

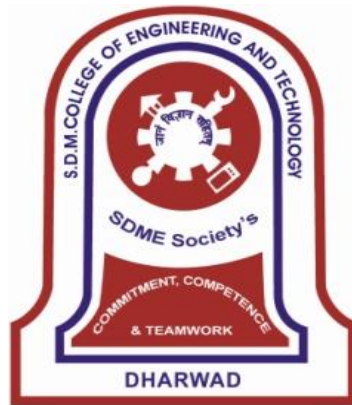
Academic Program: UG

Academic Year 2025-26

Syllabus

I & II Semester B.E.

Civil Engineering



**SHRI DHARMASTHALA MANJUNATHESHWARA COLLEGE OF ENGINEERING
& TECHNOLOGY,**

DHARWAD – 580 002

(An Autonomous Institution approved by AICTE & Affiliated to VTU, Belagavi)

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SDM College of Engineering & Technology, Dharwad

It is certified that the scheme and syllabus for I & II semester of UG program in Civil Engineering is recommended by the Board of Studies of Civil Engineering Department and approved by the Academic Council, SDM College of Engineering & Technology, Dharwad. This scheme and syllabus will be in force from the academic year 2025 - 26 till further revision.

Principal

Chairman BoS & HoD

SDM College of Engineering & Technology, Dharwad

Vision and Mission of the Institute

Vision:

To develop competent professionals with human values.

Mission:

- To have contextually relevant Curricula.
- To promote effective Teaching Learning Practices supported by Modern Educational Tools and Techniques.
- To enhance Research Culture.
- To involve the Industrial Expertise for connecting Classroom contents to real-life situations.
- To inculcate Ethics and soft skills leading to overall personality development.

DEPARTMENT OF CIVIL ENGINEERING

VISION AND MISSION

Vision:

To be the center of excellence providing the state of art civil engineering education developing competent engineers responsible for serving modern society.

Mission:

The stated vision can be achieved through:

- The development of robust curricula to meet industrial expectations.
- Interactive teaching-learning process with modern educational tools and soft skills.
- Establishing synergy between teaching and research
- Industry-Institute interaction.

Program Educational Objectives (PEOs)

I. Technical adeptness: The Civil Engineering Graduates will be technically adept to specific fields and other disciplines. Management towards Planning, Design, and Costing. Their technical skills and knowledge will enable them to perform their work with commitment and quality, timeliness with continuous improvement.

II. Interpersonal Skills: Civil Engineering Graduates will exhibit effective interpersonal skills in teams and at the workplace.

III. Awareness of Social impact: Graduates will be made aware of causes of impacts due to the development and to identify remedial measures if necessary.

IV. Professionalism: Understanding professionalism, ethics, quality performance, sustainability and allow them to be professional leaders and contributors to society through their problem-solving capabilities and executing the work.

V. Continuous Learning: Civil Engineering Graduates will exhibit interest in lifelong learning including studies leading to professional licensure or higher studies in engineering that provides for continued development of their technical ability and management skills.

PROGRAM OUTCOMES (POs)

Engineering Graduates will be able to:

- PO1.Engineering knowledge:** Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.
- PO2.Problem analysis:** Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.
- PO3.Design/ development of solutions:** Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for public health and safety and the cultural, societal, and environmental considerations.
- PO4.Conduct investigations of complex problems:** Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data and synthesis of the information to provide valid conclusions.
- PO5.Modern tool usage:** Create, select, and apply appropriate techniques, resources and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
- PO6.The engineer and society:** Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
- PO7.Environment and sustainability:** Understand the impact of professional engineering solutions in societal and environmental contexts and demonstrate the knowledge of and need for sustainable development.
- PO8.Ethics:** Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice.

PO9.Individual and teamwork: Function effectively as an individual and as a

member or leader in diverse teams and in multi-disciplinary settings.

PO10.Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO11.Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply the set one's own work, as a member and leader in a team, to manage projects and in multi-disciplinary environments.

PO12.Lifelong learning: Recognize the need for and have the preparation and ability to engage in independent and lifelong learning in the broadest context to technological change.

PROGRAM SPECIFIC OUTCOMES(PSOs)

PSO13.Project inception and design: Conceptualize projects related to different fields of Civil Engineering, collect relevant data by direct and indirect methods, analyze the project requirement and design the project.

PSO14.Draft specification: Select material, prepare estimates/costing, schedule work plans.

PSO15.Experimentation: Apply knowledge of different fields of Civil Engineering, conduct experiments, analyze, interpret data, and design the system components.

SDM COLLEGE OF ENGINEERING AND TECHNOLOGY DHARWAD

Department of Civil Engineering

Stream: Civil Engineering

First Semester

Scheme of Teaching and Examinations 2025-26

Sl. No	Course	Course Code	Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical / Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	ASC(IC)	22MATC11	Mathematics – I for Civil Engg. Stream	Maths	2	2	2	0	3	50	100	100	04
2	ASC(IC)	22CHEC12	Chemistry for Civil Engg. Stream	Chemistry	2	2	2	0	3	50	100	100	04
3	ESC	22CAED13	Computer Aided Engineering Drawing	ME	2	0	2	0	3	50	100	100	03
4	ESC-I	22ESC145	Introduction to C Programming	CSE Dept.	2	0	2	0	3	50	100	100	03
5	ETC-I	22ETC100	Introduction to AI & its Applications	CV	3	0	0	0	3	50	100	100	03
6	AEC	22PWS16	Professional writing skills in English	Humanities	1	0	0	0	1	50	50	100	01
7	HSMC	22ICO17	Indian Constitution	Humanities	1	0	0	0	1	50	50	100	01
8	AEC	22SFH18	Scientific Foundations of Health	CV	1	0	0	0	1	50	50	100	01
TOTAL					14	04	08	0	18	400	650	800	20

SDM COLLEGE OF ENGINEERING AND TECHNOLOGY DHARWAD

Department of Civil Engineering

Stream: Civil Engineering

Second Semester

Scheme of Teaching and Examinations 2025-26

Sl. No.	Course	Course Code	Course Title	TD/PSB	Teaching Hours/Week				Examination				Credits
					Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in hours	CIE Marks	SEE Marks	Total Marks	
					L	T	P	S					
1	ASC(IC)	22MATC21	Mathematics - II for Civil Engg. Stream	Maths	2	2	2	0	3	50	100	100	04
2	ASC(IC)	22PHYC22	Physics for Civil Engg. Stream	Physics	2	2	2	0	3	50	100	100	04
3	ESC	22CIV23	Engineering Mechanics	CV	3	0	0	0	3	50	100	100	03
4	ESC-II	22ESC244	Introduction to Mechanical Engineering	ME	3	0	0	0	3	50	100	100	03
5	PLC-II	22ETC25E	Renewable Energy Source	CV	3	0	0	0	3	50	100	100	03
6	AEC	22ENG26	Communicative English	Humanities	1	0	0	0	1	50	50	100	01
7	HSMC	22KSK27/ 22KBK27	Sanskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	1	50	50	100	01
8	SDC	22IDT28	Innovation and Design Thinking	Civil Engg. Dept.	1	0	1	0	1	50	50	100	01
TOTAL					10	04	04	0	18	400	650	800	20

Total credits for I year: 40

22MATC11

Mathematics I for Civil Engineering Stream

(2-2-2)4

Contact Hours: 52

Course objectives:

- Familiarize the importance of calculus associated with one variable and two variables for civil engineering.
- Develop the knowledge of Linear Algebra refereeing to matrices.
- Analyze Civil engineering problems applying Ordinary Differential equations.

Course outcome

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Apply the knowledge of calculus to solve problems related to polar curves.	-	-	1,2,12
CO-2	Learn the notion of partial differentiation to compute rate of change of multivariate functions.	-	-	1,2,12
CO-3	Make use of matrix theory for solving for system of linear equations and compute eigenvalues and eigenvectors.	-	-	1,2,12
CO-4	Analyze the solution of linear and nonlinear ordinary differential equations.	-	-	1,2,12
CO-5	Familiarize with modern mathematical tools namely Mathematica/ Matlab/ Python/ Scilab	-	5	1,2,12

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	1	1			2							1

Unit - I Calculus (8 hours)

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

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

Applications: Structural design and paths, Strength of materials, Elasticity.

Unit - II Series Expansion and Multivariable Calculus (8 hours)

Introduction to series expansion and partial differentiation in the field of Civil engineering applications.

Taylor's and Maclaurin's series expansion for one variable (Statement only)– problems. Indeterminate forms-L'Hospital's rule, problems.

Partial differentiation, total derivative-differentiation of composite functions. Jacobian and problems. Maxima and minima for a function of two variables- Problems.

Self-study: Euler's theorem and problems. Method of Lagrange's undetermined multipliers with single constraint.

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

Unit - III Ordinary Differential Equations (ODEs) of first order (8 hours)

Introduction to first-order ordinary differential equations pertaining to the applications for Civil engineering.

Linear and Bernoulli's differential equations. Exact and reducible to exact differential

equations - Integrating factors on $\frac{1}{M}\left(\frac{\partial M}{\partial y} - \frac{\partial M}{\partial x}\right)$ and $\frac{1}{N}\left(\frac{\partial M}{\partial y} - \frac{\partial M}{\partial x}\right)$ Orthogonal trajectories (cartesian) and LR -Circuits.

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

Self-Study: Applications of ODEs in Civil Engineering problems like bending of the beam, whirling of shaft, solution of non-linear ODE by the method of solvable for x and y.

Applications: Rate of Growth or Decay, Conduction of heat.

Unit - IV Linear Algebra (8 hours)

Introduction of linear algebra related to Civil Engineering applications. Elementary row transformation of a matrix, Rank of a matrix. Consistency and solution of a system of linear equations-Gauss-elimination method, Gauss-Jordan method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigen value and Eigenvector.

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

Applications: Structural Analysis, Balancing equations.

