

Academic Program: UG

Academic Year 2026 -27

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)

Ph: 0836-2447465 Fax: 0836-2464638 Web: www.sdmcet.ac.in

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 2026-27 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 knowledge of mathematics, natural science, computing, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to develop to the solution of complex engineering problems.
- PO2: Problem Analysis: Identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions with consideration for sustainable development. (WK1 to WK4).
- PO3: Design/Development of Solutions: Design creative solutions for complex engineering problems and design/develop systems/components/processes to meet identified needs with consideration for the public health and safety, whole-life cost, net zero carbon, culture, society and environment as required. (WK5)
- PO4: Conduct Investigations of Complex Problems: Conduct investigations of complex engineering problems using research-based knowledge including design of experiments, modelling, analysis & interpretation of data to provide valid conclusions. (WK8).
- PO5: Engineering Tool Usage: Create, select and apply appropriate techniques, resources and modern engineering & IT tools, including prediction and modelling recognizing their limitations to solve complex engineering problems. (WK2 and WK6)
- PO6: The Engineer and The World: Analyze and evaluate societal and environmental aspects while solving complex engineering problems for its impact on sustainability with reference to economy, health, safety, legal framework, culture and environment. (WK1, WK5, and WK7).
- PO7: Ethics: Apply ethical principles and commit to professional ethics, human values, diversity and inclusion; adhere to national & international laws. (WK9)
- PO8: Individual and Collaborative Team work: Function effectively as an individual, and as a member or leader in diverse/multi-disciplinary teams.
- PO9: Communication: Communicate effectively and inclusively within the engineering community and society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations considering cultural, language, and learning differences

PO10: Project Management and Finance: Apply knowledge and understanding of engineering management principles and economic decision-making and apply these to one's own work, as a member and leader in a team, and to manage projects and in multidisciplinary environments.

PO11: Life-Long Learning: Recognize the need for and have the preparation and ability for i) independent and life-long learning ii) adaptability to new and emerging technologies and iii) critical thinking in the broadest context of technological change. (WK8)

Knowledge and Attitude Profile (WK)

- **WK1:** A systematic, theory-based understanding of natural sciences applicable to the discipline and awareness of relevant social sciences.
- **WK2:** Conceptually based mathematics, numerical analysis, data analysis, statistics and formal aspects of computer and information science to support detailed analysis and modelling applicable to the discipline.
- **WK3:** A systematic, theory-based formulation of engineering fundamentals required in the engineering discipline.
- **WK4:** Engineering specialist knowledge that provides theoretical frameworks and bodies of knowledge for the accepted practice areas in the engineering discipline; much is at the forefront of the discipline.
- **WK5:** Knowledge, including efficient resource use, environmental impacts, whole-life cost, re-use of resources, net zero carbon, and similar concepts, that supports engineering design and operations in a practice area.
- **WK6:** Knowledge of engineering practice (technology) in the practice areas in the engineering discipline.
- **WK7:** Knowledge of the role of engineering in society and identified issues in engineering practice in the discipline, such as the professional responsibility of an engineer to public safety and sustainable development.
- **WK8:** Engagement with selected knowledge in the current research literature of the discipline, awareness of the power of critical thinking and creative approaches to evaluate emerging issues.
- **WK9:** Ethics, inclusive behavior and conduct. Knowledge of professional ethics, responsibilities, and norms of engineering practice. Awareness of the need for

diversity by reason of ethnicity, gender, age, physical ability etc. with mutual understanding and respect, and of inclusive attitudes.

Sustainable Development Goals:

