relationship **Tutorial 7:** Practice Session PS7 Exploring the Feeling of Trust **Lecture 15:** 'Respect' – as the Right Evaluation **Tutorial 8:** Practice Session PS8 Exploring the Feeling of Respect **Lecture 16:** Other Feelings, Justice in Human-to-Human Relationship **Lecture 17:** Understanding Harmony in the Society **Lecture 18:** Vision for the Universal Human Order	**8 Hours**
Module -4	
Harmony in the Nature/Existence (4 lectures and 2 tutorials for practice session) **Lecture 19:** Understanding Harmony in the Nature **Lecture 20:** Interconnectedness, self-regulation and Mutual Fulfilment among the Four Orders of Nature **Tutorial 10: Practice Session PS10** Exploring the Four Orders of Nature **Lecture 21:** Realizing Existence as Co-existence at All Levels **Lecture 22:** The Holistic Perception of Harmony in Existence **Tutorial 11: Practice Session PS11** Exploring Co-existence in Existence	**8 Hours**
Module-5	
Implications of the Holistic Understanding – a Look at Professional Ethics (5 lectures and 2 tutorials for practice session) **Lecture 23: Natural Acceptance of Human Values** **Lecture 24:** Definitiveness of (Ethical) Human Conduct **Tutorial 12: Practice Session PS12** Exploring Ethical Human Conduct **Lecture 25:** A Basis for Humanistic Education, Humanistic Constitution and Universal Human Order **Lecture 26**: Competence in Professional Ethics **Lecture 27:** Strategies for Transition towards Value-based Life and Profession **Tutorial 13: Practice Session PS14** Exploring Steps of Transition towards Universal Human Order	**8 Hours**
Course Outcomes: After studying this course, students will be able to: CO-1-Present sustainable solutions to the problems in society and nature CO-2-See that these solutions are practicable and draw roadmaps to achieve them. CO-3-Grasp the right utilization of their knowledge in their streams of Technology/Engineering/Management/any other area of study to ensure mutual fulfilment. E.g. mutually enriching production system with rest of nature. CO-4-Sincerely evaluate the course and share with their friends. They are also able to suggest measures to make the course more effective and relevant. CO-5-Make use of their understanding in the course for the happy and prosperous family and society.	
Text Books: 1. The Textbook - A Foundation Course in Human Values and Professional Ethics, R R Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-47-1 2. The Teacher's Manual- Teachers' Manual for A Foundation Course in Human Values and Professional Ethics, RR Gaur, R Asthana, G P Bagaria, 2nd Revised Edition, Excel Books, New Delhi, 2019. ISBN 978-93-87034-53	
Reference Books: 1. JeevanVidya: EkParichaya, A Nagaraj, JeevanVidyaPrakashan, Amarkantak, 1999. 2. Human Values, A.N. Tripathi, New Age Intl. Publishers, New Delhi, 2004.	

3. The Story of Stuff (Book).
4. The Story of My Experiments with Truth - by Mohandas Karamchand Gandhi
5. Small is Beautiful - E. F Schumacher.
6. Slow is Beautiful - Cecile Andrews
7. Economy of Permanence - J C Kumarappa
8. Bharat Mein Angreji Raj – Pandit Sunderlal
9. Rediscovering India - by Dharampal
10. Hind Swaraj or Indian Home Rule - by Mohandas K. Gandhi
11. India Wins Freedom - Maulana Abdul Kalam Azad
12. Vivekananda - Romain Rolland (English)
13. Gandhi - Romain Rolland (English).

COURSE OUTCOME AND PROGRAMME OUTCOME MAPPING(1/2/3):

Note:1-Low, 2-Medium, 3-High

CO/PO	PO.1	PO.2	PO.3	PO.4	PO.5	PO.6	PO.7	PO.8	PO.9	PO.10	PO.11	PO.12	PSO.1	PSO.2
CO1	-	-	-	-	-	3	3	-	-	-	-	2	-	-
CO2	-	-	-	-	-	3	2	-	-	-	-	2	-	-
CO3	-	-	-	-	-	-	3	-	-	-	-	2	-	-
CO4	-	-	-	-	-	-	-	-	3	-	-	2	-	-
CO5	-	-	-	-	-	3	-	-	-	-	-	2	-	-

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SHARNBASVA UNIVERSITY
ENGINEERING CHEMISTRY LAB
(Common to all branches)
(Effective from the academic year 2024-25)

Course code: 24CHL106/206	**CIE Marks: 50**
Contact hours /Week: 02	**SEE Marks: 50**
Total Hours: 38	**Exam hours: 03**
Semester : I/II	**Credits: 01**

Course Objectives:

Course Objectives: To provide students with practical knowledge of

- Quantitative analysis of materials by classical methods of analysis.
- Instrumental methods for developing experimental skills in building technical competence.

Instrumental Experiments

1. Potentiometric estimation of FAS using standard $K_2Cr_2O_7$ solution.
2. Conductometric estimation of acid mixture.
3. Determination of Viscosity co-efficient of the given liquid using Ostwald's viscometer.
4. Colorimetric estimation of copper.
5. Determination of pKa of the given weak acid using pH meter.

Volumetric Experiments

1. Estimation of total hardness of water by EDTA complexometric method.
2. Determination of Chloride content of water.
3. Determination of COD of waste water.
4. Preparation of standard solutions related to normality and molarity.
5. Determination of percentage of copper in brass using standard sodium thiosulphate solution.

Demonstration Experiments

1. To determine the effect of soap and detergent on the surface tension of water using a Stalagmometer.

2. To determine the strength of ferrous ammonium sulphate (Mohr's salt) solution by using external indicator.

Course outcomes:

After the completion of the course the students will be able to

CO1: Learn and apply basic techniques used in chemistry laboratory for small/large scale water analyses/purification.

CO2: Estimate the chloride content present in domestic/industry waste water.

CO3: Practice different techniques of quantitative chemical analysis to generate experimental skills and apply these skills to various analyses.

CO4: Acquire the ability to understand, explain and use instrumental techniques for chemical analysis.

CO5: Understand how chemistry addresses social, economical and environmental problems and why it is an integral part of curriculum

Mapping of course outcomes with program outcomes

CIE for the

	PO 1	PO2	PO3	PO 4	PO5	PO6	PO7	PO8	PO9	PO 10	PO 11	PO 12
CO1	3				2							3
CO2	3				3							3
CO3	3				3							3
CO4	3				3							3
CO5	3				1							3

practical component

On completion of every experiment in the laboratory, the students shall be evaluated and marks shall be awarded on the same day.

The 25 marks are divided as, for conducting the experiment 15 and 10 marks for preparation of the laboratory record, individual evaluation (which includes viva voce), (the average of total experiments)

The 25 marks shall be for the test conducted at the end of the semester, for the subject (duration of 1 hour 30 minutes)

SEE for the practical component

- SEE marks for the practical course is 50 marks
- All laboratory experiments are to be included for the practical exam
- Break up marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners
- Students can pick one question (experiment) from the questions lot prepared by the examiners
- General rubrics suggested for SEE are mentioned here, 15% write up, 70% for conduction, procedure and results and 15% for viva voce of maximum marks.
- Practical SEE will be conducted by University as per the scheduled time table, for the subject **(duration 03 hours)**

Reference Books:

1. G.H. Jeffery, J. Bassett, J. Mendham and R.C. Denney, "Vogel's A I, Text Book of Quantitative analysis, Dorling Kindersley (Idia) Pvt. Ltd. 35th Edition 2012.
2. O.P. Vermani & Narula, "Theory and Practice in Applied Chemistry", New Age International Publishers.

3. Gary D. Christian, "Analytical chemistry", 6th Edition, Wiley India.2015

Programming for Problem Solving Laboratory
[As PerNEP,Outcome BasedEducation(OBE)andChoiceBasedCreditSystem(CBCS)Scheme]
(Effectivefromthe academic year2024-2025)
SEMESTER–I/ II

CourseCode	24PPL107/24 PPL207	**CIEMarks**	50Marks
Number of Lecture Hours/ Week	2	**SEEMarks**	50Marks
ExamHours		3hours	

CREDITS– 01

Implementalltheprogramsin"C"ProgrammingLanguageandLinuxOS/Ubuntu.