Unit - V Ordinary Differential Equations of higher order (8 hours)

Importance of higher-order ordinary differential equations in Civil Engineering applications.

Higher-order linear ODEs with constant coefficients-Inverse differential operator, method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations-Problems.

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

Applications: Oscillations of a spring, Transmission lines, Highway engineering.

List of Laboratory experiments (2 hours/week per batch/ batch strength 15)

10 lab sessions + 1 repetition class + 1 Lab Assessment

1. 2D plots for Cartesian and polar curves.
2. Finding angle between polar curves, curvature, and radius of curvature of a given curve.
3. Finding partial derivatives, Jacobian and plotting the graph.
4. Applications to Maxima and Minima of two variables.
5. Solution of first order differential equation and plotting the graphs.
6. Numerical solution of system of linear equations, test for consistency and graphical representation.
7. Solution of system of linear equations using Gauss-Seidel iteration.
8. Compute eigen values and eigen vectors and find the largest and smallest eigen value by Rayleigh power method.
9. Solutions of Second-order ordinary differential equations with initial/boundary conditions
10. Solution of a differential equation of oscillations of a spring/deflection of a beam with different loads.

Suggested software's: Mathematica/MatLab/Python/Scilab.

Reference 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.
3. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017.
4. N.P Bali and Manish Goyal: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
5. Gupta C.B, Sing S.R and Mukesh Kumar: "Engineering Mathematic for Semester I and II", Mc-Graw Hill Education (India) Pvt. Ltd 2015.

22CHEC12

Chemistry for Civil Engineering stream

(2-2-2)4

Contact Hours: 52

Course objectives:

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

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Identify the terms and processes involved in scientific and engineering applications.	1	-	2,3,7
CO-2	Explain the phenomena of chemistry to describe the methods of engineering processes.	1	-	2,3,7
CO-3	Solve for the problems in chemistry that are pertinent in engineering	1	-	2,3,7
CO-4	Apply the basic concepts of chemistry to explain the chemical properties and processes.	1	-	2,3,7
CO-5	Analyse properties and processes associated with chemical substances in multidisciplinary	1	-	2,3,7

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	3	1	1				1					

Unit - I: Structural Materials (8 hours)

Metals and Alloys: Introduction, Properties and application of Iron and its alloys, Aluminium 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.

Glass: Introduction, Composition, Types, Preparation of Soda-lime glass, properties

and applications of glass.

Self-learning: Chemistry of reinforced concrete from various sources of water (seawater, groundwater treated water).

Unit - II: Water Technology and Nanotechnology (8 hours)

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 electrodialysis, determination of COD, numerical problems. Forward osmosis: Introduction, Process, and applications.

Nanotechnology: Introduction, size dependent properties of nanomaterial (surface area and catalytic), Synthesis of nanomaterial by sol-gel method and co-precipitation method.

Self-learning: Sewage treatment (Primary, secondary and tertiary)

Unit - III: Polymer and Composites (8 hours)

Polymer: Introduction, methods of polymerization, molecular weight of polymers, numerical problems. Synthesis, properties and engineering applications of polyethylene (PE) and Chlorinated polyvinyl chloride (CPVC).

Fibers: Synthesis, properties and applications of polypropylene and nylon fibers.

Polymer composites: Introduction, properties and applications of fiber reinforced polymers composites (FRPC),

Geo polymer concrete: Introduction, synthesis, constituents, properties and applications.

Adhesives: Introduction, properties and applications of epoxy resin.

Self-learning: Biopolymer: Introduction, structural properties, and applications of cellulose and lignin.

Unit - IV: Phase Rule and Corrosion (8 hours)

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

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, and anodization and sacrificial anode method). Corrosion penetration rate and numerical.

Analytical Techniques: Optical sensors and its application in the estimation of beverages. pH sensors and its application in the determination of soil sample.

Self-learning: Corrosion inhibitors, Factors affecting corrosion.

Unit - V: Electrode system, Energy Conversion and Storage (8 hours)

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

Energy conversion: Introduction, construction, working, and applications of Photovoltaic cells, methanol-oxygen fuel cells.

Storage devices: Introduction, construction and working of Li-ion battery.

Self-learning: Nernst equation, Galvanic cell

List of Laboratory experiments (2 hours/week per batch/ batch strength 15)

10 lab sessions + 1 repetition class + 1 Lab Assessment

A – Demonstration (any two) offline/virtual:

- A1. Synthesis of polyurethane
- A2. Quantitative estimation of Aluminium by precipitation method
- A3. Synthesis of iron oxide nanoparticles
- A4. Determination of chloride content in the given water sample by Argentometric method

B – Exercise (compulsorily any 4 to be conducted):

- B1. Conductometric estimation of acid mixture
- B2. Potentiometric estimation of FAS using $K_2Cr_2O_7$
- B3. Determination of pKa of vinegar using pH sensor (Glass electrode)
- B4. Determination of rate of corrosion of mild steel by weight loss method
- B5. Estimation of total hardness of water by EDTA method

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

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

D – Open Ended Experiments (any two):

- D1. Gravimetric estimation of gypsum in Portland cement
- D2. Electroplating of desired metal on substrate
- D3. Estimation of manganese dioxide in pyrolusite
- D4. Analysis of cement for its components

Reference Books:

1. A Textbook of Engineering Chemistry, SS Dara & Dr. SS Umare, S Chand & Company Ltd., 12th Edition, 2011.
2. A Textbook of Engineering Chemistry, R.V. Gadag and Nityananda Shetty, I. K. International Publishing house. 2nd Edition, 2016.
3. Textbook of Polymer Science, F.W. Billmeyer, John Wiley & Sons, 4th Edition, 1999.
4. Nanotechnology A Chemical Approach to Nanomaterials, G.A. Ozin & A.C. Arsenault, RSC Publishing, 2005.
5. Corrosion Engineering, M. G. Fontana, N. D. Greene, McGraw Hill Publications, New York, 3rd Edition, 1996.

6. Linden's Handbook of Batteries, Kirby W. Beard, Fifth Edition, McGraw Hill, 2019.
7. OLED Display Fundamentals and Applications, Takatoshi Tsujimura, Wiley–Blackwell, 2012.
8. Principles of Instrumental Analysis, Douglas A. Skoog, F. James Holler, Stanley R. Crouch Seventh Edition, Cengage Learning, 2020.
9. Polymer Science, V R Gowariker, N V Viswanathan, Jayadev, Sreedhar, Newage Int. Publishers, 4th Edition, 2021.
10. Engineering Chemistry, P C Jain & Monica Jain, Dhanpat Rai Publication, 2015-16th Edition.
11. Chemistry for Engineering Students, B. S. Jai Prakash, R. Venugopal, Sivakumaraiah & Pushp ayengar., Subash Publications, 5th Edition, 2014
12. "Engineering Chemistry", O. G. Palanna, Tata McGraw Hill Education Pvt. Ltd. New Delhi, Fourth Reprint, 2015.

22CAED13

Computer Aided Engineering Drawing

(2-0-2)3

Contact Hours: 39

Course objectives:

- To understand the basic principles and conventions of engineering drawing.
- To use drawing as a communication mode.
- To generate pictorial views using CAD software.
- To understand the development of surfaces.
- To visualize engineering components.

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Draw and communicate the objects with definite shape and dimensions	10	1,2,5,12	6,8,9
CO-2	Recognize and draw the shape and size of objects through different views	10	1,2,5,12	6,8,9
CO-3	Develop the lateral surfaces of the object	10	1,2,5,12	6,8,9
CO-4	Create drawing views using CAD software.	10	1,2,5	6,7,9,12
CO-5	Identify the interdisciplinary engineering components or systems through its graphical representation.	10	1,2,5,12	9

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	3	2.2			3	1		1	1	3		1.8

Unit - I (9 Hours)

Introduction:

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

Orthographic Projections of Points, Lines and Planes:

Introduction to Orthographic projections: Orthographic projections of points in 1st and 3rd quadrants. Orthographic projections of lines (Placed in First quadrant only).

Orthographic projections of planes viz triangle, square, rectangle, pentagon, hexagon, and circular laminae (Placed in First quadrant only using change of position method).

Application on projections of Lines & Planes.

Unit - II (8 Hours)

Orthographic Projection of Solids:

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

Unit - III (8 Hours)

Isometric Projections:

Isometric scale, Isometric projection of hexahedron (cube), right regular prisms, pyramids, cylinders, cones and spheres. Isometric projection of combination of two simple solids.

Conversion of simple isometric drawings into orthographic views:

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

Introduction to drawing views using 3D environment (For CIE only).

Unit - IV (7 Hours)

Development of Lateral Surfaces of Solids:

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

Problems on applications of development of lateral surfaces like funnels and trays.

Unit - V (8 Hours)

Multidisciplinary Applications & Practice:

Free hand Sketching: True free hand, Guided Free hand, Roads, Buildings, Utensils, Hand tools & Furniture's etc.

Drawing Simple Mechanisms; Bicycles, Tricycles, Gear trains, Ratchets, two-wheeler cart & Four-wheeler carts to dimensions etc

Electric Wiring and lighting diagrams; Like, Automatic fire alarm, Call bell system, UPS system, Basic power distribution system using suitable software.

Basic Building Drawing; Like, Architectural floor plan, basic foundation drawing, steel structures- Frames, bridges, trusses using Auto CAD or suitable software,

Electronics Engineering Drawings- Like, Simple Electronics Circuit Drawings, practice on layers concept.