SDG1: No Poverty

SDG2: Zero Hunger

SDG3: Good Health and Well-being

SDG4: Quality Education

SDG5: Gender Equality

SDG6: Clean Water and Sanitation

SDG7: Affordable and Clean Energy

SDG8: Decent Work and Economic Growth

SDG9: Industry, Innovation, and Infrastructure

SDG10:Reduced Inequalities

SDG11:Sustainable Cities and Communities

SDG12:Responsible Consumption and Production

SDG13:Climate Action

SDG14:Life Below Water

SDG15:Life on Land

SDG16:Peace, Justice, and Strong Institutions

SDG17:Partnerships for the Goals

SDMCET: Syllabus

SDM College of Engineering and Technology, Dharwad B.E. in Civil Engineering, Scheme of Teaching and Examinations 2026-27 Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2026-27)														
I SEMESTER (Chemistry Cycle)														
Sl. No	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching & Learning Scheme					Examination				Credits
					CI		LI	TW & SL	TH/S	Duration in hours	CI Marks	SEE Marks	Total Marks	
					L	T	P	SL						
1	ASC (IC)	26UMATCV11	Mathematics- I for CV stream	Mathematics	42	0	28	50	120	3	50	100	100	4
2	ASC (IC)	26UCHECV12	Chemistry for CV stream	Chemistry	42	0	28	50	120	3	50	100	100	4
3	ESC	26UCED13	Computer-Aided Engineering Drawing	Mechanical Engineering	28	0	28	34	90	3	50	100	100	3
4	ESC-I	26UESC145	Elements of Civil Engineering	Civil Engineering	42	0	0	48	90	3	50	100	100	3
5	ETC	26UETC151	Introduction to AI and its application	Civil Engineering	42	0	0	48	90	3	50	100	100	3
6	HSMC	26UPWS16	Professional Writing Skills in English	Humanities	14	0	0	16	30	1	50	50	100	1
7	HSMC	26UICO17	Indian Constitution	Humanities	14	0	0	16	30	1	50	50	100	1
8	AEC	26UBEC18	Biology for Engineers	Humanities	14	0	0	16	30	1	50	50	100	1
Total									600				800	20
9	AICTE Activity Points (Students must earn 100 Activity points between 1-8 semester)				Compulsory requirement for the award of the Degree									

TH/S- Total Hours per Semester, TW & SL- Term Work & Self Learning, CI- Course Instructions, LI-Laboratory Instructions.

SDMCET: Syllabus

SDM College of Engineering and Technology, Dharwad B.E. in Civil Engineering, Scheme of Teaching and Examinations 2026-27 Outcome-Based Education (OBE) and Choice-Based Credit System (CBCS) (Effective from the academic year 2026-27)														
II SEMESTER (Physics Cycle)														
Sl. No	Course	Course Code	Course Title	Teaching Department (TD) and Question Paper Setting Board (PSB)	Teaching & Learning Scheme				Examination				Credits	
					CI		LI	TW & SL	TH/S	Duration in hours	CI Marks	SEE Marks		Total Marks
					L	T	P	SL						
1	ASC (IC)	26UMATCV21	Mathematics-II for CV stream	Mathematics	42	0	28	50	120	3	50	100	100	4
2	ASC (IC)	26UPHYCV22	Physics for CV stream	Physics	42	0	28	50	120	3	50	100	100	4
3	ESC	26UESC23	Engineering Mechanics	Civil Engineering	42	0	0	48	90	3	50	100	100	3
4	ESC-II	26UESC242	Introduction to Mechanical Engineering	Mechanical Engineering	42	0	0	48	90	3	50	100	100	3
5	PLC (IC)	26UPLC252	Introduction to C Programming	Civil Engineering	42	0	0	48	90	3	50	100	100	3
6	HSMC	26UENG26	Communicative English	Humanities	14	0	0	16	30	1	50	50	100	1
7	HSMC	26UKSK27/ 26UKBK27	Sanskritika Kannada/ Balake Kannada	Humanities	14	0	0	16	30	1	50	50	100	1
8	AEC	26UIDT28	Innovation and Design Thinking	Civil Engineering	14	0	0	16	30	1	50	50	100	1
Total									600				800	20
9	AICTE Activity Points (Students must earn 100 Activity points between 1-8 semester)				Compulsory requirement for the award of the Degree									

TH/S- Total Hours per Semester, TW & SL- Term Work & Self Learning

Total credits for I year: 40

26UMATCV11

Mathematics - I for CV Stream

(42-0-28-50)4

Total Hours: 120

Course Learning Objective (CLO):

- 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 (1-11)		
		Substantial Level(3)	Moderate Level(2)	Slight Level(1)
CO-1	Apply the knowledge of calculus to solve problems related to polar	-	-	1,2,11
CO-2	Solve the partial differentiation to compute rate of change of multivariate functions.	-	1,2,11	-
CO-3	Analyze the solution of linear and non-linear ordinary differential equations. Solve higher order differential equations	-	1,2,11	-
CO-4	Apply the matrix theory for solving system of linear equations and compute Eigen values and Eigenvectors.	-	-	1,2,11
CO-5	Implement solutions for various mathematical problems using	-	5	1,2,11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	1.4	1.4			2						1.4