Courseobjectives:

1. To understand and write simple programs
2. To develop programs on arithmetic operations
3. Understand decision making, repetitions using programming
4. Understand 1-D and 2-D array using programming
5. To develop programs using modularity
6. To understand use of strings in C programming
7. To develop code using indirection referencing
8. To Understand the difference between unions, structures.
9. To develop code using files.

S.No.	ListofExperiments:
1.	Creating and Running Simple C Programs. • C-Program to demonstrate a Simple Calculator. • C-Program to convert temperature given in Celsius to Fahrenheit and Fahrenheit to Celsius.
2.	Creating and Running C Programs on Expressions. • C-Program to calculate a student's average score for a course with 4 quizzes, 2 midterms and a final. The quizzes are weighted 30%, the midterms 40% and the final 30%. • C-Program to demonstrate Increment and Decrement Operators.

3.	Creating and Running C Programs on Making Decision. • C-Program to read a test score, calculate the grade for the score and print the grade. • C-Program to uses a menu to allow the user to add, multiply, subtract and divide two numbers using switch statement.
4.	Creating and Running C Programs on Repetition or Loops. • C-Program to print a number series from 1 to a user-specified limit in the form of a right triangle. • C-Program to calculate nth Fibonacci number.
5.	Creating and Running C Programs on One Dimensional Arrays: • C-Program to calculate average of the number in an array. • C-Program to search an ordered list using binary search.
6.	Creating and Running C Programs on Two Dimensional Arrays: • C-Program to perform addition of two matrices. • C-Program to perform multiplication of two matrices.
7.	Creating and Running C Programs on User Defined Functions: • C-Program to read a number, find whether it is a palindrome or not. • C-Program to read a number, find whether it is prime number or not.
8.	Creating and Running C Programs on Strings: • C Program to Check if the Substring is present in the given String. • C-program to demonstrate built-in sting functions like strlen(), strcpy(), strcmp(), strcat().
9.	Creating and Running C Programs on Storage Classes and Pointers: • C-program to add two numbers using pointers. • C-Program to read an array of elements and compute their sum using pointers.
10.	Creating and Running C Programs on Unions: • C-Program to demonstrate union of short int and two char.
11.	Creating and Running C Programs on Structures: • C Program to read employee details (name, salary, address) and print the same using structure.
12.	Creating and Running C Programs on Files: • C-Program to demonstrate function fread()/fscanf(). • C-Program to demonstrate function fwrite()/fprintf().

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Sharnbasva University
B. Tech First Year Scheme of Teaching and Examinations
Outcome-Based Education (OBE) and Choice Based Credit System (CBCS)
(Effective from the academic Year-2024-25, Scheme 2024)
First/Second Semester

MANUFACTURING PRACTICE AND DIGITAL FABRICATION LAB						
Course Code	**24FAB108/24FAB208**				**CIE Marks**	**50**
Teaching Hours/Week	**L**	**T**	**P**	**Total**	**SEE Marks**	**50**
	0	**0**	**4**	**4**	**Total Marks**	**100**
Total Hours of Teaching	**48**				**Exam Hours**	**03**
Credits-02						

Course Category: Foundation
Preamble: In the rapidly advancing field of engineering, it is essential for students to develop practical skills that complement their theoretical knowledge. Digital Fabrication, Workshop, and Manufacturing Practice is a foundational course designed to introduce first-year engineering students to the core concepts and hands-on techniques used in modern manufacturing. This course aims to bridge the gap between design and fabrication, fostering an understanding of how raw ideas are transformed into tangible products.
Pre-requisite, if any: Nil

Course Objectives:

- To provide exposure to the students with hands on experience on various basic engineering practices in Civil, Mechanical, Electrical and Electronics Engineering.
- To have a study and hands-on-exercise on plumbing and carpentry components.
- To have a practice on gas welding, foundry operations and fitting.
- To have a practice on soldering.
- To have a study on measurement of electrical quantities, energy and resistance to earth.

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Module No.	Topics	Teaching Hours	RBT Levels
Module-1	**Electrical & Electronics:** Introduction to basic Electrical and electronic components. **Practicals / Lab activities:** 1. Parallel/ series connections of three bulbs. 2. Stair case wiring. 3. Make a simple LED circuit **4.** Simple water level alarm buzzer circuit.	**08**	**L1, L2, L3**
Module-2	**Fitting shop:** Introduction to marking and fitting processes **Practicals /Lab activities:** 1. To study different instruments/tools used in fitting shop. 2. To make a square fit from the given mid steel pieces. 3. Demonstration on semi-permanent fastening such as screw, nut,bolts,etc **Carpentaryshop :** **Practicals / Lab activities:** 1. To study different instruments/tools used in Carpentry shop. 2. Make a job as per given drawing. (only Cross Half lap joint)	**10**	**L1, L2, L3**
Module-3	**Plumbing, Plastic Moulding & Glass Cutting:** Introductions to plumbing tools, plastic moulding and glass cutting **Practicals /Lab activities:** 1. To study different instruments/tools used for plumbing. 2. Using tools and materials make T pipe connections. 3. Demo of plastic moulding (virtual). 4. To study different instruments/tools used for glass cuttingand make a job as per given drawing.	**10**	**L1, L2, L3**
Module-4	**Machine shop:** Introduction to different types of machines such as lathe machine, shaper machine, drilling machine, milling machine, 3D printing, and CNC machines (lathe and milling). **Practicals /Lab activities:** 1. Practice of Facing, Plane Turning, step turning, taper turning, knurling and parting. 2. Study of Quick return mechanism of Shaper. 3. Turning operation on CNC lathe 4. Demonstration of 3D printing.	**10**	**L1, L2, L3**
Module-5	**Welding Shop:** Introduction to different joining process like welding, soldering, brazing. **Practicals / Lab activities:** 1. To make a Butt joint using the given two M.S pieces by arc or TIG welding or MIG welding. 2. Study of soldering and brazing process. **Foundry shop:**	**10**	**L1, L2, L3**

	Casting: Introduction to casting processes **Practicals / Lab activities:** **5.** Demonstration of different tools/equipment's used in casting and demonstration of wax casting. 1. Forging a Simple shape		

Text Books:	1. Elements of Workshop Technology:Vol I:Manufacturing Processes, S K Hajra.Choudhury, A K. Hajra Choudhury,15th Edition Reprinted 2013,Media Promoters &Publishers Pvt Ltd., Mumbai
Reference Books:	1. Raghuwanshi B.S., Workshop Technology Vol. I & II, Dhanpath Rai & Sons. 2. Kannaiah P. and Narayana K.L., Workshop Manual, 2nd Edn, Scitech publishers. 3. John K.C., Mechanical Workshop Practice. 2nd Edn. PHI 2010. 4. JeyapoovanT.and Pranitha S., Engineering Practices Lab Manual, 3rd Edn. Vikas Pub.2008

Conduct of CIE and SEE Examination:
Continuous Internal Evaluation (CIE):
Semester End Examination (SEE):
Conduct of Practical Examination:
1. All laboratory experiments are to be included for practical examination.
2. Breakup of marks and the instructions printed on the cover page of answer script to be strictly adhered by the examiners.
3. Students can pick one experiment from the questions lot prepared by the examiners.
4. Change of experiment is allowed only once and 15% Marks allotted to the procedure part to be made zero.

Scheme of Semester End Examination (SEE):
ONE question from Module1 or Module 2:20 Marks
ONE question from Module3 or Module 4or module 5:30 Marks
Viva –Voice :10 Marks
Total :50 Marks

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

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain concepts
3. Encourage collaborative (Group Learning) Learning in the class
4. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develops thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.

7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them. 8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

COURSE OUTCOMES: At the end of the course the student will be able to:	
CO.1	Demonstrate the ability to construct and troubleshoot basic electrical and electronic circuits, including series and parallel connections, wiring, and simple alarm systems.
CO.2	Acquire skills in fitting and carpentry by using various tools to create precise components and assemblies according to technical drawings.
CO.3	Apply techniques in plumbing, plastic molding, and glass cutting to assemble pipe connections, simulate molding processes, and produce glass components as per specifications.
CO.4	Acquire skills in operating various machine shop tools and equipment, including lathe, shaper, drilling, milling machines, and CNC lathe, as well as 3D printing technologies.
CO.5	Demonstrate proficiency in various joining processes, including welding, soldering, and brazing, and apply casting techniques to create simple components.