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

Reference Books:

1. S.N. Lal, & T Madhusudhan: Engineering Visualisation, 1st Edition, Cengage, Publication.
2. K. R. Gopalakrishna, & Sudhir Gopalakrishna: Textbook of Computer Aided Engineering Drawing, 39th Edition, Subash Stores, Bangalore, 2017.
3. Parthasarathy N. S., Vela Murali, Engineering Drawing, Oxford University Press, 2015.
4. Bhattacharya S. K., Electrical Engineering Drawing, New Age International publishers, second edition 1998, reprint 2005.
5. Chris Schroder, Printed Circuit Board Design using AutoCAD, Newnes, 1997.
6. K S Sai Ram Design of steel structures, Third Edition by Pearson.
7. Nainan p kurian Design of foundation systems, Narosa publications.
8. A S Pabla, Electrical power distribution, 6th edition, Tata Mcgraw hill.
9. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt.Limited, 2019.

22ESC145**Introduction to C Programming****(2-0-2)3****Contact Hours: 39**

Course objectives: The course focuses on developing the problem-solving skills that can be applied to problems in different areas, which enables students to take up subsequent IT-related courses and professional careers.

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain the basic structure and working principles of computer.	-	-	1
CO-2	Write a C program using C programming constructs to solve given problem.	-	1,2,3	-

CO-3	Understand and apply the features of data structures like arrays and strings to solve given problem	-	1,2,3	-
CO-4	Explain the usage and the need for writing modular programs and demonstrate its use in writing programs.	-	1,2,3	-
CO-5	Explain various building blocks of data structures like structures, pointers in solving real-life problems.	-	1,2,3	-

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	1.8	2	2									

Unit - I (8 Hours)

Introduction to C: Introduction to computers, input and output devices, Algorithms and Flowcharts.

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

Unit - II (8 Hours)

Operators in C, Type conversion and typecasting.

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

Unit - III (8 Hours)

Functions: Introduction to user defined functions, Function definition, function declaration, function call, return statement, passing parameters to functions, recursive functions.

Unit - IV (8 Hours)

Arrays: Declaration of arrays, accessing the elements of an array, Operations on arrays, passing arrays to functions, operations on two-dimensional arrays, passing two-dimensional arrays to functions, introduction to multidimensional arrays

Applications of arrays: case study with sorting and searching techniques: Bubble sort, Linear Search.

Unit - V (8 Hours)

Strings: String taxonomy, string function.

Pointers: Introduction to Pointers, Declaring Pointer Variables

Structures: Introduction to structures.

Laboratory Component:

Working Platform: Preferably Linux Operating System.

Expected Coding Practices:

1. Use of Good Programming practices: Declaration of variables, Indentation,

Documentation, Simplicity of logic, Efficiency of logic, uniformity etc.

2. Generic and Reusable code.
3. Inclusions of exceptional cases.
4. Better usability.

Course Contents:

Programming exercises of varying complexity, to meet the learning results stated in course outcomes for this course.

Reference Books:

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

22ETC100 Introduction to AI and its Applications (3-0-0) 3

Contact Hours: 39

Course Learning Objectives: This course focuses on the following learning perspectives:

- Understand the basics of Artificial Intelligence and Machine Learning
- Use of Gen AI and prompts to get the results for a given problem
- Current trends in AI and its future directions
- Applications of AI in various industrial domains

Course Outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain the concepts and types of artificial intelligence	-	6	1,8,12
CO-2	Illustrate basic machine learning methods for regression, classification and clustering	-	3	2,4,5,8,12
CO-3	Make use of prompt engineering techniques to interact with generative AI tools	2	3	5,8,12
CO-4	Identify real-world applications across different disciplines	-	2,3	5,8,12
CO-5	Outline recent trends in artificial intelligence and machine learning	-	1,5	8,12

POs/PSOs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	1.5	2.0	2.0	1.0	1.25	2.0	-	1.0	-	-	-	1.0

Suggested Platforms: ChatGPT for prompt engineering, Jupyter notebook

Contents:

Unit-I

Introduction to Artificial Intelligence: Artificial Intelligence How Does AI Work? Advantages and Disadvantages of Artificial Intelligence, History of Artificial Intelligence, Types of Artificial Intelligence, Weak AI, Strong AI, Reactive Machines, Limited Memory, Theory of Mind, Self-Awareness, Is Artificial Intelligence Same as Augmented Intelligence and Cognitive Computing, Machine Learning and Deep Learning.

Machine Intelligence: Defining Intelligence, Components of Intelligence, Differences Between Human and Machine Intelligence, Agent and Environment, Search, Uninformed Search Algorithms, Informed Search Algorithms: Pure Heuristic Search, Best-First Search Algorithm (Greedy Search).

Knowledge Representation: Introduction, Knowledge Representation, Knowledge-Based Agent, Types of Knowledge. **08 Hrs.**

Unit-II

Machine Learning: Techniques in AI, Machine Learning Model, Regression Analysis in Machine Learning, Classification Techniques, Clustering Techniques, Naïve Bayes Classification, Neural Network, Support Vector Machine (SVM). **08 Hrs.**

Unit-III

Introduction to Prompt Engineering: Introduction to Prompt Engineering, The Evolution of Prompt Engineering, Types of Prompts, How Does Prompt Engineering Work? Comprehending Prompt Engineering's Function in Communication, The Advantages of Prompt Engineering, The Future of LLM Communication.

Prompt Engineering Techniques for ChatGPT: Introduction to Prompt Engineering Techniques, Instructions Prompt Technique, Zero, One, and Few Shot Prompting, Self-Consistency Prompt.

Prompts for Creative Thinking: Introduction, Unlocking Imagination and Innovation. Prompts for Effective Writing: Introduction, Igniting the Writing Process with Prompts. **08Hrs.**

Unit-IV

Trends in AI: AI and Ethical Concerns, AI as a Service (AlaaS), Recent trends in AI, Expert System, Internet of Things, Artificial Intelligence of Things (AIoT). **07 Hrs.**

Unit-V

Robotics: Robotics-an Application of AI, Drones Using AI, No Code AI, Low Code AI

Industrial Applications of AI: Application of AI in Healthcare, Application of AI in Finance, Application of AI in Retail, Application of AI in Agriculture, Application of AI in Education, Application of AI in Transportation, AI in Experimentation and Multi-disciplinary research. **08 Hrs.**

Text books:

- 1) Reema Thareja, Artificial Intelligence: Beyond Classical AI, Pearson Education, 2023.
- 2) Ajantha Devi Vairamani and Anand Nayyar, Prompt Engineering: Empowering Communication, 1st Edition, CRC Press, Taylor & Francis Group, 2024. (DOI: <https://doi.org/10.1201/9781032692319>).
- 3) Saptarsi Goswami, Amit Kumar Das and Amlan Chakrabarti, "AI for Everyone – A Beginner's Handbook for Artificial Intelligence", Pearson, 2024.

22PWS16	Professional writing skills in English	(1-0-0)1
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Contact Hours: 13

Course objectives:

- To Identify the Common Errors in Writing and Speaking of English.
- To achieve better technical writing and Presentation skills for employment.
- To read technical proposals properly and make them to write good technical reports.
- To acquire Employment and Workplace communication skills.
- To learn about Techniques of Information Transfer through presentation in different level.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12) / PSOs (13-16)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Identify the Common Errors in Writing and Speaking.		10	
CO-2	Achieve better technical writing and Presentation skills.		10	
CO-3	Read Technical proposals properly and write standard technical reports.	10		
CO-4	Acquire Employment and Workplace communication skills.		10	
CO-5	Learn Effective Presentation Skills	10		

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level										2.4		

Unit - I (02 Hours)

Identifying Common Errors in Written and Spoken English: Verb Phrase and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules), Common errors in Subject-verb agreement, Words Confused / Misused, errors identification.

Unit - II (02 Hours)

Nature and Style of sensible writing: Punctuation marks, Paragraph Writing, Writing Articles, Precise writing and Techniques in Essay writing, Sentence arrangements and Corrections activities. Misplaced modifiers, Contractions, Collocations, Correction of Errors.

Unit - III (03 Hours)

Technical Reading and Writing Practices: Technical writing process, Introduction to Technical Reports writing, Significance of Reports, Types of Reports. Introduction to Technical Proposals Writing, Types of Technical Proposals, Characteristics of Technical Proposals. Scientific Writing Process. Grammar – Voices and Reported Speech, Spotting Error & Sentence Improvement, Cloze Test and Theme Detection Exercises.

Unit - IV (03 Hours)

Professional Communication for Employment: Listening Comprehension, Types of Listening, Listening Barriers, Improving Listening Skills. TED talks, Reading Comprehension, Tips for effective reading. Job Applications, Types of official/employment/business Letters, Resume vs. Bio Data, Profile, CV. and effective resume writing, Emails, Blog Writing and Memos.

Unit - V (03 Hours)

Professional Communication at Workplace: Agenda, Minutes of Meeting, Group Discussion and Professional Interviews, Characteristics and Strategies of a GD and PI's, Intra and Interpersonal Communication Skills at workplace, Non-Verbal Communication Skills and its importance in GD and Interview. Presentation skills and Formal Presentations by Students, Strategies of Presentation Skills.

Reference Books:

1. "Professional Writing Skills in English" published by Fillip Learning – Education (ILS), Bangalore – 2022.
2. "Functional English" (As per AICTE 2018 Model Curriculum) (ISBN-978-93-5350-047-4) Cengage learning India Pvt Limited [Latest Edition 2019].
3. English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.

4. Technical Communication by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
5. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
6. High School English Grammar & Composition by Wren and Martin, S Chandh & Company Ltd – 2015.
7. Effective Technical Communication – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private
8. Rogers, C., Farson, R. E. Active Listening. Gordon Training Inc., www.gordontraining.com/free-workplace-articles/active-listening/, Extract from 1957 article.
9. Wood, Frederick. A Remedial English Grammar for Foreign Students. Macmillan Education, India, 1990.
10. Yadugiri, M A. Making Sense of English - A Textbook of Sounds, Words and Grammar, Viva Books, 2020.