Unit I

Polar Curves and Curvature: Polar coordinates, Polar curves, angle between the radius vector and the tangent, angle between two curves. Pedal equations. Curvature and radius of curvature - Cartesian, parametric, polar and pedal forms. **8 hours**

Unit II

Series Expansion, Indeterminate Forms and Multivariable Calculus: Statement and problems on Taylor's and Maclaurin's series expansion for one variable. Indeterminate forms - L'Hospital's rule. Partial differentiation, total derivative - differentiation of composite functions, Jacobian, Maxima and minima for the function of two variables. **9 hours**

Unit III

Ordinary Differential Equations (ODEs) of first order: Linear and Bernoulli's differential equation. Exact and reducible to exact differentialequations with integrating factors

$$\frac{1}{M} \left(\frac{\partial M}{\partial y} - \frac{\partial M}{\partial x} \right) \text{ and } \frac{1}{N} \left(\frac{\partial M}{\partial y} - \frac{\partial M}{\partial x} \right)$$

Orthogonal trajectories, law of natural growth and decay.

8 hours

Unit IV

Ordinary differential equations of higher order: Higher-order linear ordinary differential equations with constant coefficients, homogeneous and non-homogeneous equations (e^{ax}, sin(ax+b), cos(ax+b), xⁿ only), Method of variation of parameters, Cauchy's and Legendre's homogeneous differential equations. Applications: Solving governing differential equations of Mass Spring.**9 hours**

Unit V

Linear Algebra: Elementary row transformation of a matrix, Rank of a matrix. Consistency and Solution of system of linear equations - Gauss-elimination method and approximate solution by Gauss-Seidel method. Eigenvalues and Eigenvectors, Rayleigh's power method to find the dominant Eigenvalue and Eigenvector. Applications: Traffic flow. **8 hours**

List of Laboratory experiments (2 hours/week 14 lab sessions)

1. Introduction, Basics of Python.
2. Programming Structure in Python.
3. 2D plots for Cartesian and polar curves.
4. Finding angle between polar curves.
5. Finding Radius of curvature.
6. Expansion of Taylor's and Maclaurin's series.
7. Finding partial derivatives and Jacobian.
8. Solution of first order and higher order ordinary differential equations.
9. Plotting solutions of ODE.
10. Solution of Differential Equation of Oscillations of Spring with Various Load.
11. Finding rank, reduced echelon form, solving system of linear equations using Gauss elimination method.
12. Solving system of linear equations using Gauss-Seidel method.
13. Determine Eigenvalues and Eigenvectors.
14. Find the Dominant Eigen Value and Corresponding Eigen Vector by Rayleigh Power Method.

Suggested software: Mathematica/MatLab/Python/Scilab

Software used: Python

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. B.V. Ramana, Higher Engineering Mathematics, McGraw-Hill Education, 11th Ed., 2017.

26UCHECV12

Chemistry for CV stream

(42-0-28-50)4

Total Hours: 120

Course Learning Objective (CLO):

- 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 chemical analysis 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 (1-11)		
		Substantial Level(3)	Moderate Level(2)	Slight Level(1)
CO-1	Identify and analyse key concepts and processes in electrochemistry, energy systems and green fuels, and apply them to solve numerical problems and evaluate engineering applications.	1	-	2,3,11
CO-2	Analyse the chemical phenomena and synthesis processes of polymers, composites, and biopolymers and correlate their structure, properties and performance with engineering	1	-	2,3
CO-3	Explain the composition, processing and performance of metals, alloys, nanomaterials, cement and advanced concrete composites for sustainable and innovative	1	6	2,3,11

CO-4	Analyse corrosion mechanisms and metal finishing processes and apply advanced protection and surface engineering techniques to enhance the durability and performance of engineering materials.	1	-	2,3
CO-5	Explain water quantity parameters and apply advanced chemical and instrumental techniques for quantitative assessment of water and industrial effluents.	1	6	2,3,7,11

POs	1	2	3	4	5	6	7	8	9	10	11
MappingLevel	3	1	1	-	-	2	1	-	-	-	1

Unit I

Electrochemistry: Introduction, electrode potential, overview of Nernst equation, concentration cell, numerical problems on concentration cells.