Mapping of the Course Outcomes for Course Code 24FAB108/24FAB208 to Program Outcomes

24FAB108/ 24FAB208	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO.1	3	-	-	-	-	-	-	-	-	-	-	2			
CO.2	3	-	-	-	-	-	-	-	-	-	-	2			
CO.3	3	-	-	-	-	-	-	-	-	-	-	2			
CO.4	3	-	-	-	3	-	-	-	-	-	-	2			
CO.5	3	-	2	-	-	-	-	-	-	-	-	2			

1-Low, 2- Medium, and 3- High

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SPORTS AND YOGA (24SNY109)

CourseTitle:	**SPORTS AND YOGAD**		
CourseCode:	24SNY109	CIEMarks	50
Course Type		SEEMarks	50

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	(Theory)	TotalMarks	100
Semester:	**I/II**		
Teaching Hours/Week(L/T)	1	Exam Hours	02
Total Hours of Pedagogy	20hours	Credits	01

Course objectives

- To impart the students with basic concepts of Physical Education, Sports and Yoga
- Yoga for health and wellness. To familiarize the students with health related Exercises, Sports and
- Yoga for Overall growth & development To create a foundation for the professionals in Sports
- Sports and Yoga. To impart the basic knowledge and skills to teach Physical Education,
- Sports & Yoga activities.
- To familiarize the students with health- r e l a t e d Exercises, Sports and Yoga for Overall growth &development

MODULE1:

Introduction to: Origin of Sports,

Kabaddi Court Marking Rules and Regulation and Basic Skills

MODULE2:

Basic Concepts of Yoga: Aims, Objectives, and basic concepts of Yoga

MODULE3:

Introduction to: Origin of Sports

Volleyball Court Marking Rules and Regulation and Basic Skills

MODULE4:

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Basic Asanas Pranayama and Surya Samaskara
MODULE5: • Conditioning exercises • Rural Games (Lagori, Kuntepille, Breaking the Pot, Human hurdles etc) • Intramural Competitions • Recreation games • Assignments Seminar and Projects

Course outcome **At the end of the course the student will be able to:**	
CO1.	Students will be able to understand the basic principles and practices of Physical Education, Sports and Yoga
CO2.	Students will be able to instruct the Physical Activities, Sports and Yoga practices for Healthy Living
CO3.	To develop professionalism among students to conduct, organize & officiate Physical Education, Sports and Yoga events at schools, colleges and community.
CO4	Students will learn to apply knowledge of Physical fitness and exercise management to lead better quality life.
CO5	The students will gain knowledge of professional preparation in Physical Education, Sports and Yoga.
Assessment Details (both CIE and SEE)	
Suggested Learning Resources: **Books(TitleoftheBook/Nameoftheauthor/Nameofthepublisher/EditionandYear)** 17. D.M Jyoti, Yoga and Physical Activities (2015) lulu.com3101, Hills borough, NC27609, United States 18. "Asana, Pranayama, Mudra, Bandha", 1969, Swamy Sathyananda Saraswati, Bihar Yoga Bharati, Munger	
Web links and Video Lectures(e-Resources): [If any]https://nss.gov.in/sites/default/files/manualNss2006.pdf	
Activity Based Learning (Suggested Activities in Class)/Practical Based learning [If any]	

Cos and Pos Mapping(Individual teacher has to fill up)												
PO												
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**

CO1	3	3	3			1						1
CO2	3	2										1
CO3	3	3	3									1
CO4	3	2										1
CO5	3	2				2						1

TITLE OF THE COURSE: NATIONAL CADET CORPS
B.E., I/II Semester, Engineering

Subject Code: 24NSS109	**CIE: 50**
Number of Lecture Hours/Week: 03	**SEE: 50**
Total Number of Lecture Hours: 42	**Exam Hours: 03**
CREDITS – 00	

Course Objectives : Cadets will be able to: -

(a) Know about the history of NCC, its organization, and incentives of NCC for their careerprospects.
(b) Acquire knowledge of duties and conduct of ncc cadets.
(c) Understand about different NCC camps and their conducts.
(d) Understand the concept of national integration and its importance.
(e) Understand the concept of self-awareness and emotional intelligence.
(f) Understand the concept of critical & creative thinking.
(g) Understand the process of decision making & problem solving.
(h) Understand the concept of team and its functioning.
(i) Understand the concept and importance of Social service.

COURSE CONTENT	**HRS**

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MODULE –I NCC General • Introduction of NCC, History, • Aims, Objective of NCC • NCC as Organization, Incentives of NCC, Duties of NCC Cadet. • NCC Camps: Types & Conduct.	**L1,L2** **08 HRS**
MODULE –II National Integration & Awareness • National Integration: Importance & Necessity, Factors Affecting National Integration, • Unity in Diversity • Role of NCC in Nation Building, • Threats to National Security.	**L1,L2 08 HRS**
MODULE –III Personality Development • Intra & Interpersonal skills • Self-Awareness & Analysis, Empathy, Critical & creative thinking, • Decision makes and problem solving.	**L1,L2** **08 HRS**
MODULE –IV : Social Service and Community Development • Basics of social service and its need, • Types of social service activities, • Objectives of rural development	**L1,L2** **09HRS**
MODULE –V Military History • Indian Army • Navy, • Air Force. war Heroes,	**L1,L2** **09HRS**

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

1: Imbibe the conduct of NCC cadets.

2: Respect the diversity of different Indian culture.

3: Practice togetherness and empathy in all walks of their life.

4: Do their own self analysis and will work out to overcome their weakness for better performance in all aspects of life.

5: Do the social services on different occasions..

CO'S	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	P10	P11	P12
CO1	2	2	1				1					

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CO2	2	1	2				1						
CO3	2	2	1				2						
CO4	2	2	2				2						
CO5	2	2	1				3						

Question Paper Pattern:

1. The question paper will have ten questions.
2. Each full question consists of 10 marks.
3. There will be 2 full questions (with a maximum of four sub questions) from each module.
4. Each full question will have sub questions covering all the topics under a module.
5. **The students will have to answer 5 full questions, selecting one full question from each module.**

Text Books:

1. NCC Officers Hand Book OTA Kamtee Nagpur.
2. Cadet Hand Book DG NCC New Delhi.

REFERENCE BOOKS:

1. NCC Special Subject SD/SW KAR & GOA DTE Bengaluru
2. NCC Common Subject SD/SW KAR & GOA DTE Bengaluru

Online Resources:

1. *"Size of NCC" (PDF). Archived from the original (PDF) on 2012-05-26. Retrieved 2011-10-28.*
2. ^ *"DG NCC | National Cadet Corps | India"*.
3. ^ *"President Ram Nath Kovind presents Shaurya Chakra to Lt Col Vikrant Prasher". Odisha Diary. Retrieved 2023-03-17.*
4. ^ *"Handbook NCC" (PDF). Directorate of Tamil Nadu.*
5. ^ *"Paramilitary Forces of India". Mr.M.C. Sharma.*

NATIONAL SERVICE SCHEME

CourseTitle:	**NATIONAL SERVICE SCHEME**		
CourseCode:	24NSS109	CIEMarks	50
Course Type	(Theory)	SEEMarks	50
		TotalMarks	100
Semester:	**I/II**		
TeachingHours/Week(L/T)	1	ExamHours	02

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TotalHoursofPedagogy	20hours	Credits	01

Courseobjectives

- National Service Scheme (NSS) will enable the students to:
- Understand the community in general in which they work.
- Identify the needs and problems of the community and involve them in problem –solving.
- Develop among themselves a sense of social & civic responsibility & utilize their knowledge in finding practical solutions to individual and community problems.
- Develop competence required for group-living and sharing of responsibilities & gain skills in mobilizing community participation to acquire leadership qualities and democratic attitudes.
- Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.

MODULE1:

Introduction to NSS: History, aims, objectives, and basic concepts.Motto, symbol, and significance of NSS.Organizational structure, duties, and roles of volunteers and officers.