Question Paper Pattern (SEE) - MCQ on all units: 50X1 = 50 marks

Question Paper Pattern (CIE: 3 IAs) MCQ on covered units: 20X1 = 20 marks

22ICO17

Indian Constitution

(1-0-0)1

Contact Hours: 13

Course objectives:

- To know about the basic structure of Indian Constitution.
- To know the Fundamental Rights (FR's), DPSP's and Fundamental Duties (FD's) of our constitution.
- To know about our Union Government, political structure & codes, procedures.
- To know the State Executive & Elections system of India.
- To learn the Amendments and Emergency Provisions, other important provisions given by the constitution.

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Analyse the basic structure of Indian Constitution.	8		6,7
CO-2	Remember their Fundamental Rights, DPSP's and Fundamental Duties (FD's) of our constitution.	8		6,7
CO-3	Know about our Union Government, political structure & codes, procedures.	8		6,7
CO-4	Understand our State Executive & Elections system of India.	8		6,7

CO-5	Remember the Amendments and Emergency Provisions, other important provisions given by the constitution.	8		6,7
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POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level						1	1	3				

Unit - I (02 hours)

Indian Constitution: Necessity of the Constitution, Societies before and after the Constitution adoption. Introduction to the Indian constitution, Making of the Constitution, Role of the Constituent Assembly.

Unit - II (02 hours)

Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. building.

Unit - III (03 hours)

Directive Principles of State Policy (DPSP's) and its present relevance in Indian society. Fundamental Duties and its Scope and significance in Nation, Union Executive Parliamentary System, Union Executive – President, Prime Minister, Union Cabinet.

Unit - IV (03 hours)

Parliament - LS and RS, Parliamentary Committees, Important Parliamentary Terminologies. Judicial System of India, Supreme Court of India and other Courts, Judicial Reviews and Judicial Activism.

Unit - V (03 hours)

State Executive and Governor, CM, State Cabinet, Legislature - VS & VP, Election Commission, Elections & Electoral Process. Amendment to Constitution, and important Constitutional Amendments till today. Emergency Provisions.

Reference Books:

1. "Constitution of India" (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022.
2. "Introduction to the Constitution of India", (Students Edition.) by Durga Das Basu (DD Basu): Prentice –Hall, 2008.
3. "Constitution of India, Professional Ethics and Human Rights" by Shubham Singles, Charles E. Haries, andet al: published by Cengage Learning India, Latest Edition – 2019.
4. "The Constitution of India" by Merunandan K B: published by Merugu Publication, Second Edition, Bengaluru.
5. "Samvidhana Odu" - for Students & Youths by Justice HN Nagamohan Dhas, Sahayana, kerekon.

6. M.Govindarajan, S.Natarajan, V.S.Senthilkumar, "Engineering Ethics", Prentice – Hall, 2004.

22SFH18 Scientific Foundations of Health (1-0-0)1

Contact Hours: 13

Course objectives:

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

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	To understand and analyse about Health and wellness (and its Beliefs) & It's balance for positive mindset.	9,12		
CO-2	Develop the healthy lifestyles for good health for their better future.	9,12		
CO-3	Build a Healthy and caring relationships to meet the requirements of good/social/positive life.	9,12		
CO-4	To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.	9,12		
CO-5	Prevent and fight against harmful diseases for good health through positive mindset.	9,12		

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level									3			3

Unit - I (02 hours)

Good Health & It's balance for positive mindset: Health -Importance of Health, Influencing factors of Health, Health beliefs, Advantages of good health, Health &

Behaviour, Health & Society, Health & family, Health & Personality, Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.

Unit - II (02 hours)

Building of healthy lifestyles for better future: Developing healthy diet for good health, Food & health, Nutritional guidelines for good health, Obesity & overweight disorders and its management, eating disorders, Fitness components for health, Wellness and physical function, how to avoid exercise injuries.

Unit - III (03 hours)

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

Unit - IV (03 hours)

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

Unit - V (03 hours)

Preventing & fighting against diseases for good health: How to protect from different types of infections, how to reduce risks for good health, reducing risks & coping with chronic conditions, Management of chronic illness for Quality of life, Health & Wellness of youth: a challenge for upcoming future, Measuring of health & wealth status.

Reference Books:

1. "Scientific Foundations of Health" – Study Material Prepared by Dr. L. Thimmesha, Published in VTU - University Website.
2. "Scientific Foundations of Health", (ISBN-978-81-955465-6-5) published by Infinite Learning Solutions, Bangalore – 2022.
3. Health Psychology - A Textbook, FOURTH EDITION by Jane Ogden McGraw Hill Education (India) Private Limited - Open University Press.
4. Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Routledge 711 Third Avenue, New York, NY 10017.
5. HEALTH PSYCHOLOGY (Ninth Edition) by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited – Open University Press.
6. SWAYAM / NPTL/ MOOCS/ We blinks/ Internet sources/ YouTube videos and other materials / notes.
7. Scientific Foundations of Health (Health & Wellness) - General Books published for university and colleges references by popular authors and published by the reputed publisher.

II Semester

22MATC21

Mathematics - II for Civil Engineering stream

(2-2-2)4

Contact Hours: 52

Course objectives:

- Develop the knowledge of solving civil engineering problems numerically.
- Familiarize the importance of Integral calculus and Vector calculus essential for civil engineering.
- Analyse Civil engineering problems by applying Partial Differential Equations.

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Apply the knowledge of numerical methods in solving physical and engineering phenomena.	-	-	1,2,12
CO-2	Apply the knowledge of multiple integrals to compute area and volume.	-	-	1,2,12
CO-3	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line.	-	-	1,2,12
CO-4	Demonstrate partial differential equations and their solutions for physical interpretations.	-	-	1,2,12
CO-5	Get familiarize with modern mathematical tools namely Mathematica/ MatLab/ Python/ Scilab.	-	5	1,2,12

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	1	1			2							1

Unit - I Numerical Methods-1 (08 hours)

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: Bisection method, Lagrange's inverse Interpolation.

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

Unit - II Numerical Methods-2 (08 hours)

Introduction to various numerical techniques for handling Civil Engineering applications.

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

Self-Study: Adam-Bashforth method.

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

Unit - III Integral Calculus (08 hours)

Introduction to Integral Calculus in Civil Engineering applications.

Multiple Integrals: Evaluation of double and triple integrals, evaluation of double integrals by change of order of integration, changing into polar coordinates. Applications to find Area and Volume by double integral. Problems.

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

Self-Study: Volume by triple integration, Centre of gravity.

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

Unit - IV Vector Calculus (08 hours)

Introduction to Vector Calculus in Civil Engineering applications.

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

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

Self-Study: Volume integral and Gauss divergence theorem.

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

Unit - V Partial Differential Equations (08 hours)

Importance of partial differential equations for Civil Engineering applications.

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

Self-Study: Solution of one-dimensional heat equation and wave equation by the method of separation of variables.

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

List of Laboratory experiments

(2hours/week per batch/batch strength15) 10 lab sessions + 1repetition class + 1 Lab Assessment

1. Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson method.
2. Interpolation/Extrapolation using Newton's forward and backward difference formula.
3. Program to compute surface area, volume, and centre of gravity.
4. Evaluation of improper integrals.
5. Finding gradient, divergent, curl and their geometrical interpretation.
6. Computation of area under the curve using Trapezoidal, Simpson's (1/3)rd and (3/8)th rule
7. Solution of ODE of first order and first degree by Taylor's series and Modified Euler's method.
8. Solution of ODE of first order and first degree by Runge-Kutta 4th order and Milne's predictor-corrector method.
9. Verification of Green's theorem.
10. Solution of one-dimensional heat equation and wave equation.

Reference 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.
3. V. Ramana: "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed., 2017
4. Srimanta Pal & Subodh C. Bhunia: "Engineering Mathematics" Oxford University Press, 3rd Ed., 2016.
5. N.P Bali and Manish Goyal: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.

22PHYC22**Physics for Civil Engineering Stream****(2-2-2)4****Contact Hours: 52****Course objectives:**

- To understand the types of oscillation, shock waves & its generation, and applications.
- To Study the elastic properties of materials and failures of engineering materials.
- To Study the acoustics buildings and the essentials of radiometry and photometry.
- To understand the principles photonic devices and their application relevant to civil engineering.
- To understand the various natural disasters and fundamentals of crystal structure.

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1-12)		
	Substantial Level (3)	Moderate Level (2)	Slight Level (1)

CO-1	Elucidate the concepts in oscillations, waves, elasticity and material failures.	1	2,12	5
CO-2	Principle and theory of elastic materials and its relevance in construction technology	1	2,12	-
CO-3	Summarize concepts of acoustics in buildings and explain the concepts in radiation and photometry.	1	2,12	-
CO-4	Discuss the principles photonic devices and their application relevant to civil engineering.	1,2	12	6
CO-5	Describe the various natural hazards and Elaborate crystal structure fundamentals.	1,8,9	2,5,12	3
CO-6	Team work to conduct experiments in physics and experimental analysis ability.	-	-	5

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	3	2.2			1.3	1		3	3			2

Unit - I Oscillations and Shock waves (8 Hours)

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

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

Self-learning: Simple Harmonic motion, Differential equation for SHM.

Unit - II Elasticity (8 Hours)

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

Self-learning: Stress-Strain Curve.

Unit - III Acoustics, Radiometry and Photometry (8 Hours)

Acoustics: Introduction to Acoustics, Types of Acoustics, Reverberation and reverberation time, Absorption power and Absorption coefficient, Requisites for acoustics in auditorium, Sabine's formula (derivation), Measurement of absorption coefficient, Factors affecting the acoustics and remedial measures, Sound Insulation and its measurements. Noise and its Measurements, Impact of Noise in Multi-storied buildings.

Radiometry and Photometry: Radiation Quantities, Spectral Quantities, Relation between luminance and Radiant quantities, Reflectance and Transmittance, Photometry (cosine law and inverse square law).

Self-learning: Introduction to acoustics.