Energy systems: Introduction, principal component of batteries, classification of batteries, characteristics of battery-capacity, power density, cell balancing and cycle life. Construction, working, and applications of Lead-acid and Lithium-ion battery. Fuel cell-definition, advantages and limitations. Construction, working and applications of solid-oxide fuel cells.

Green Fuels: Introduction, production of green hydrogen by photocatalytic water splitting by TiO₂ catalyst and construction, working, advantages and disadvantages of silicon solar cell.

8 hours

Unit II

Polymer: Introduction, Number average and weight average molecular weight of polymer-numerical problems. synthesis, properties and engineering applications of chlorinated polyvinyl chloride (CPVC), polymethyl methacrylate (PMMA), ABS polymer and polycarbonate. Preparation, properties and industrial applications of graphene oxide by Hummer's method.

Composite Polymer: Preparation, properties and applications of Kevlar and carbon fiber.

Biopolymers: Introduction, synthesis, properties and applications of polylactic acid (PLA).

8 hours

Unit III

Metals and Alloys: Introduction, classification of metals: ferrous and non-ferrous. Composition, properties, applications of iron alloys - wrought iron, cast iron, pig iron and steel; aluminium alloys-Duralumin and Magnalumin.

Nanomaterials: Introduction, size dependent properties-surface area, catalytic property and thermal properties. Concrete as composite material, composition of

nano- concrete, synthesis of TiO₂ nanoparticles by sol-gel method for sensor applications.

Cement: Introduction, composition, manufacturing process of cement-wet process, process of setting and hardening of cement, special cement-composition, properties and applications.

Geopolymer concrete: Introduction, mechanism of geopolymerization and manufacturing process of geopolymer concrete.

Piezoelectric cement composites: Introduction, piezoelectric materials in cement composites and its applications in civil engineering. **9 hours**

Unit IV

Corrosion: Introduction, electrochemical theory of corrosion of steel in concrete, factors affecting rate of corrosion-Nature of the metal, nature of the corrosion product, anodic and cathodic area, pH, temperature and conductance of the medium, types of corrosion-differential metal corrosion, differential aeration corrosion-waterline and pitting corrosion and stress corrosion in civil structures. Corrosion control by galvanization, anodization and sacrificial anode method. Corrosion penetration rate (CPR)-introduction and numerical problems.

Metal finishing: Introduction, technological importance of metal finishing, electroplating of chromium-decorative and hard chromium. Electroless plating of copper taking PCB as an example Difference between electro electroless plating. **8**

hours

Unit V

WaterChemistry:Introduction,waterqualityparameters (pH,turbidity,dissolved oxygen, fluoride, nitrate and alkalinity). Estimation of chloride by argentometric method. Estimation of sulphite by gravimetric method. Hard water: Introduction, types, determination of total hardness by EDTA method and numerical problems. Determination of dissolved oxygen by Winkler's method and determination of chemical oxygen demand (COD) and numerical problems.

Analyticaltechniques:Potentiometricsensors:Principle,instrumentationandapplicationinthe estimation of iron in industrial effluents.Conductometric sensors:Principle,instrumentationand application in the determination of acid mixture in industrial effluents. Colorimetric sensor: Principle, instrumentation and application in the estimation of copper in brass alloy. **9**

hours

PRACTICAL MODULE

1. Estimation of total hardness of given water sample by EDTA method.
2. Estimation of percentage of CaO in cement by complexometric method.
3. Determination of chemical oxygen demand (COD) of industrial effluents.

4. Determination copper in brass by iodometric method.
5. Estimation of iron in Haematite ore solution by external indicator method.
6. Estimation of Chloride by argentometric method.
7. Determination of alkalinity of water sample by HCl method.
8. Estimation of acid mixture using conductometric sensor.
9. Estimation of iron in rust sample using potentiometric sensor.
10. Determination of pKa value of vinegar solution using pH sensor.
11. Estimation of copper present in e-waste (WPCB) by optical sensor (Colorimetry).
12. Determination of viscosity coefficient of green fuel using Ostwald's viscometer.
13. Estimation of percentage of iron in steel industry effluent by using optical sensor.
14. Estimation of Li/Na/K by using Flame photometer.