MODULE2:

Basic Concepts of NSS: Understanding the philosophy and fundamental principles of NSS. Importance of national integration and social harmony.Role of NSS in promoting unity and social justice.

MODULE3:

Youth and Community Development: Role of youth in society and community building. Leadership skills and team building.

Challenges faced by rural and urban communities.

Environment and Sustainability:

Understanding the importance of environmental conservation.

Role of NSS in promoting sustainable development and ecological balance.

MODULE4:

Health, Hygiene, and Sanitation:

- **Importance of health education.**
- **Practices for good hygiene and sanitation.**
- **Basic awareness of public health issues and preventive measures.**

Social Issues and Responsibilities:

Awareness of current social issues like gender inequality, literacy, and environmental degradation.

Role of NSS in addressing these issues through service.
MODULE5: **Disaster Management:** • **Introduction to disaster preparedness and management.** • **Role of NSS volunteers in disaster relief activities.** **Volunteering and Community Service:** **Planning and organizing community service projects. Participation in social campaigns like Swachh Bharat Abhiyan, blood donation drives, and health camps.** **Fieldwork and Practical Engagement:** • **Attending fieldwork in community service.** • **Participating in NSS special camps and events.** • **Field visits to rural or urban areas to understand local issues.**

Courseoutcome Attheendofthecourse thestudentwillbeableto:	
CO1.	Understand the importance of his / her responsibilities towards society.
CO2.	Analyse the environmental and societal problems/issues and will be able to design solutions for the same.
CO3.	Evaluate the existing system and to propose practical solutions for the same for sustainable development.
CO4.	Implement government or self-driven projects effectively in the field.
CO5.	Develop capacity to meet emergencies and natural disasters & practice national integration and social harmony in general.
Assessment Details (both CIE and SEE)	
SuggestedLearningResources: **Books(TitleoftheBook/Nameoftheauthor/Nameofthepublisher/EditionandYear)** 19. NSS MANUAL - https://nss.gov.in/sites/default/files/manualNss2006.pdf	
WeblinksandVideoLectures(e-Resources): [If any]https://nss.gov.in/sites/default/files/manualNss2006.pdf	
ActivityBasedLearning(SuggestedActivitiesinClass)/PracticalBasedlearning [If any]	

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COsandPOsMapping(Individualteacherhastofillup)												
	PO											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	3	3	3			1						1
CO2	3	2										1
CO3	3	3	3									1
CO4	3	2										1
CO5	3	2				2						1

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Open Elective Subject: INTRODUCTION TO MUSIC
[As per Choice Based Credit System (CBCS) scheme]
(Effective from the academic year 2022-2023)
Semester I

Subject Code	22AEC161/261	CIE	50
Number of Lecture Hours/Week	12	SEE	50
	48		100
CREDITS-03			

Open Elective Subject: BASIC MUSIC -I

Unit_1:	Teaching Hours	RBT LEVEL
MUSIC TECHNICAL TERMS	10	

Unit_2:	Teaching Hours	RBT LEVEL
BASIC TABALA TAALS	10	

Unit_3:	Teaching Hours	RBT LEVEL
TAALS TECHNICAL AND DETAILS OF THE TAAL	10	

Unit_4:	Teaching Hours	RBT LEVEL
SARIGAMA GEETA FROM BELOW RAGAS 1 BHUPALI, 2 DURGA, 3 BHIMPALAS .	10	

Unit_5:	Teaching Hours	RBT LEVEL
BHUPALI RAGA CHOTA KHAYAL IN TEEN TAAL .	08	

Outcome of the subject:

After successfully competition of the course, student will be able to

1 Understanding of BASIC MUSIC.
2 The ability to SING, TO DEMONSTRATE.
3 Knowledge & skill in the use of basic tools LIKE HARMONIUM AND TABALA ,TAANPURA.
4 The ability to explore the expressing possibilities of various media.
5 The ability to make OR PRESENT independently .
Knowledge of both theory and practical.

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Course Title:	Engineering Mathematics-2 for CSS		
Course Code:	24MATS201	CIE Marks	50
Course Type(Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T:P)	3:2: 0	Exam Hours	03
Total Hours of Pedagogy	36 Hours Theory and 12Hours Tutorial/practice	Credits	04

Course objectives: The goal of the course Engineering Mathematics-2 for CSS **(24MATS201)**is to

- Understand the concept of multiple integrals and Vector spaces.
- Remember engineering problems applying Partial Differential Equations.
- Apply the knowledge of solving engineering problems numerically.

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

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop student's theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self–study.
4. Student progress can be monitored through internal assessment by the course teacher.
5. Two assignments on each module.
6. Encourage the students for group learning to improve their creative and analytical skills.
7. Show short related video lectures in the following ways:
8. As an introduction to new topics (pre-lecture activity).
9. As a revision of topics (post-lecture activity).
10. As additional examples (post-lecture activity).
11. As an additional material of challenging topics (pre-and post-lecture activity).
12. As a model solution of some exercises (post-lecture activity).

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

CO1	Understand the concept of ordinary differential equation.
CO2	Learn the concept of multiple Integrals.
CO3	Learn and apply the basic concept of numerical methods.
CO4	Able to solve problems in complex variable.
CO5	Apply the knowledge of Linear Algebra to solve problems on Linear Transformation.

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Bloom's level of the course outcomes:

CO#	Bloom's Level					
	Remember (L1)	Understand (L2)	Apply (L3)	Analyze (L4)	Evaluate (L5)	Create (L6)
CO1	√	√	√			
CO2	√	√	√			
CO3	√	√	√			
CO4	√	√	√			
CO5	√	√	√			

Course Articulation Matrix / Course mapping:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1										1
CO2	3	1										1
CO3	3	3										1
CO4	3	2										1
CO5	3	1										1
AVG	3	1.6										1

Note: 1-Low mapped, 2-Medium mapped, 3-High mapped

Module-1 : ORDINARY DIFFERENTIAL EQUATIONS

Introduction to Linear ordinary differential equations of second and Higher order for handling Computer Science and Engineering applications.

Solution of second and higher order Ordinary Linear Differential Equations with constant coefficients, Inverse Differential Operator Method (Types -I, II and III only), Variation of Parameters method, applications of Differential equations LCR Circuits.

Self-Study / Tutorial: Python Program: Finding the roots for second order ODE, Finding the roots by the method of variation of parameter.

Applications: Application of second order ODE, initial conditions and initial value problems.

(RBT Levels: L1, L2 and L3) (10 hours)

Module-2 :MULTIPLE AND IMPROPER INTEGRAL.

Introduction to Integral Calculus in Computer Science Engineering applications.
Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications of double and triple integral and Problems.
Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.
Self-Study / Tutorial: Python Program: Evaluation of Double and triple integrals, Evaluation of Beta and Gamma functions.
Applications: Applications to mathematical quantities (Area, Surface area, Volume). Analysis of probabilistic models.
(RBT Levels: L1, L2 and L3) (10 hours)

Module-3: NUMERICAL METHODS– 1

Importance of numerical methods for discrete data in the field of Computer science and engineering applications.
Solution of algebraic and transcendental equations: Regula- Falsi and Newton-Raphson methods (only formulae). Problems. Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.
Self-Study / Tutorial: Python Program: Finding the roots by Newton Raphson and Regula- Falsi method.
Applications: Power Systems
(RBT Levels: L1, L2 and L3) (09 hours)

Module-4 :COMPLEX VARIABLE- I

Introduction to Complex variable in Computer Science & Engineering.
Function of a complex variable, limits, continuity, differentiability,. Analytic functions-Cauchy-Riemann equations in Cartesian and polar forms. Properties and construction of analytic functions.
Self-Study / Tutorial: Python Program: Finding the analytic function and Harmonic conjugate.
Applications: Network analysis, Signal Processing, and Image Processing.
(RBT Levels: L1, L2 and L3) (10 hours)

Module-5 :ADVANCED LINEAR ALGEBRA

Importance of Vector Space and Linear Transformations in the field of Computer science and engineering and its applications.
Definitionsof Groups, rings and fields.Vector spaces: Definition and examples, subspace, linear span, linearly independent and dependent sets, Basis and dimension.
Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation, Change of coordinates, Rank and nullity of a linear operator, Rank-Nullity theorem (Statement only).
Self-Study / Tutorial: Python Program: Evaluation of linearly dependent and linearly independent.
Applications: Image processing, AI & ML, Graphs and networks, computer graphics.
(RBT Levels: L1, L2 and L3) (09 hours)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 50% of the maximum marks (25 marks out of 50 marks). The minimum passing marks for the SEE is 35%

of the maximum marks out of 100 marks (18 marks out of 50 marks).