Unit - IV Photonics (8 Hours)

LASER: Properties of a LASER Beam, Interaction of Radiation with Matter, LASER action, Population Inversion, Metastable State, Requisites of a LASER System, Semiconductor LASER, LASER Range Finder, LIDAR, Road Profiling, Bridge Deflection, Speed Checker. Numerical Problems.

Optical Fiber: Principle and Construction of Optical Fibers, Acceptance angle and Numerical Aperture (NA), Expression for NA, Modes of Propagation, Attenuation and Fiber Losses, Fiber Optic Displacement Sensor, Fiber Optic Temperature Sensor, Numerical Problems.

Self-learning: Total Internal Reflection.

Unit - V Natural hazards and Crystal Structure (8 Hours)

Natural hazards:

Earthquake: general characteristics, Classification of Earthquakes; Measurement of Magnitude and intensity; Earthquake proof buildings
Tsunami—causes, characteristics, engineering structures to withstand tsunami.
Landslide—causes, types, effects and prevention.

Crystal structure:

Introduction, Lattice parameters, crystal direction and planes, miller indices with examples, interplanar spacing, coordination number, atomic packing factor, Bragg's law X-ray diffraction (qualitative), crystal structure of diamond and cesium chloride.

Self-learning: Richter scale.

Reference Books:

1. Materials Science and Engineering by R Balasubramaniam, second edition, Wiley India Pvt. Ltd. Ansari Road, Daryaganj, New Delhi-110002.
2. A Textbook of Engineering Physics by M.N. Avadhanulu, P G. Kshirsagar and

T V S Arun Murthy, Eleventh edition, S Chand and Company Ltd. New Delhi 110055.

3. Engineering Physics by R. K. Gaur and S. L. Gupta, 2010 edition, Dhanpat Rai Publications Ltd., New Delhi-110002,
4. Building Science: Lighting and Accoustics, B. P. Singh and Devaraj Singh, Dhanpat Rai Publications (P) Ltd.,
5. Building Acoustics: Tor Eric Vigran, Taylor and Francis, 2008 Edition.

Laboratory Component:

Any Ten Experiments must be completed from the list of experiments.

Note: The experiments must be classified into

- a) Exercise
- b) Demonstration
- c) Structured Inquiry
- d) Open Ended Based on convenience classify the following experiments into the above categories. Select at least one simulation/spreadsheet activity.

List of Experiments:

1. Determination of Young's modulus of the material of the given bar Uniform Bending.
2. Determination of Rigidity modulus of the Material of the wire using Torsional Pendulum.
3. Study of Forced Mechanical Oscillations and Resonance.
4. Study of the frequency response of Series & Parallel LCR circuits.
5. Determination of Fermi Energy of the given Conductor.
6. Determination of Resistivity by Four Probe Method.
7. Determination of effective spring constant of the given springs in series and parallel combinations.
8. Determination of Young's modlus of the material of the given bar Single Cantilever.
9. Determination of the the Moment of Inertia of the given irregular body using torsional pendulum.
10. Determination of Wavelength of Laser using Diffraction Grating.
11. Determination of Acceptance angle and Numerical Aperture of the given Optical Fiber.
12. Determination of the Radius of Curvature of the given Plano Convex Lens by setting Newton's Rings.
13. Step Interactive Physical Simulations.
14. Study of motion using spread Sheets
15. Application of Statistics using Spread Sheets.
16. PHET Interactive Simulations.

22CIV23

Engineering Mechanics

(3-0-0)3

Contact Hours: 39

Course objectives:

- To develop students' ability to analyze the problems involving forces, moments with their applications.
- To analyse the member forces in trusses.

- To make students to learn the effect of friction on different planes.
- To develop the student's ability to find out the centre of gravity and moment of inertia and their applications.
- To make the students learn about kinematics and kinetics and their applications.

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Compute the resultant of a force system and resolution of a force.	2	1	
CO-2	Comprehend the action for forces, moments, and other types of loads on rigid bodies and compute the reactive forces.	2	1	
CO-3	Analyze the frictional resistance offered by different planes.	2	1	
CO-4	Locate the centroid and compute the moment of inertia of sections.	2	1	
CO-5	Analyze the bodies in motion.	2	1	

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	2	3										

Unit - I (8 hours)

Resultant of coplanar force system: Basic dimensions and units, Idealisations, Classification of force system, principle of transmissibility of a force, composition of forces, resolution of a force, Free body diagrams, moment, Principle of moments, couple, Resultant of coplanar concurrent force system, Resultant of coplanar non-concurrent force system, Numerical examples.

Unit - II (8 hours)

Equilibrium of coplanar force system: Equilibrium of coplanar concurrent force system, Lami's theorem, Equilibrium of coplanar parallel force system, types of beams, types of loadings, types of supports, Equilibrium of coplanar non-concurrent force system, support reactions of statically determinate beams subjected to various types of loads, Numerical examples.

Unit - III (8 hours)

Analysis of Trusses: Introduction, Classification of trusses, analysis of plane perfect trusses by the method of joints and method of sections, Numerical examples.

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

Unit - IV (8 hours)

Centroid of Plane areas: Introduction, Locating the centroid of rectangle, triangle, circle, semicircle, quadrant and sector of a circle using method of integration, centroid of composite areas and simple built-up sections, Numerical examples.

Moment of inertia of plane areas: Introduction, Rectangular moment of inertia, polar moment of inertia, product of inertia, radius of gyration, parallel axes theorem, perpendicular axis theorem, moment of inertia of rectangular, triangular and circular areas from the method of integration, moment of inertia of composite areas and simple built-up sections, Numerical examples.

Unit - V (7 hours)

Kinematics:

Linear motion: Introduction, Displacement, speed, velocity, acceleration, acceleration due to gravity.

Reference Books:

1. Bansal R. K., Rakesh Ranjan Beohar and Ahmad Ali Khan, Basic Civil Engineering and Engineering Mechanics, 2015, Laxmi Publications.
2. Kolhapure B K, Elements of Civil Engineering and Engineering Mechanics, 2014, EBPB.
3. Beer F.P. and Johnston E. R., Mechanics for Engineers, Statics and Dynamics, 1987, McGraw Hill.
4. Irving H. Shames, Engineering Mechanics, 2019, Prentice-Hall.
5. Hibbler R. C., Engineering Mechanics: Principles of Statics and Dynamics, 2017, Pearson Press.
6. Timoshenko S, Young D. H., Rao J. V., Engineering Mechanics, 5th Edition, 2017, Pearson Press.
7. Bhavikatti S. S., Engineering Mechanics, 2019, New Age International.
8. Reddy Vijaykumar K and Suresh Kumar K, Engineering Mechanics, 2011, BS publication.

22ESC244**Introduction to Mechanical Engineering****(3-0-0)3****Contact Hours: 39****Course objectives:**

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

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain the concepts of Role of Mechanical Engineering and Energy sources.	1	7	6,10,12
CO-2	Describe the Machine Tool Operations and advanced Manufacturing process.	1		6,7,10,12
CO-3	Explain the Working Principle of IC engines and EV vehicles.	1		6,7,10,12
CO-4	Discuss the Properties of Common Engineering Materials and various Metal Joining Processes.	1		6,7,10,12
CO-5	Explain the Concepts of Mechatronics, Robotics and Automation in IoT.	1		6,7,10,12

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	3					1	1.2			1		1

Unit - I (8 hours)

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

Energy: Introduction and applications of Energy sources like Fossil fuels, Nuclear fuels, Hydel, Solar, wind, and biofuels, Environmental issues like Global warming and Ozone depletion

Unit - II (8 hours)

Machine Tool Operations:

Working Principle of lathe, Lathe operations: Turning, facing, knurling. Working principles of Drilling Machine, drilling operations: drilling, boring, reaming. Working of Milling Machine, Milling operations: plane milling and slot milling.

(No sketches of machine tools, sketches to be used only for explaining the operations).

Introduction to Advanced Manufacturing Systems: Introduction, components of CNC, advantages and applications of CNC, 3D printing.

Unit - III (8 hours)

Introduction to IC Engines: Components and Working Principles, 4-Stroke Petrol and Diesel Engines, Application of IC Engines.

Insight into Future Mobility; Electric and Hybrid Vehicles, Components of Electric and Hybrid Vehicles. Advantages and disadvantages of EVs and Hybrid vehicles.

Unit - IV (7 hours)

Engineering Materials: Types and applications of Ferrous & Nonferrous Metals, silica, ceramics, glass, graphite, diamond and polymer. Shape Memory Alloys.

Joining Processes: Soldering, Brazing and Welding, Definitions, classification of welding process, Arc welding, Gas welding and types of flames.

Unit - V (8 hours)

Introduction to Mechatronics and Robotics: open-loop and closed-loop mechatronic systems. Classification based on robotics configuration: polar cylindrical, Cartesian coordinate and spherical. Application, Advantages and disadvantages.

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

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

Reference Books:

1. Elements of Mechanical Engineering, K R Gopala Krishna, Subhash Publications, 2008.
2. An Introduction to Mechanical Engineering, Jonathan Wickert and Kemper Lewis, Third Edition, 2012.
3. Elements of Workshop Technology (Vol. 1 and 2), Hazra Choudhry and Nirzar Roy, Media Promoters and Publishers Pvt. Ltd., 2010.
4. Manufacturing Technology- Foundry, Forming and Welding, P.N.Rao Tata McGraw Hill 3rdEd., 2003.
5. Internal Combustion Engines, V. Ganesan, Tata McGraw Hill Education; 4th edition, 2017.
6. Robotics, Appu Kuttan KK K. International Pvt Ltd, volume 1.
7. Dr SRN Reddy, Rachit Thukral and Manasi Mishra, "Introduction to Internet of Things: A Practical Approach", ETI Labs.
8. Raj kamal, "Internet of Things: Architecture and Design", McGraw hill.