Textbooks:

1. R.V. Gadag and Nityananda Shetty, A Textbook of Engineering Chemistry, I. K. International Publishing house. 2nd Edition, 2016.
2. Dhanpat Rai, Engineering Chemistry: Jain & Jain, Publisher: Publishing Company, ISBN: 978-935316118.
3. Harvey, James A., Smart Materials: Handbook of materials selection, 2002, John Wiley & Sons Canada, Limited, ISBN: 9780471359241.
4. S. K. Malik, Materials Science Publisher: New Age International Publishers, ISBN: 978- 8122418713.
5. Dr. K. K. Rajeshwar, Electrochemical Energy System: (IIT Madras), Publisher: IIT Madras Open Courseware (Free PDF & videos), ISBN: N/A (Open Educational Resource).

26UCED13 Computer Aided Engineering Drawing

(28-0-28-34)3

Total Hours: 90

Course Learning Objective (CLO):

- 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 (1-11)		
	Substantial Level (3)	Moderate Level (2)	Slight Level (1)

CO-1	Generate orthographic projections of points, Lines and planes manually and with Computer-aided tools.	10	1,2,5	6,8,9
CO-2	Generate orthographic projections of solids manually and with Computer-aided tools.	10	1,2,5	6,8,9
CO-3	Develop the lateral surfaces of solids for real-world applications.	10	1,2,5	6,8,9
CO-4	Draw isometric views and convert isometric drawings to orthographic views.	10	1,2,5	6,8,9
CO-5	Create schematics diagrams of models of basic building components.	10	1,2,5	9

POs	1	2	3	4	5	6	7	8	9	10	11
MappingLevel	2	2	--	--	2	1	--	1	1	3	--

Unit I

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).

9 Hours

Unit II

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.

8 Hours

Unit III

Section of Solids: Introduction, Section planes, Sectional views: apparent shapes and true shapes, Sections of right regular prisms, pyramids, cylinders and cones resting with their base on HP. (Concepts only and No Problems for practice)

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. **9 Hours**

Unit IV

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. **8 Hours**

Unit V

Multidisciplinary Applications & Practice:

Building Components Drafting:

Drawing of Basic Building Components: foundations, columns, beams, slabs, walls, doors windows, staircase, assigning materials. Drafting a 2D floor plan for a simple single-storey residential building (1BHK).

Graphs & Charts: Drawing graphs and charts like, Column chart, Pie chart, Line charts, Gantt charts, etc. **8 Hours**

Reference Books:

1. S.N. Lal, & T Madhusudhan: Engineering Visualisation, 1st Edition, Cengage Publication 2022.
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. K S Sai Ram Design of steel structures, , Third Edition by Pearson
5. Nainan P Kurian Design of foundation systems, Narosa publications
6. Bhatt, N.D., Engineering Drawing: Plane and Solid Geometry, 53rd edition, Charotar Publishing House Pvt. Limited, 2019.

26UESC145**Elements of Civil Engineering****(42-0-0-48) 3****Total Hours: 90**

Course Learning Objectives:

- Understand the scope, importance, and multidisciplinary nature of Civil Engineering and its role in infrastructure development and society.
- Explain the principles of sustainability in Civil Engineering, including water conservation, green buildings, and climate-resilient practices.
- Apply the basic concepts of engineering mechanics such as forces, moments, couples, and resultants in solving simple engineering problems.
- Analyze equilibrium conditions of coplanar force systems and solve related numerical problems involving beams, supports, and loading.
- Understand the principles of friction and apply them to practical engineering situations such as inclined planes, ladders, wedges, and belt drives.

Course Outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain the scope of Civil Engineering, its major divisions and the role of Civil Engineers in infrastructure development, transportation, water resources and environmental systems.	1,6	7, 10	-
CO-2	Illustrate the principles of sustainable Civil Engineering practices including rainwater harvesting, green building concepts, sustainable materials, and climate-resilient infrastructure.	7, 6	3, 5	10
CO-3	Apply the concepts of force systems, moments, couples, resolution and composition of forces, and free body diagrams to determine resultants in engineering problems.	1, 2	5	10
CO-4	Analyze the equilibrium of coplanar concurrent and non-concurrent force systems, including beams, supports, and loading conditions, and solve related numerical problems.	1, 2, 5	3	10
CO-5	Apply the principles of friction to engineering systems and solve practical problems involving horizontal planes, inclined planes, ladders, wedges, and belt drives.	1, 2	5, 6,	10

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	3	3	2	-	2.25	2.6	2.5	-	-	1.2	-

Unit I

Introduction to Civil Engineering Civil Engineering for Civilization: Surveying, Fluid Mechanics and Hydraulics, Transportation Engineering, Water Resources Engineering, Environmental Engineering, Geotechnical Engineering, Foundation Engineering, Construction Technology—Built Environment, Infrastructure, Role of Civil Engineer, Roads and Highways, Types of Roads, Classification of Roads by Nagpur Road Plan, Dams, Bridges and types of Bridges.