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

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component of the CIE shall be 50 marks.

The CIE marks for the theory component shall be 50 marks and scored will be reduced to 25 marks as below:

- Two Tests as CIE-1 after completion of 50% of syllabus followed with improvement test-1 with the same syllabus of CIE-1 (on the need basis of students) and CIE-2 after completion of remaining 50% of syllabus followed with improvement test-2 with the same syllabus of CIE-2 (on the need basis of students).
- Average of best two performances of the Internaltests shall be considered for 25 marks.
- Session wise assignments for 10 marks
- For relevant other activities (Eg. Seminar, field work, Math Lab, activity report etc) 10 marks
- Attendance 5 marks (95% to 100% of attendance) and 04 marks (85% to 94% of attendance)

Semester End Examination (SEE)

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of three sub questions) from each module
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Text Books

7. **B.S.Grewal**:"Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
8. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

22. **V. Ramana:**"Higher Engineering Mathematics" McGraw-Hill Education,11th Ed.,2017
23. **Srimanta Pal &Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
24. **N.P Bali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications,10th Ed.,2022.
25. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw–Hill Book Co., New York, 6thEd., 2017
26. **C.B Gupta, S. R Singh and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
27. **James Stewart: "**Calculus" Cengage Publications, 7thEd., 2019.
28. **David CLay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed.,2018

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Course Title:	Engineering Mathematics-2 for EES.		
Course Code:	24MATE201	CIE Marks	50
Course Type(Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T:P)	3:2: 0	Exam Hours	03
Total Hours of Pedagogy	36 Hours Theory and 12 Hours Tutorial/practice	Credits	04

Course objectives: The goal of the course Engineering Mathematics-2 for EES**.(24MATE201)** is to

- Understand the importance of multiple integrals and Ordinary Differential Equations.
- Remember electronics and electrical engineering problems applying Partial Differential Equations.
- Apply the knowledge of Laplace Transforms to solve engineering problems.

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

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop student's theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self–study.
4. Student progress can be monitored through internal assessment by the course teacher.
5. Two assignment on each module.
6. Encourage the students for group learning to improve their creative and analytical skills.
7. Show short related video lectures in the following ways:
8. As an introduction to new topics (pre-lecture activity).
9. As a revision of topics (post-lecture activity).
10. As additional examples (post-lecture activity).
11. As an additional material of challenging topics (pre-and post-lecture activity).
12. As a model solution of some exercises (post-lecture activity).

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

CO1	Understand the concept of ordinary differential equations.
CO2	Learn the concept of multiple Integrals.
CO3	Learn the basic concept of numerical methods.
CO4	To understand the concept of Laplace transform and Initial value problems.

CO5	Apply the knowledge of Linear Algebra to solve problems on Linear Transformation.

Bloom's level of the course outcomes:

CO#	Bloom's Level					
	Remember (L1)	**Understand (L2)**	**Apply (L3)**	**Analyse (L4)**	**Evaluate (L5)**	**Create (L6)**
CO1	√	√	√			
CO2	√	√	√			
CO3	√	√	√			
CO4	√	√	√			
CO5	√	√	√			

Course Articulation Matrix / Course mapping:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1										1
CO2	3	1										1
CO3	3	3										1
CO4	3	2										1
CO5	3	1										1
AVG	3	1.6										1

Note: 1-Low mapped, 2-Medium mapped, 3-High mapped

Module-1 : ORDINARY DIFFERENTIAL EQUATION

Introduction to Linear ordinary differential equations of second and higher order for handling EC and EE Engineering applications.

Solution of second and higher order Ordinary Linear Differential Equations with constant coefficients, Inverse Differential Operator Method, Variation of Parameters method, applications of Differential equations LCR Circuits.

Self-Study / Tutorial: Python Program: Finding the roots for second order ODE, Finding the roots by the method of variation of parameter.

Applications: Application of second order ODE, initial conditions and initial value problems.
(RBT Levels: L1, L2 and L3) (10 hours)

Module-2 :MULTIPLE AND IMPROPER INTEGRALS.

Introduction to Integral Calculus EC and EE Engineering applications.
Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find: Area and Volume by double integral. Problems.
Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.
Self-Study / Tutorial: Python Program: Evaluation of Double and triple integrals, Evaluation of Beta and Gamma functions.
Applications: Applications to mathematical quantities (Area, Surface area, Volume). Analysis of probabilistic models.
(RBT Levels: L1, L2 and L3) (10 hours)

Module-3: NUMERICAL METHODS-I

Importance of numerical methods for discrete data in the field of EC and EE engineering applications.
Solution of polynomial and transcendental equations: Regula-Falsi method and Newton-Raphson method (only formulae). Problems.
Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.
Self-Study / Tutorial: Python Program: Finding the roots by Newton Raphson and RegulaFalsi method.
Applications: Power Systems.
(RBT Levels: L1, L2 and L3) (09 hours)

Module-4 : LAPLACE TRANSFORMS

Introduction to Laplace Transforms in EC and EE Engineering.
Laplace Transforms: Definition, Laplace transforms of Elementary functions, properties (without proof) periodic function, Unit step function, Unit impulse function.
Inverse Laplace Transforms: Definition, Convolution Theorem (without proof) and Finding Inverse Laplace transform by convolution Theorem. Solution of Linear Differential equations using Laplace Transforms and Applications.
Self-Study / Tutorial: Python Program Laplace transforms of ODE and Convolution theorem.
Applications: Network analysis, Signal Processing, and Image Processing.
(RBT Levels: L1, L2 and L3) (10 hours)

Module-5: VECTOR SPACE

Importance of Vector Space and Linear Transformations in the field of EC and EE engineering applications.
Vector spaces: Definition and examples, subspace, linear span, linearly independent and dependent sets, Basis and dimension.
Linear transformations: Definition and examples, Algebra of transformations, Matrix of a linear transformation. Change of coordinates, Rank and nullity of a linear operator, Rank-Nullity theorem. Inner product spaces and orthogonality.
Self-Study / Tutorial: Python Program: Evaluation of linearly dependent and linearly independent.
Applications: Image processing, Graphs and networks, computer graphics, Antenna.
(RBT Levels: L1, L2 and L3) (09 hours)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 50% of the maximum marks (25 marks out of 50 marks). The minimum passing marks for the SEE is 35% of the maximum marks out of 100 marks (18 marks out of 50 marks).

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

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component of the CIE shall be 50 marks.

The CIE marks for the theory component shall be 50 marks and scored will be reduced to 25 marks as below:

- Two Tests as CIE-1 after completion of 50% of syllabus followed with improvement test-1 with the same syllabus of CIE-1 (on the need basis of students) and CIE-2 after completion of remaining 50% of syllabus followed with improvement test-2 with the same syllabus of CIE-2 (on the need basis of students).
- Average of best two performances of the Internaltests shall be considered for 25 marks.
- Session wise assignments for 10 marks
- For relevant other activities (Eg. Seminar, field work, Math Lab, activity report etc) 10 marks
- Attendance 5 marks (95% to 100% of attendance) and 04 marks (85% to 94% of attendance)

Semester End Examination (SEE)

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of three sub questions) from each module
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Text Books

9. **B.S.Grewal**:"Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
10. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

29. **V. Ramana:**"Higher Engineering Mathematics" McGraw-Hill Education,11th Ed.,2017
30. **Srimanta Pal &Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
31. **N.P Bali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications,10th Ed.,2022.
32. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw–Hill Book Co., New York, 6thEd., 2017
33. **C.B Gupta, S. R Singh and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
34. **James Stewart: "**Calculus" Cengage Publications, 7thEd., 2019.
35. **David CLay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed.,2018

Course Title:	Engineering Mathematics-2 for CES.