22ETC25E**Renewable Energy Sources****(3-0-0)3****Contact Hours: 39**

Course objectives:

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

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:	Mapping to POs (1-12)		
	Substantial Level (3)	Moderate Level (2)	Slight Level (1)

CO-1	Describe the environmental aspects of renewable energy resources. In Comparison with various conventional energy systems, their prospects and limitations.	1	--	7
CO-2	Describe the use of solar energy and the various components used in energy production with respect to applications like-heating, cooling, desalination, power generation.	--	1	2,7
CO-3	Understand the conversion principles of wind and tidal energy	1	--	2,7
CO-4	Understand the concept of biomass energy resources and green energy.	--	1	2
CO-5	Acquire the basic knowledge of ocean thermal energy conversion and hydrogen energy.	1	--	2

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level	2.6	1					1					

Unit - I (07 hours)

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

Unit – II (08 hours)

Solar Energy: Fundamentals; Solar Radiation; Estimation of solar radiation on horizontal and inclined surfaces; Solar radiation Measurements- Pyrheliometers, Pyrometer, Sunshine Recorder. Solar Thermal systems: Flat plate collector; Solar distillation; Solar Pond electric power plant.

Solar electric power generation- Principle of Solar cell, Photovoltaic system for electric power generation, advantages, Disadvantages and applications of solar photovoltaic system.

Unit - III (08 hours)

Wind Energy: Properties of wind, availability of wind energy in India, wind velocity and power from wind; major problems associated with wind power, Basic components of wind energy conversion system (WECS); Classification of WECS- Horizontal axis- single, double and multiblade system. Vertical axis- Savonius and darrieus types.

Biomass Energy: Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies-fixed dome; Urban waste to energy conversion; Biomass gasification (Downdraft).

Unit - IV (08 hrs)

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

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

Unit - V (08 hrs)

Green Energy: Introduction, Fuel cells: Classification of fuel cells – H₂; Operating principles, Zero energy Concepts. Benefits of hydrogen energy, hydrogen production technologies (electrolysis method only), hydrogen energy storage, applications of hydrogen energy, and problems associated with hydrogen energy.

Reference books

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

22ENG26

Communicative English

(1-0-0)1

Contact Hours: 13

Course objectives:

This course focuses on the following learning perspectives:

- To know about Fundamentals of Communicative English and Communication Skills in general.
- To train to identify the nuances of phonetics, intonation and enhance pronunciation skills for better Communication skills.
- To impart Basic English grammar and essentials of important language skills.
- To enhance with English vocabulary and language proficiency for better communication skills.
- To learn about Techniques of Information Transfer through presentation.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-12) / PSOs (13-16)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Apply the Fundamentals of Communication Skills in their Career.		10	
CO-2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.		10	

CO-3	Impart basic English grammar and essentials of language skills as per present requirement.	10		
CO-4	Acquire vocabulary and language proficiency.		10	
CO-5	Adopt the Techniques of Information Transfer through presentation.	10		

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level										2.4		

Unit - I (03 hours)

Introduction to Communicative English: meaning and Definition, Fundamentals of Communicative English, Process of Communication, Barriers to Effective Communicative English, Different styles and levels in Communicative English. Interpersonal and Intrapersonal Communication Skills.

Unit - II (Language Lab) (03 hours)

Introduction to Phonetics: Sounds- consonants, vowels and diphthongs, Syllables and Structure. Word Accent, Stress Shift and Intonation, Phonetic Transcription, Common Errors in Pronunciation.

Unit - III (Language Lab) (02 hours)

Vocabulary: Word formation Synonyms, Antonyms, Homophones, Homonyms, Affixes, Abbreviations, Strong and Weak forms of Words, Word pairs, One Word Substitutes and Error identification.

Unit - IV (02 hours)

Grammar: Parts of Speech, Articles and Preposition Tense, Sentences, Kinds of sentences, types of sentences, Transformation. of sentences Question Tags and Exercises on it.

Unit - V (03 hours)

Communication Skills for Employment: Presentation Skills, Extempore, Public Speaking, Mother Tongue Influence (MTI), Reading and Listening Comprehensions – Exercises.

Reference Books:

1. Communication Skills by Sanjay Kumar & PushpLata, Oxford University Press India Pvt Ltd - 2019
2. A Textbook of English Language Communication Skills, Published by Infinite Learning Solutions, Bengaluru - 2022.

3. English for Engineers by N.P. Sudharshana and C.Savitha, Cambridge University Press – 2018.
4. English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt Limited, 2019.
5. A Course in Technical English – D Praveen Sam, KN Shoba, Cambridge University Press – 2020.
6. Practical English Usage by Michael Swan, Oxford University Press – 2016.
7. Rogers, C., Farson, R. E. Active Listening. Gordon Training Inc., www.gordontraining.com/free-workplace-articles/active-listening/, Extract from 1957 article.
8. Wood, Frederick. A Remedial English Grammar for Foreign Students. Macmillan Education, India, 1990.
9. Yadugiri, M A. Making Sense of English - A Textbook of Sounds, Words and Grammar, Viva Books, 2020.

Question Paper Pattern (SEE) - MCQ on all units: 50X1 = 50 marks
Paper Pattern (CIE: 3 IAs) MCQ on covered units: 20X1 = 20 marks

Question

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ - ಕನ್ನಡ ಬಲ್ಲ ಮತ್ತು ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಕ್ರಮ

Course Title:	ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ		
Course Code:	22KSK27	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives : ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:
The course (22KSK17/27) will enable the students,

1. ಪದವಿ ವಿದ್ಯಾರ್ಥಿಗಳಾಗಿರುವುದರಿಂದ ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.
2. ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಪ್ರಧಾನ ಭಾಗವಾದ ಆಧುನಿಕಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
3. ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಮೂಡಿಸುವುದು.
4. ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯವನ್ನು ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ಪರಿಚಯಿಸುವುದು.
5. ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process - General Instructions) :

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

1. ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡವನ್ನು ಬೋಧಿಸಲು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಪ್ರಸ್ತುತ ಪುಸ್ತಕ ಆಧಾರಿಸಿ ಬ್ಲಾಕ್ ಬೋರ್ಡ್ ವಿಧಾನವನ್ನು ಅನುಸರಿಸುವುದು. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಪ್ರೇರೇಪಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
2. ಇತ್ತೀಚಿನ ತಂತ್ರಜ್ಞಾನದ ಅನುಕೂಲಗಳನ್ನು ಬಳಸಿಕೊಳ್ಳುವುದು - ಅಂದರೆ ಕವಿ-ಕಾವ್ಯ ಪರಿಚಯದಲ್ಲಿ ಕವಿಗಳ ಚಿತ್ರಣ ಮತ್ತು ಲೇಖನಗಳು ಮತ್ತು ಕಥೆ ಕಾವ್ಯಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟ ಧ್ವನಿ ಚಿತ್ರಗಳು, ಸಂಭಾಷಣೆಗಳು, ಈಗಾಗಲೇ ಇತರ ವಿಮರ್ಶಕರು ಬರೆದಿರುವ ವಿಮರ್ಶಾತ್ಮಕ ವಿಷಯಗಳನ್ನು ಟಿಪಿಟಿ, ಡಿಜಿಟಲ್ ಮಾಧ್ಯಮಗಳ ಮುಖಾಂತರ ವಿಶ್ಲೇಷಿಸುವುದು.
3. ನವೀನ ಮಾದರಿಯ ಸಾಹಿತ್ಯ ಬೋಧನೆಗೆ ಸಂಬಂಧಪಟ್ಟ ವಿಧಾನಗಳನ್ನು ಶಿಕ್ಷಕರು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅನುಕೂಲವಾಗುವ ರೀತಿಯಲ್ಲಿ ಅಳವಡಿಸಿಕೊಳ್ಳಬಹುದು.

ಘಟಕ -1 ಕನ್ನಡ ಸಂಸ್ಕೃತಿ ಮತ್ತು ಭಾಷೆ ಕುರಿತಾದ ಲೇಖನಗಳು (03 hours of pedagogy)

1. ಕರ್ನಾಟಕ ಸಂಸ್ಕೃತಿ - ಹಂಪ ನಾಗರಾಜಯ್ಯ
2. ಕರ್ನಾಟಕದ ಏಕೀಕರಣ: ಒಂದು ಅಪೂರ್ವ ಚರಿತ್ರೆ - ಜಿ. ವೆಂಕಟಸುಬ್ಬಯ್ಯ
3. ಆಡಳಿತ ಭಾಷೆಯಾಗಿ ಕನ್ನಡ - ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ ಮತ್ತು ಪ್ರೊ. ವಿ. ಕೇಶವಮೂರ್ತಿ

ಘಟಕ - 2 ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ (03 hours of pedagogy)

1. ವಚನಗಳು: ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ಯಕ್ಕಿ, ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ಯಕ್ಕಿ ಲಕ್ಕಮ್ಮ.
2. ಕೀರ್ತನೆಗಳು: ಅದರಂದೇನು ಫಲ ಇದರಂದೇನು ಫಲ - ಪುರಂದರದಾಸರು
ತಲ್ಲಣಿಸಿದಿರು ಕಂಡೆ; ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
3. ತತ್ವಪದಗಳು: ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ

ಘಟಕ -3 ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ (03 hours of pedagogy)

1. ದಿವಿಜಿ ರವರ ಮಂಕುತಿಮ್ಮನ ಕಗ್ಗದಿಂದ ಆಯ್ದ ಕೆಲವು ಭಾಗಗಳು
2. ಕುರುಡು ಕಾಂಚಾಣ: ದಾ.ರಾ. ಬೇಂದ್ರೆ
3. ಹೊಸಬಾಳಿನ ಗೀತೆ: ಕುವೆಂಪು

ಘಟಕ - 4 ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ (03 hours of pedagogy)