Infrastructure: Role of Civil Engineer in the Infrastructural Development, Smart city, Safe city, Clean city; Domestic water and wastewater treatment. Projects of national importance (PM GatiShakti National Master Plan (PMGS-NMP), Sagarmala Programme, etc.).

9 Hours

Unit II

Sustainability in Civil Engineering Designing and constructing infrastructure with minimal environmental impact and efficient resource use. Rainwater harvesting methods for water conservation and groundwater recharge. Energy-efficient buildings- natural ventilation, and renewable energy systems. Sustainable construction materials- recycled and low-energy materials. water management. Green building practices, carbon reduction methods, and climate-resilient designs ensure long-term sustainability and environmental protection and Introduction to SDGs. **9**

Hours

Unit III

Equilibrium and Resultant of Force Systems: Basic idealizations, Introduction to SI units, Force and its characteristics, classification of force systems and the principle of transmissibility and superposition of a force. The composition and resolution of forces, and the preparation of free body diagrams. the concepts of moment, principle of moments, and couples with their characteristics. the determination of resultants of coplanar concurrent and non-concurrent force systems, relevant numerical examples for problem-solving practice. **8**

Hours

Unit IV

Equilibrium of coplanar force system: Definition of Equilibrant; Conditions of static equilibrium for Concurrent force systems, Lami's theorem; Numerical problems. Conditions of static equilibrium for non-concurrent force systems. Types of beams, loads and supports, Numerical problems. **8**

Hours

Unit V

Friction: Introduction to friction and its significance in engineering mechanics; classification of friction into static, kinetic, rolling, and belt friction; laws of Coulomb friction; limiting friction, coefficient of friction, and angle of repose; analysis of equilibrium of bodies on horizontal and inclined planes; friction in practical applications such as ladders, wedges, and belt drives; determination of frictional forces in systems subjected to external loads; numerical examples for problem-solving.

8 Hours

Textbooks

1. R. C. Hibbeler, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press, 2016.
2. N H Dubey, Engineering Mechanics - Statics and Dynamics, Tata McGraw Hill, 2013.
3. F P. Beer, E. R Johnston and J T De Wolf, Mechanics of Materials, Tata McGraw-Hill, Seventh Edition, SI Units, 2014.
4. Rangawala S. C. "Engineering Materials", Charotar Publishing House, Anand, India, 2009.
5. B C Punmia, A K Jain and A K Jain, Building Construction, Laxmi Publications (P) Ltd., New Delhi, 2008.
6. H S. Peavy, D R. Rowe, George T, Environmental Engineering, Mc-Graw Hill International Edition, New York, 2000.
7. Bhavikatti S. S., Engineering Mechanics, New Age International, 2019.

26UETC151

Introduction to AI and its Applications

(42-0-0-48) 3

Total Hours:90

Course Learning Objectives:

- 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(1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain the concepts and types of artificial intelligence	-	6	1,8,11
CO-2	Illustrate basic machine learning methods for regression, classification and clustering.	-	3	2,4,5,8,11
CO-3	Illustrate prompt engineering techniques to interact with generative AI tools.	2	3	5,8,11
CO-4	Identify real-world applications across different disciplines.	-	2,3	5,8,11
CO-5	Outline recent trends in artificial intelligence and machine learning.	-	1,5	8,11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	1.5	2	2	1	1.25	2	-	1	-	-	1

Suggested Platforms: ChatGPT for prompt engineering, Jupyter notebook

Contents:

Unit I

Introduction to Artificial Intelligence: Definition and Brief discovery of Artificial Intelligence How Does AI Work? Advantages and Disadvantages of Artificial Intelligence, Types of Artificial Intelligence based on functionalities and capabilities, Augmented Intelligence Vs Cognitive Computing.

Defining Intelligence, Components of Intelligence, AI Agent and types, Uninformed Search Algorithms, and Informed Search Algorithms: Pure Heuristic Search, Best-First Search Algorithm (Greedy Search).