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Course Code:	24MATC201	CIE Marks	50
Course Type(Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L: T:P)	3:2: 0	Exam Hours	03
Total Hours of Pedagogy	36 Hours Theory and 12 Hours Tutorial/practice	Credits	04

Course objectives: The goal of the course Engineering Mathematics-2 for CES.(**24MATC201**)is to

- Understand the importance of Integral calculus and Vector calculus essential for Civil engineering.
- Remember Civil engineering problems applying Partial Differential Equations.
- Apply the knowledge of solving Civil engineering problems numerically.

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

1. In addition to the traditional lecture method, different types of innovative teaching methods may be adopted so that the delivered lessons shall develop student's theoretical and applied mathematical skills.
2. State the need for Mathematics with Engineering Studies and Provide real-life examples.
3. Support and guide the students for self–study.
4. Student progress can be monitored through internal assessment by the course teacher.
5. Two assignments on each module.
6. Encourage the students for group learning to improve their creative and analytical skills.
7. Show short related video lectures in the following ways:
8. As an introduction to new topics (pre-lecture activity).
9. As a revision of topics (post-lecture activity).
10. As additional examples (post-lecture activity).
11. As an additional material of challenging topics (pre-and post-lecture activity).
12. As a model solution of some exercises (post-lecture activity).

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

CO1	Understand the various physical modules through higher differential equations and solve such linear ordinary differential equations.
CO2	Learn and apply the concepts Partial differential equation and their solutions for physical interpretations.
CO3	Learn and apply the basic concept of numerical methods.

CO4	Apply the knowledge of multiple Integrals.
CO5	Understand the applications of vector integration.

Bloom's level of the course outcomes:

CO#	Bloom's Level					
	Remember (L1)	Understand (L2)	Apply (L3)	Analyse (L4)	Evaluate (L5)	Create (L6)
CO1	√	√	√			
CO2	√	√	√			
CO3	√	√	√			
CO4	√	√	√			
CO5	√	√	√			

Course Articulation Matrix / Course mapping:

CO#	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1										1
CO2	3	1										1
CO3	3	3										1
CO4	3	1										1
CO5	3	2										1
AVG	3	1.6										1

Note: 1-Low mapped, 2-Medium mapped, 3-High mapped

Module-1: ORDINARY DIFFERENTIAL EQUATION OF HIGHER ORDER

Introduction to Linear ordinary differential equations of second and Higher order for handling Civil Engineering applications. Solution of second and higher order Ordinary Linear Differential Equations with constant coefficients, Inverse Differential Operator Method, Variation of Parameters method, applications of Differential equations related to civil engineering.

Self-Study / Tutorial: Python Program: Finding the roots for second order ODE, Finding the roots by the method of variation of parameter.

Applications: Application of second order ODE, initial conditions and initial value problems.

(RBT Levels: L1, L2 and L3) (10 hours)

Module-2: PARTIAL DIFFERENTIAL EQUATIONS

Importance of partial differential equations for Civil Engineering application.

Formation of PDE's by elimination of arbitrary constants and functions. Solution of non- homogeneous PDE by direct integration. Homogeneous PDEs involving derivative with respect to one independent variable only. Solution of Lagrange's linear PDE. Derivation of one-dimensional heat equation and wave equation.

Self-Study / Tutorial: Python Program: Solution of PDE by direct integration, Formation of PDE with respected to one independent variable.
Applications: Design of structures (vibration of rod/membrane).
(RBT Levels: L1, L2 and L3) (10 hours)

Module-3: NUMERICAL METHODS

Importance of numerical methods for discrete data in the field of Civil Engineering.
Solution of algebraic and transcendental equations: Regula- Falsi and Newton-Raphson methods (only formulae). Problems.
Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula (All formulae without proof). Problems.
Numerical integration: Trapezoidal, Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rules (without proof). Problems.

Self-Study / Tutorial: Python Program: Newton's forward and Backward interpolation formula, Solution of numerical integration by Simpson's $(1/3)^{rd}$ rule.
Applications: Estimating the approximate roots, extreme values, Area, volume, surface area. Finding approximate solutions to engineering problems.
(RBT Levels: L1, L2 and L3) (09 hours)

Module-4: MULTIPLE INTEGRALS.

Introduction to Integral Calculus in Civil Engineering applications.
Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find: Area and Volume by double integral. Problems.
Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions. Problems.

Self-Study / Tutorial: Python Program: Evaluation of Double and triple integrals, evaluation of Beta and Gamma functions.
Applications: Applications to mathematical quantities (Area, Surface area, Volume) Analysis of probabilistic models.
(RBT Levels: L1, L2 and L3) (10 hours)

Module-5 : VECTOR INTEGRATION

Introduction to Vector Calculus in Civil Engineering applications.
Vector Integration: Line integrals, Surface integrals. Applications to work done by a force and flux. Statement of Green's theorem, Stoke's theorem and Gauss divergence theorem and Problems.

Self-Study / Tutorial: Python Program: Finding surface integrals, Evaluation of surface area by Green's theorem.
Applications: Heat and mass transfer, oil refinery problems, environmental engineering. Analysis of stream lines.
(RBT Levels: L1, L2 and L3) (09 hours)

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 50% of the maximum marks (25 marks out of 50 marks). The minimum passing marks for the SEE is 35% of the maximum marks out of 100 marks (18 marks out of 50 marks).

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

if the student secures not less than 35% (18 Marks out of 50 marks) in the semester-end examination (SEE), and a minimum of 35% (35 marks out of 100 marks) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The CIE marks for the theory component of the CIE shall be 50 marks.

The CIE marks for the theory component shall be 50 marks and scored will be reduced to 25 marks as below:

- Two Tests as CIE-1 after completion of 50% of syllabus followed with improvement test-1 with the same syllabus of CIE-1 (on the need basis of students) and CIE-2 after completion of remaining 50% of syllabus followed with improvement test-2 with the same syllabus of CIE-2 (on the need basis of students).
- Average of best two performances of the Internal tests shall be considered for 25 marks.
- Session wise assignments for 10 marks
- For relevant other activities (Eg. Seminar, field work, Math Lab, activity report etc) 10 marks
- Attendance 5 marks (95% to 100% of attendance) and 04 marks (85% to 94% of attendance)

Semester End Examination (SEE)

- The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
- The question paper will have ten full questions carrying equal marks.
- Each full question carries 20 marks.
- There will be two full questions (with a maximum of three sub questions) from each module
- Each full question will have sub questions covering all the topics under a module.
- The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

Text Books

11. **B.S.Grewal**:"Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
12. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.

Reference Books

36. **V. Ramana:**"Higher Engineering Mathematics" McGraw-Hill Education,11th Ed.,2017
37. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press, 3rdEd., 2016.
38. **N.P Bali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications,10th Ed.,2022.
39. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw–Hill Book Co., New York, 6thEd., 2017
40. **C.B Gupta, S. R Singh and Mukesh Kumar:** "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India)Pvt.Ltd 2015.
41. **James Stewart: "**Calculus" Cengage Publications, 7thEd., 2019.
42. **David CLay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed.,2018

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SHARNBASVA UNIVERSITY
ENGINEERING CHEMISTRY FOR COMPUTER SCIENCE ENGINEERING STREAM

Syllabus

Semester: II

Course Title:	**Engineering Chemistry for CSS**		
Course Code:	**24CHES202**	CIE Marks	50
Course Type	(Theory)	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L/T)	3	ExamHours	3
Total Hours of Pedagogy	40 hours	Credits	3

Course objectives

- To enable students to acquire knowledge on principles of chemistry for engineeringapplications.
- To develop an intuitive understanding of chemistry by emphasizing the relatedbranches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solvesocietal problems.

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Teaching-Learning Process

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

- Flipped class
- Smart class room
- Blended mode of leaning
- Interactive simulations and animation
- Tutorial & remedial classes for needy students (not regular T/R)
- Conducting Makeup classes
- Demonstration of concepts either by building models or by industry visit
- Experiments in laboratories shall be executed in blended mode (conventional or non–conventional methods)
- Use of ICT – Online videos, online courses
- Daily learning through assignments

MODULE 1: Energy Storage Systems and Sensors	**(8hr)**

Energy Storage Systems: Introduction to batteries, construction, working and applications of Ni-MH battery, Lithium ion and Sodium ion batteries.