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

ಘಟಕ - 5 ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಕಥೆ ಮತ್ತು ಪ್ರವಾಸ ಕಥನ (03 hours of pedagogy)

1. ಯುಗಾದಿ: ವಸುಧೇಂದ್ರ
2. ಮಗಾನೆ ಎಂಬ ಗಿರಿಜನ ಪರ್ವತ: ಹಿ.ಚಿ. ಬೋರಲಿಂಗಯ್ಯ

Course outcome (Course Skill Set)

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ (22KSK17/27) ಪಠ್ಯ ಕಲಿಕೆಯ ನಂತರ ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ :

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

C01	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.
C02	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ

	ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಫೂರ್ತಿ ಮೂಡುತ್ತದೆ.
C03	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಹೆಚ್ಚಿಸುತ್ತದೆ.
C04	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕ ಹೆಚ್ಚಿಸುತ್ತದೆ.
C05	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

University Prescribed Textbook :

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ

ಡಾ. ಹಿ.ಚಿ.ಬೋರಲಿಂಗಯ್ಯ ಮತ್ತು ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ,

ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

- ವಿಶೇಷ ಸೂಚನೆ : 1. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮಕ್ಕೆ ಸೀಮಿತವಾಗಿ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ ಇರುತ್ತದೆ.
2. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮವನ್ನು ಹೊರತುಪಡಿಸಿದ ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿನ ಉಳಿದ ಪದ್ಯ & ಗದ್ಯ ಭಾಗ ಹಾಗೂ ಇತರ ಲೇಖನಗಳನ್ನು ಹೆಚ್ಚುವರಿ ಪೂರಕ ಓದಿಗಾಗಿ ಬಳಸಿಕೊಳ್ಳಬಹುದು. ಅಂತಿಮ ಪರೀಕ್ಷೆಯಲ್ಲಿ ಈ ಪಾಠಗಳಿಂದ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುವುದಿಲ್ಲ.

3. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ (9900832331) ಇವರನ್ನು ಸಂಪರ್ಕಿಸಿ.
4. ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ, ಕೋರ್ಸ್ ಆಯ್ಕೆ ಮಾಹಿತಿ, ಅಧ್ಯಯನ ಸಾಮಗ್ರಿ & ಬಹು ಆಯ್ಕೆ ಮಾದರಿಯ ಪ್ರಶ್ನೆಗಳ ಕೈಪಿಡಿಗಾಗಿ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್ ಸೈಟ್ ನೋಡುವುದು.

COs and POs Mapping (Samskritika Kannada/ Balake Kannada):

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

ಬಳಕೆ ಕನ್ನಡ - baLake Kannada (Kannada for Usage)

ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ - (Prescribed Textbook to Learn Kannada)

Course Title:	ಬಳಕೆ ಕನ್ನಡ		
Course Code:	22KBK27	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Theory	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	1:0:0:0	Exam Hours	01 Theory
Total Hours of Pedagogy	15 hours	Credits	01

Course objectives : ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯ ಉದ್ದೇಶಗಳು:

The course (22KBK17/27) will enable the students,

1. To Create the awareness regarding the necessity of learning local language for comfortable and healthy life.
2. To enable learners to Listen and understand the Kannada language properly.
3. To speak, read and write Kannada language as per requirement.
4. To train the learners for correct and polite conversation.
5. To know about Karnataka state and its language, literature and General information about this state.

ಬೋಧನೆ ಮತ್ತು ಕಲಿಕಾ ವ್ಯವಸ್ಥೆ (Teaching-Learning Process - General Instructions) :

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

1. ಬಳಕೆ ಕನ್ನಡವನ್ನು ತರಗತಿಯಲ್ಲಿ ಶಿಕ್ಷಕರು ಬೋಧಿಸಲು ವಿಟಿಯು ಸೂಚಿಸಿರುವ ಪಠ್ಯಪುಸ್ತಕವನ್ನು ಉಪಯೋಗಿಸಬೇಕು.
2. ಪ್ರಮುಖ ಅಂಶಗಳ ಚಾರ್ಟ್ ಗಳನ್ನು ತಯಾರಿಸಲು ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ಉತ್ತೇಜಿಸುವುದು ಮತ್ತು ತರಗತಿಯಲ್ಲಿ ಅವುಗಳನ್ನು ಚರ್ಚಿಸಲು ಅವಕಾಶ ಮಾಡಿಕೊಡುವುದು.
3. ಪ್ರತಿ ವಿದ್ಯಾರ್ಥಿ ಪುಸ್ತಕವನ್ನು ತರಗತಿಯಲ್ಲಿ ಬಳಸುವಂತೆ ನೋಡಿಕೊಳ್ಳುವುದು ಮತ್ತು ಪ್ರತಿ ಪಾಠ ಮತ್ತು ಪ್ರವಚನಗಳ ಮೂಲ ಅಂಶಗಳಿಗೆ ಸಂಬಂಧಪಟ್ಟಂತೆ ಪೂರಕ ಚಟುವಟಿಕೆಗಳಿಗೆ ತೊಡಗಿಸತಕ್ಕದ್ದು.
4. ಡಿಜಿಟಲ್ ತಂತ್ರಜ್ಞಾನದ ಮುಖಾಂತರ ಇತ್ತೀಚೆಗೆ ಡಿಜಿಟಲೀಕರಣ ಗೊಂಡಿರುವ ಭಾಷೆ ಕಲಿಕೆಯ ವಿಧಾನಗಳನ್ನು ಪಿಪಿಟಿ ಮತ್ತು ದೃಶ್ಯ ಮಾಧ್ಯಮದ ಮುಖಾಂತರ ಚರ್ಚಿಸಲು ಕ್ರಮಕೈಗೊಳ್ಳುವುದು. ಇದರಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳನ್ನು ತರಗತಿಯಲ್ಲಿ ಹೆಚ್ಚು ಏಕಾಗ್ರತೆಯಿಂದ ಪಾಠ ಕೇಳಲು ಮತ್ತು ಅಧ್ಯಯನದಲ್ಲಿ ತೊಡಗಲು ಅನುಕೂಲವಾಗುತ್ತದೆ.
5. ಭಾಷಾಕಲಿಕೆಯ ಪ್ರಯೋಗಾಲಯದ ಮುಖಾಂತರ ಬಹುಬೇಗ ಕನ್ನಡ ಭಾಷೆಯನ್ನು ಕಲಿಯಲು ಅನುಕೂಲವಾಗುವಂತೆ ಕಾರ್ಯಚಟುವಟಿಕೆಗಳನ್ನು ಮತ್ತು ಕ್ರಿಯಾ ಯೋಜನೆಗಳನ್ನು ರೂಪಿಸುವುದು.

Module - 1

(03 hours of pedagogy)

1. Introduction, Necessity of learning a local language. Methods to learn the Kannada language.
2. Easy learning of a Kannada Language: A few tips. Hints for correct and polite conversation, Listening and Speaking Activities, Key to Transcription
3. ವೈಯಕ್ತಿಕ, ಸಾಮ್ಯಸೂಚಕ/ಸಂಬಂಧಿತ ಸಾರ್ವನಾಮಗಳು ಮತ್ತು ಪ್ರಶ್ನಾರ್ಥಕ ಪದಗಳು - Personal Pronouns, Possessive Forms, Interrogative words

Module - 2	(03 hours of pedagogy)
1. ನಾಮಪದಗಳ ಸಂಬಂಧಾರ್ಥಕ ರೂಪಗಳು, ಸಂದೇಹಾಸ್ಪದ ಪ್ರಶ್ನೆಗಳು ಮತ್ತು ಸಂಬಂಧವಾಚಕ ನಾಮಪದಗಳು - Possessive forms of nouns, dubitive question and Relative nouns 2. ಗುಣ, ಪರಿಮಾಣ ಮತ್ತು ವರ್ಣಬಣ್ಣ ವಿಶೇಷಣಗಳು, ಸಂಖ್ಯಾವಾಚಕಗಳು Qualitative, Quantitative and Colour Adjectives, Numerals 3. ಕಾರಕ ರೂಪಗಳು ಮತ್ತು ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು -ಸಪ್ರಸಿದ್ಧ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ - (ಅ, ಅದು, ಅವು, ಅವಳಿ) -Predictive Forms, Locative Case	
Module - 3	(03 hours of pedagogy)
1. ಚತುರ್ಥಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯದ ಬಳಕೆ ಮತ್ತು ಸಂಖ್ಯಾವಾಚಕಗಳು - Dative Cases, and Numerals 2. ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳು ಮತ್ತು ಬಹುವಚನ ನಾಮರೂಪಗಳು -Ordinal numerals and Plural markers 3. ದೋಷ/ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು & ವರ್ಣ ಗುಣವಾಚಕಗಳು -Defective/Negative Verbs & Colour Adjectives	
Module- 4	(03 hours of pedagogy)
1. ಅಪ್ರಾಪ್ತ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತ್ತು ಒತ್ತಾಯ ಅರ್ಥರೂಪ ಪದಗಳು ಮತ್ತು ವಾಕ್ಯಗಳು Permission, Commands, encouraging and Urging words (Imperative words and sentences) 2. ಸಾಮಾನ್ಯ ಸಂಭಾಷಣೆಗಳಲ್ಲಿ ದ್ವಿತೀಯ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ಸಂಭವನೀಯ ಪ್ರಕಾರಗಳು Accusative Cases and Potential Forms used in General Communication 3. "ಇರು ಮತ್ತು ಇರಲ್ಲ" ಸಹಾಯಕ ಕ್ರಿಯಾಪದಗಳು, ಸಂಭಾವ್ಯಸೂಚಕ ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾ ಪದಗಳು - Helping Verbs "iru and iralla", Corresponding Future and Negation Verbs 4. ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧ ಸೂಚಕ, ವಸ್ತು ಸೂಚಕ ಪ್ರತ್ಯಯಗಳು ಮತ್ತು ನಿಷೇಧಾರ್ಥಕ ಪದಗಳ ಬಳಕೆ- Comparitive, Relationship, Identification and Negation Words	
Module - 5	(03 hours of pedagogy)
1. ಕಾಲ ಮತ್ತು ಸಮಯದ ಹಾಗೂ ಕ್ರಿಯಾಪದಗಳ ವಿವಿಧ ಪ್ರಕಾರಗಳು -Different types of Tense, Time and Verbs 2. ದ್, -ತ್, -ತು, -ಇತ್ತು, -ಅಗಿ, -ಅಲ್ಲ, -ಗ್, -ಕ್, ಇದೆ, ಕ್ರಿಯಾ ಪ್ರತ್ಯಯಗಳೊಂದಿಗೆ ಭೂತ, ಭವಿಷ್ಯತ್ ಮತ್ತು ವರ್ತಮಾನ ಕಾಲ ವಾಕ್ಯ ರಚನೆ - Formation of Past, Future and Present Tense Sentences with Verb Forms 3. Kannada Vocabulary List :ಸಂಭಾಷಣೆಯಲ್ಲಿ ದಿನೋಪಯೋಗಿ ಕನ್ನಡ ಪದಗಳು -Kannada Words in Conversation	