Introduction of Knowledge representation and concept of Knowledge Based Agent, Brief Discussion of Types of Knowledge.

9 Hours

UnitII

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

9 Hours**UnitIII**

Introduction to Prompt Engineering: Introduction and evolution of Prompt Engineering, Types of Prompts, How Does Prompt Engineering Work? The Advantages of Prompt Engineering, The Future of LLM Communication.

Prompt Engineering Techniques for Chat GPT / Perplexity/ Deep seek/ Claude AI, Copilot and practical demonstration in the classroom: Different types of Prompt Engineering Techniques, Zero, One, Few Shot Prompting and Self-Consistency Prompt.

7 Hours**UnitIV**

Recent Trends in AI: Brief reasons for maintaining Ethics in AI, AI as a Service (AlaaS), Vendors of AlaaS, Collaborative systems, Game theory and social sciences, Neuromorphic Computing and its models, Expert System and its functions Artificial Intelligence of Things (AIoT).

8 Hours**UnitV**

Application of AI using Robotics and Drones: Introduction to No Code AI and Low Code 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.

9 Hours**Reference 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.

26UPWS16 Professional writing skills in English (14-0-0-16)1**Total Hours: 30****Course Learning Objective (CLO):**

- 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 Information Transfer Techniques through presentation in different levels.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs(1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Identify the Common Errors in Writing and Speaking.	-	9,11	-
CO-2	Achieve better technical writing and Presentation skills.	-	9,11	-
CO-3	Read Technical proposals properly and write standard technical reports.	9,11	-	-
CO-4	Acquire Employment and Workplace communication skills.	-	9,11	-
CO-5	Learn Effective Presentation Skills	9,11	-	-

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

Unit I

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.

3 Hours

Unit II

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.

2 Hours

Unit III

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.

3 Hours

Unit IV

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. **3 Hours**

Unit V

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.

3 Hours

Reference Books:

1. "Professional Writing Skills in English" published by Fillip Learning – Education (ILS), Bangalore – 2022.
2. Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
3. Wood, Frederick. A Remedial English Grammar for Foreign Students. Macmillan Education, India, 1990.
4. Yadugiri, M A. Making Sense of English - A Textbook of Sounds, Words and Grammar, Viva Books, 2020.

26UICO17

Indian Constitution

(14-0-0-16)1

Total Hours: 30

Course Learning Objective (CLO):

- 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 (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Explain the basic structure of Indian Constitution.	-	-	7
CO-2	Describe the Fundamental Rights and Fundamental Duties present in our constitution.	-	-	7
CO-3	Describe the directive principles of state policy.	-	-	7

CO-4	Explain State Executive & Elections system in India.	-	-	7
CO-5	Describe the Amendments and Emergency Provisionsother important provisions given by the	-	-	7

POs	1	2	3	4	5	6	7	8	9	10	11
MappingLevel	-	-	-	-	-	-	1	-	-	-	-

Unit I

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. **3 hours**

Unit II

Salient features of India Constitution. Preamble of Indian Constitution & Key concepts of the Preamble. Fundamental Rights (FR's) and its Restriction and limitations in different Complex Situations. building. **3 hours**

Unit III

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. **3 hours**

Unit IV

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. **3 hours**

Unit V

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. **2 hours**

Reference Books:

1. "Constitution of India" (for Competitive Exams) - Published by Naidhruva Edutech Learning Solutions, Bengaluru. – 2022.
2. "Constitution of India, Professional Ethics and Human Rights" by Shubham Singles, Charles E. Haries, andet al: published by Cengage Learning India, Latest Edition – 2019.

Course Learning Objective (CLO):

Gain a fundamental understanding of basic biological concepts and their relevance to engineering applications.

Course Outcomes (COs):

Description of the Course Outcome: At the end of the course the student will be able to		Mapping to POs (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Appraise an understanding of the diverse applications of biomolecules.	1	2,3	-
CO-2	Outline the architecture and functioning of the brain, eye, and heart as integral systems in the human body.	2,3	1	-
CO-3	Understand the structure, functions, and bioengineering approaches related to the lungs, kidneys, muscular system, and skeletal system.	-	2,3	1
CO-4	Understand the nature-inspired materials and mechanisms.	-	2,3	1
CO-5	Summarize the latest trends in bioengineering.	2,3	1	-

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	1.8	2.4	2.4	-	-	-	-	-	-	-	-

Course content:

Unit I

Biomolecules and their applications: Carbohydrates, Nucleic acids, Proteins, lipids, and Enzymes.