Sensors: Introduction, working principle and applications of Conductometric sensors, Electrochemical sensors, Thermometric sensors, and Optical sensors. Sensors for the measurement of dissolved oxygen (DO). Electrochemical gas sensors for SOx and NOx.

MODULE 2: **Display and Memory Systems**	**(8hr)**

Display Systems: Photoactive and electroactive materials, Nanomaterials and organic materials used in optoelectronic devices. Liquid crystals (LC's) - Introduction, classification, properties and application in Liquid Crystal Displays (LCD's). Properties and application of Organic Light Emitting Diodes (OLED's) and Quantum Light Emitting Diodes (QLED's), Lightemitting electrochemical cells.

Memory : Introduction, Basic concepts of electronic memory, History of organic/polymer electronic memory devices, Classification of electronic memory devices,

1. NOTE: Wherever the contact hours is not sufficient, tutorial hour can be converted to theory hour

types of organic memory devices (organic molecules, polymeric materials, organic- inorganic hybrid materials).

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MODULE 3: Electrode System and Corrosion (8hr)
Corrosion Chemistry: Introduction, electrochemical theory of corrosion, types of corrosion-differential metal and differential aeration. Corrosion control - galvanization, anodization and sacrificial anode method. Corrosion Penetration Rate (CPR) - Introduction and numerical problem. **Electrode System**: Introduction, types of electrodes. Ion selective electrode – definition, construction, working and applications of glass electrode. Determination of pH using glass electrode. Reference electrode - Introduction, calomel electrode – construction, working and applications of calomel electrode. Concentration cell– Definition, construction and Numerical problems.
MODULE 4: Green Fuels and Polymers (8hr)
Green Fuels: Introduction, construction and working of solar photovoltaic cell, advantages, and disadvantages. Generation of energy (green hydrogen) by electrolysis of water and its advantages. **Polymers:** Introduction, Molecular weight - Number average, weight average and numerical problems. Conducting polymers – synthesis and conducting mechanism of polyacetylene and commercial applications. Preparation, properties, and commercial applications of graphene oxide.
MODULE5: Analytical Techniques and E-Waste Management (8hr)
Analytical Techniques: Introduction, principle and instrumentation of Conductometry; its application in the estimation of weak acid. Potentiometry; its application in the estimation of iron. **E-Waste:** Introduction, sources of e-waste, Composition, Characteristics, and Need of e- waste management. Toxic materials used in manufacturing electronic and electrical products, health hazards due to exposure to e-waste. Recycling and Recovery: Different approaches of recycling (separation, thermal treatment)

Course outcome (Course Skill Set) At the end of the course the student will be able to:	
CO1.	Identify the terms and processes involved in scientific and engineering Applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineeringprocesses
CO3.	Solve for the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties andprocesses

CO5.	Analyze properties and Processes associated with chemical substances in multidisciplinary situations

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 50% of the maximum marks (25 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The suggested components of CIE for Theory course are:

The CIE marks for the theory component shall be 50 marks is as detailed below:

- Four tests each of 25 Marks; (Third and fourth tests are improvement tests, Average of best of first or third CIE and Second or fourth CIE is considered).
- CIE will be conducted by the university as per scheduled time table with question papers for the subject (duration of 1 hour 30 minutes)
- Session wise assignments for 10 marks
- Activities 10 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

Semester End Examination (SEE)

8. Theory SEE will be conducted by University as per the scheduled time table, with question papers for the subject **(duration 03 hours)**
9. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
10. The question paper will have ten full questions carrying equal marks.
11. Each full question carries 20 marks.
12. There will be two full questions (with a maximum of four sub questions) from each module.
13. Each full question will have sub questions covering all the topics under a module.
14. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

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

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
2. Engineering Chemistry, Satyaprakash & Manisha Agrawal, Khanna Book Publishing, Delhi
3. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
4. Essentials of Physical Chemistry, Bahl&Tuli, S.Chand Publishing
5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley
6. Engineering Chemistry – I, D. Grour Krishana, Vikas Publishing
7. A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12th Edition, 2011.
8. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I. K. International Publishing house. 2nd Edition, 2016.
9. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
10. Nanotechnology A Chemical Approach to Nanomaterials, G.A. Ozin & A.C. Arsenault, RSC Publishing, 2005.
11. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
13. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley–Blackwell , 2012
14. Supercapacitors: Materials, Systems, and Applications, Max Lu, Francois Beguin, Elzbieta Frackowiak, Wiley-VCH; 1st edition, 2013.
15. “Handbook on Electroplating with Manufacture of Electrochemicals”, ASIA PACIFIC BUSINESS PRESS Inc., 2017. Dr. H. Panda,
16. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi: 10.17226/4782.
17. Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022
18. High Performance Metallic Materials for Cost Sensitive Applications, F. H. Froes, et al. John Wiley & Sons, 2010
19. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyanarayanan, NiraliPrakashan, 2020
20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020
21. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers, 4th Edition, 2021
22. Engineering Chemistry, P C Jain & Monica Jain, Dhanpat Rai Publication, 2015-16th Edition.
23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition,2002.
24. Nanotechnology Principles and Practices, Sulabha K Kulkarni, Capital Publishing Company, 3rd Edition

2014

25. Principles of nanotechnology, Phanikumar, Scitech publications, 2nd Edition, 2010.
26. Chemistry for Engineering Students, B. S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushpa Iyengar., Subash Publications, 5th Edition, 2014
27. "Engineering Chemistry", O. G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.
28. Chemistry of Engineering materials, Malini S, K S Anantha Raju, CBS publishers Pvt Ltd.,
29. Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.

Web links and Video Lectures (e-Resources):

- http://libgen.rs/
- https://nptel.ac.in/downloads/122101001/
- https://nptel.ac.in/courses/104/103/104103019/
- https://ndl.iitkgp.ac.in/
- https://www.youtube.com/watch?v=faESCxAWR9k
- https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWh
- https://www.youtube.com/watch?v=j5Hml6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo
- https://www.youtube.com/watch?v=1xWBPZnEJk8
- https://www.youtube.com/watch?v=wRAo-M8xBHM

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

- https://www.vlab.co.in/broad-area-chemical-sciences
- https://demonstrations.wolfram.com/topics.php
- https://interestingengineering.com/science

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

	PO											
	PO1	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**
CO1	**3**	**1**	**1**				**1**					
CO2	**3**	**1**	**1**				**1**					
CO3	**3**	**1**	**1**				**1**					
CO4	**3**	**1**	**1**				**1**					
CO5	**3**	**1**	**1**				**1**					

Sharnbasva University, Kalaburagi.

SHARNBASVA UNIVERSITY
ENGINEERING CHEMISTRY FOR CIVIL ENGINEERING STREAM

Syllabus

Semester:II

Course Title:	**Engineering Chemistry for CES**		
Course Code:	**24CHEC202**	CIE Marks	50
Course Type	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L/T)	3	ExamHours	03
Total Hours of Pedagogy	40 hours	Credits	03

Course objectives

- To enable students to acquire knowledge on principles of chemistry for engineeringapplications.
- To develop an intuitive understanding of chemistry by emphasizing the relatedbranches of engineering.
- To provide students with a solid foundation in analytical reasoning required to solvesocietal problems.

Teaching-Learning Process

Teaching-Learning Process

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

- Flipped class
- Smart class room
- Blended mode of leaning
- Interactive simulations and animation
- Tutorial & remedial classes for needy students (not regular T/R)
- Conducting Makeup classes
- Demonstration of concepts either by building models or by industry visit
- Experiments in laboratories shall be executed in blended mode (conventional or non–conventional methods)
- Use of ICT – Online videos, online courses
- Daily learning through assignments

Sharnbasva University, Kalaburagi.