Course outcome (Course Skill Set)

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಅಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು:

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

C01	To understand the necessity of learning of local language for comfortable life.
C02	To speak, read and write Kannada language as per requirement.
C03	To communicate (converse) in Kannada language in their daily life with kannada speakers.
C04	To Listen and understand the Kannada language properly.
C05	To speak in polite conversation.

University Prescribed Textbook :

ಬಳಕೆ ಕನ್ನಡ

ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ

ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ,

ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ, ಬೆಳಗಾವಿ.

ಸೂಚನೆ :

- ವಿಶೇಷ ಸೂಚನೆ : 1. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮಕ್ಕೆ ಸೀಮಿತವಾಗಿ ಅಂತಿಮ ಪರೀಕ್ಷೆಯ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ ಇರುತ್ತದೆ.
2. ಮೇಲಿನ ಪಠ್ಯಕ್ರಮವನ್ನು ಹೊರತುಪಡಿಸಿದ ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯಪುಸ್ತಕದಲ್ಲಿನ ಉಳಿದ ಭಾಗಗಳನ್ನು ಹೆಚ್ಚುವರಿ ಪೂರಕ ಓದಿಗಾಗಿ ಬಳಸಿಕೊಳ್ಳಬಹುದು. ಅಂತಿಮ ಪರೀಕ್ಷೆಯಲ್ಲಿ ಈ ಪಾಠಗಳಿಂದ ಪ್ರಶ್ನೆಗಳನ್ನು ಕೇಳಲಾಗುವುದಿಲ್ಲ.
- =====
3. ಹೆಚ್ಚಿನ ಮಾಹಿತಿ ಮತ್ತು ವಿವರಣೆಗಳಿಗೆ ಡಾ. ಎಲ್. ತಿಮ್ಮೇಶ (9900832331) ಇವರನ್ನು ಸಂಪರ್ಕಿಸಿ.
4. ಮಾದರಿ ಪ್ರಶ್ನೆಪತ್ರಿಕೆ, ಕೋರ್ಸ್ ಆಯ್ಕೆ ಮಾಹಿತಿ, ಅಧ್ಯಯನ ಸಾಮಗ್ರಿ & ಬಹು ಆಯ್ಕೆ ಮಾದರಿಯ ಪ್ರಶ್ನೆಗಳ ಕೈಪಿಡಿಗಾಗಿ ವಿಶ್ವವಿದ್ಯಾಲಯದ ವೆಬ್ ಸೈಟ್ ನೋಡುವುದು.

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

- ✓ Contents related activities (Activity-based discussions)
- ✓ For active participation of students instruct the students to prepare Flowcharts and Handouts
- ✓ Organising Group wise discussions Connecting to placement activities
- ✓ Quizzes and Discussions.
- ✓ Seminars and assignments.

COs and POs Mapping (Samskritika Kannada/ Balake Kannada):

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
C01						3				1		
C02						3				1		
C03						3				1		
C04						3				1		
C05						3				1		

Course objectives:

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

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-12)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Understand design process procedure.	-	-	3
CO-2	Generate and develop design ideas through different techniques	-	-	3
CO-3	Identify the significance of reverse Engineering to Understand products.	-	-	6
CO-4	Draw technical drawing for design ideas	-	-	1
CO-5	Idea and tasks for some design ideas.	-	-	1

POs	1	2	3	4	5	6	7	8	9	10	11	12
Mapping Level			1		1	1					1	

Unit - I (2 hours)

Introduction - Process of Design - Understanding Design thinking. Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping

Unit - II (2 hours)

Tools for Design Thinking - Real-Time design interaction captures and analysis – Enabling efficient collaboration in digital space– Empathy for design – Collaboration in distributed Design.

Unit - III (3 hours)

Design Thinking in IT design - Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping.

Unit - IV (3 hours)

Design Thinking For strategic innovations - Growth – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.

Unit - V (3 hours)

Design thinking workshop: Empathize, Design, Ideate, Prototype and Test.

Reference Books:

- 1) John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) 2nd Edition, 2013.
- 2) Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press, 2009.
- 3) Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 1st Edition, 2011.
- 4) Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 1st Edition, 2013.
- 5) Yousef Haik and Tamer M.Shahin, "Engineering Design Process", Cengage Learning, 2nd Edition, 2011.
- 6) Jeanne Liedtka, Andrew King, and Kevin Bennett, "Solving Problems with Design Thinking - Ten Stories of What Works", Columbia Business School Publishing, 1st Edition, 2013.

CIE and SEE Evaluation (from 2023-24 batch)**Courses with LTP 3-0-0 and 4-0-0 or 2-2-0/3-2-0****Continuous Internal Evaluation (CIE):**

- Two Internal Assessment and one Improvement test each of 20 marks and one hour duration.
- Two higher scores from three tests are taken representing 40 marks.
- Question Paper pattern for Internal Assessment: 3 questions of 10 marks each with maximum of two subdivisions. Q.3 is compulsory and one question to be answered from Q.1 and Q.2.
- Course Teacher Assessment (CTA): Minimum two components such as quiz, seminar, written assignment, any technical activity related to course each of 5marks. Total CTA marks-10
- CIE=40 (from tests) +10(from CTA) =50 marks

Semester End Examination (SEE):

- SEE is conducted for 100 marks with 3 hours duration. It is reduced to 50 marks.
- Question Paper pattern for SEE: Five units with built in choice. Each question with maximum of three subdivisions.
- Two questions are to be set from each unit with built in choice, for example Q1 or Q2 in unit –I, Q 3 or Q 4 in unit-II and so on.
- A total of 5 full questions to be answered choosing one full question from each unit. All five units are to be answered compulsorily.
- Each question is of 20 marks.
- The Question paper is to be set for duration of 3 hours both for 3 and 4 credits courses.
- The Question paper is to be set for 100 marks for 3 and 4 credits courses.

ASC(IC)/PCC with LTP 2-0-2, 3-0-2 and 2-2-2**Continuous Internal Evaluation (CIE):**

Theory CIE component:

- Two Internal Assessment and one Improvement test each of 20 marks and one hour duration.
- Two higher scores from three tests are taken representing 40 marks.
- Question Paper pattern for Internal Assessment: 3 questions of 10 marks each with maximum of two subdivisions. Q.3 is compulsory and one question to be answered from Q.1 and Q.2.

Course Teacher Assessment (CTA): Totally based on conduction of experiments as set by the course teacher.

Laboratory component assessment:

- 5 marks: for conduction, regularity, involvement, journal writing, etc. Minimum 75% of attendance is compulsory. If the performance is not satisfactory in laboratory the student shall be detained and required to reregister for the course whenever offered next.

- 5 marks: Lab Test. A Lab test as per the class timetable must be conducted at the end for 50 marks and scale down to 5 marks.
- CIE for integrated course =40 (from IA tests) +10 (from CTA i.e., lab component) =50 marks.
- There will not be any remuneration for Final Lab Test since it is CTA of integrated course.
- Copy of the Marks list to be sent to the concerned course instructor immediately after the completion of test for that batch. Original Marks list to be maintained in the department.
- CIE=40(from tests) +10(from CTA i.e. lab component) =50 marks

Semester End Examination (SEE):

- SEE is conducted for 100 marks with 3 hours duration. It is reduced to 50 marks.
- Question Paper pattern for SEE: Five units with built in choice. Each question with maximum of three subdivisions.
- Two questions are to be set from each unit with built in choice, for example Q1 or Q2 in unit –I, Q 3 or Q 4 in unit-II and so on.
- A total of 5 full questions to be answered choosing one full question from each unit. All five units are to be answered compulsorily.
- Each question is of 20 marks.
- The Question paper is to be set for duration of 3 hours both for 3 and 4 credits courses.
- The Question paper is to be set for 100 marks for 3 and 4 credits courses.

AEC/HSMS/UHV Courses with LTP 1-0-0:**Continuous Internal Evaluation (CIE)**

- Two Internal Assessment and one Improvement test each of 20 marks and one hour duration.
- Two higher scores from three tests are taken representing 40 marks.
- Question Paper pattern for Internal Assessment: MCQ 20 questions
- Course Teacher Assessment (CTA): Minimum two components such as quiz, seminar, written assignment, any technical activity related to course etc. each of 5 marks. Total CTA marks-10
- CIE=40(from tests) +10(from CTA) =50 marks

Semester End Examination (SEE):

- SEE is conducted for 50 marks of 1 hour duration. There will be 50 MCQs.
- Question Paper pattern for SEE: The question paper will contain 12 MCQ questions drawn from each Unit.
- Students have to answer maximum of 10 questions from each unit.
- All five units are to be answered compulsorily.