Module-1: Structural Materials (8 hr)
Metals and Alloys: Introduction, Properties and application of Iron and its alloys, **Cement:** Introduction, composition, properties, classification, manufacturing process of cement, process of setting and hardening of cement, additives for cement and testing of cement. **Refractories:** Introduction, classification based on chemical composition, properties and application of refractory materials (clay bricks. silicon bricks, casting materials) **Glass:** Introduction, Composition, Types, Preparation of Soda-lime glass, properties and applications of Soda-lime glass.
Module-2: Energy Conversion Systems and Corrosion (8 hr)
Energy conversion: Fuel Cells: Introduction, construction, working and applications of methanol–oxygen and polymer electrolyte membrane (PEM) fuel cell. **Storage devices:** Introduction, construction and working of Li-ion battery.

1. NOTE: Wherever the contact hours is not sufficient, tutorial hour can be converted to theory hours

Corrosion: Introduction, electrochemical corrosion of steel in concrete, types (differential metal and aeration), Stress corrosion in civil structures, corrosion control (design and selection of materials, galvanization, anodization and sacrificial anode method).
Module-3: Nanotechnology and Water Technology (8 hr)
Nanotechnology: Introduction, size dependent properties of nanomaterial (surface area and catalytic), Synthesis of nanomaterial by sol-gel method and precipitation method. **Nanomaterials:** Introduction, properties and engineering applications of carbon nanotubes, graphene and nanomaterials for water treatment (Metal oxide). **Water technology:** Introduction, water parameters, hardness of water, determination of temporary, permanent and total hardness by EDTA method, numerical problems, softening of water by ion exchange method, desalination of water by reverse osmosis, determination ofCOD, numerical problems.

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Module-4:Polymer and Composites (8 hr)	
Polymer: Introduction, type of polymerization with examples (Addition and condensation), molecular weight of polymers, numerical problems. Synthesis, properties and engineering applications of polyethylene (PE) and polyvinyl chloride (PVC). **Fibers and composites**: Synthesis, properties and applications of Kevlar and nylon fibers. **Adhesives**: Introduction, properties and applications of epoxy resin. **Biodegradable polymers**: Synthesis of polylactic acid (PLA) and their applications.	
Module-5:Phase Rule and Analytical Techniques (8 hr)	
Phase rule: Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: One component (water system) . **Analytical techniques**: Introduction, principle, instrumentation of potentiometric sensors; its application in the estimation of iron, Optical sensors (colorimetry); its application in the estimation of the copper, pH-sensor (Glass electrode); its application in the determinationof pH of beverages.	
Course outcome (Course Skill Set) At the end of the course the student will be able to:	
CO1.	Identify the terms and Processes involved in scientific and engineering applications
CO2.	Explain the phenomena of chemistry to describe the methods of engineeringprocesses
CO3.	Solve for the problems in chemistry that are pertinent in engineering applications
CO4.	Apply the basic concepts of chemistry to explain the chemical properties andprocesses
CO5.	Analyze properties and Processes associated with chemical substances in multidisciplinary situations

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Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing marks for the CIE is 50% of the maximum marks (25 marks out of 50). The minimum passing marks for the SEE is 35% of the maximum marks (18 marks out of 50).

Continuous Internal Evaluation(CIE):

The CIE shall be conducted by the course teacher throughout the semester. The suggested components of CIE for Theory course are:

The CIE marks for the theory component shall be 50 marks is as detailed below:

- Four tests each of 25 Marks; (Third and fourth tests are improvement tests, Average of best of first or third CIE and Second or fourth CIE is considered).
- CIE will be conducted by the university as per scheduled time table with question papers for the subject (duration of 1 hour 30 minutes)
- Session wise assignments for 10 marks
- Activities 10 marks
- Attendance 5 marks (95% to 100%), 04 marks (85% to 94%)

Semester End Examination (SEE)

15. Theory SEE will be conducted by University as per the scheduled time table, with question papers for the subject **(duration 03 hours)**
16. The SEE question paper will be set for 100 marks and the marks scored will be proportionately reduced to 50 marks.
17. The question paper will have ten full questions carrying equal marks.
18. Each full question carries 20 marks.
19. There will be two full questions (with a maximum of four sub questions) from each module.
20. Each full question will have sub questions covering all the topics under a module.
21. The students will have to answer five full questions, selecting one full question from each module.

Suggested Learning Resources:

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

1. Wiley Engineering Chemistry, Wiley India Pvt. Ltd. New Delhi, 2013- 2nd Edition.
2. Engineering Chemistry, Satyaprakash& Manisha Agrawal, Khanna Book Publishing, Delhi
3. A Text Book of Engg. Chemistry, Shashi Chawla, Dhanpat Rai & Co. (P) Ltd.
4. Essentials of Physical Chemistry, Bahl&Tuli, S.Chand Publishing
5. Applied Chemistry, Sunita Rattan, Kataria 5. Engineering Chemistry, Baskar, Wiley
6. Engineering Chemistry – I, D. GrourKrishana, Vikas Publishing

7. A Text book of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12thEdition, 2011.
8. A Text Book of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I. K. International Publishing house. 2nd Edition, 2016.
9. Text Book of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
10. Nanotechnology A Chemical Approach to Nanomaterials, G.A. Ozin& A.C. Arsenault, RSCPublishing, 2005.
11. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.
12. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
13. OLED Display Fundamentals and Applications, TakatoshiTsujimura, Wiley–Blackwell , 2012
14. Supercapacitors: Materials, Systems, and Applications, Max Lu, Francois Beguin, ElzbietaFrackowiak, Wiley-VCH; 1st edition, 2013.
15. "Handbook on Electroplating with Manufacture of Electrochemicals", ASIA PACIFIC BUSINESS PRESS Inc., 2017. Dr. H. Panda,
16. Expanding the Vision of Sensor Materials. National Research Council 1995, Washington, DC: The National Academies Press. doi: 10.17226/4782.
17. Engineering Chemistry, Edited by Dr. Mahesh B and Dr. Roopashree B, Sunstar Publisher, Bengaluru, ISBN 978-93-85155-70-3, 2022
18. High Performance Metallic Materials for Cost Sensitive Applications, F. H. Froes, et al. John Wiley & Sons, 2010
19. Instrumental Methods of Analysis, Dr. K. R. Mahadik and Dr. L. Sathiyanarayanan, NiraliPrakashan, 2020
20. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020
21. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers, 4th Edition, 2021
22. Engineering Chemistry, P C Jain & Monica Jain, Dhanpat Rai Publication, 2015-16th Edition.
23. Nanostructured materials and nanotechnology, Hari Singh, Nalwa, academic press, 1st Edition,2002.
24. Nanotechnology Principles and Practices, Sulabha K Kulkarni, Capital Publishing Company, 3rd Edition 2014
25. Principles of nanotechnology, Phanikumar, Scitech publications, 2nd Edition, 2010.
26. Chemistry for Engineering Students, B. S. Jai Prakash, R. Venugopal, Sivakumaraiah& Pushpa Iyengar., Subash Publications, 5th Edition, 2014
27. "Engineering Chemistry", O. G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.

28. Chemistry of Engineering materials, Malini S, K S Anantha Raju, CBS publishers Pvt Ltd.,
Laboratory Manual Engg. Chemistry, Anupma Rajput, Dhanpat Rai & Co.

Web links and Video Lectures (e-Resources):

- http://libgen.rs/
- https://nptel.ac.in/downloads/122101001/
- https://nptel.ac.in/courses/104/103/104103019/
- https://ndl.iitkgp.ac.in/
- https://www.youtube.com/watch?v=faESCxAWR9k
- https://www.youtube.com/watch?v=TBqXMWaxZYM&list=PLyhmwFtznRhuz8L1bb3X-9IbHrDMjHWWh
- https://www.youtube.com/watch?v=j5Hml6KN4TI
- https://www.youtube.com/watch?v=X9GHBdyYcyo
- https://www.youtube.com/watch?v=1xWBPZnEJk8
- https://www.youtube.com/watch?v=wRAo-M8xBHM

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

- https://www.vlab.co.in/broad-area-chemical-sciences
- https://demonstrations.wolfram.com/topics.php
- https://interestingengineering.com/science

COs and POs Mapping (Individual teacher has to fill up)												
	PO											
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
CO1	3	1	1				1					
CO2	3	1	1				1					
CO3	3	1	1				1					
CO4	3	1	1				1					
CO5	3	1	1				1					