4 Hours

Unit II

Human organ systems and bio designs: Brain as a CPU system, Eye as a Camera system, Heart as a pump system.

3 Hours

Unit III

Human organ systems and bio-designs – 2: Lungs as purification system, Kidney as a filtration system, Muscular and Skeletal Systems as scaffolds.

2 Hours

Unit IV

Nature-bioinspired materials and mechanisms: Echolocation, Photosynthesis, Bird flying (GPS and aircraft), Shark skin (Friction reducing swimsuits),

Kingfisher beak (Bullet train). Human Blood substitutes.

3

Hours

UnitV

Trends in bioengineering: Bioprinting techniques and materials, 3D printing of ear, bone, and skin. Electrical tongue and electrical nose in food science, Bioimaging and Artificial Intelligence for disease diagnosis. **2 Hours**

Reference Books:

- 1) Human Physiology, Stuart Fox, Krista Rompolski, McGraw-Hill eBook. 16/e Edition, 2022
- 2) Biology for Engineers, Thyagarajan S., Selvamurugan N., Rajesh M.P., Nazeer R.A., Thilagaraj W., Barathi S., and Jaganthan M.K., Tata McGraw-Hill, New Delhi, 2012.
- 3) Biomedical Instrumentation, Leslie Cromwell, Prentice Hall 2011.
- 4) Biology for Engineers, Sohini Singh and Tanu Allen, Vayu Education of India, New Delhi, 2014.
- 5) Bioremediation of heavy metals: bacterial participation, by C R Sunilkumar, N Geetha A. C. Udayashankar Lambert Academic Publishing, 2019.
- 6) Electronic Noses and Tongues in Food Science, Maria Rodriguez Mende, Academic Press, 2016

II Semester

26UMATCV21

Mathematics - II for CV stream

(42-0-28-50)4

Total Hours: 120

Course Learning Objective (CLO):

- 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 (1-11)		
		Substantial Level(3)	Moderate Level(2)	Slight Level(1)
CO-1	Apply the concepts of integral calculus to model and solve problems in engineering applications such as area, volume.	-	-	1,2,11
CO-2	Apply the concepts of partial differential equations and solve problems in engineering.	-	1,2,11	-
CO-3	Apply the concepts of vector calculus and solve problems in engineering.	-	1,2,11	-
CO-4	Apply appropriate numerical methods to find approximate solutions of algebraic, transcendental, and ordinary differential equations and to perform interpolation and numerical integration in engineering contexts.	-	-	1,2,11
CO-5	Implement solutions for various mathematical problems using python.	-	5	1,2,11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	1.4	1.4			2						1.4

Unit I

Integral Calculus and its applications: Multiple Integrals: Evaluation of double and triple integrals, Evaluation of double integral by change of order of integration, changing to polar coordinates. Application to find Area and volume using double integration. Beta and Gamma functions: Definitions, properties, relation between Beta and Gamma functions.

8 hours

Unit II

Partial Differential Equations (PDE): Formation of PDEs 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. Method of Separation of variables. Application of PDE: Derivation of one-dimensional heat equation and wave equation.

9 hours

Unit III

Vector calculus:

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

Vector Integration: Line integrals, work done by a force and flux, Statements of Green's theorem and Stoke's theorem, problems without verification. **8 hours**

Unit IV

Numerical Methods-1: Solution of algebraic and transcendental equations: Regula-Falsi and Newton-Raphson methods, problems. Interpolation: Finite differences, Interpolation using Newton's forward and backward difference formulae, Newton's divided difference formula and Lagrange's interpolation formula. **8 hours**

Unit V

Numerical Methods-2: Numerical integration: Trapezoidal, Simpson's 1/3rd and 3/8th rules. 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, Milne's predictor corrector method. **9 hours**

List of Laboratory experiments (2hours/week, 14 lab sessions)

- 1) Evaluate double integration and compute area and volume.
- 2) Evaluation of improper integrals, Beta and Gamma function.
- 3) Evaluate triple integration and compute volume.
- 4) Finding gradient, divergence and curl.
- 5) Evaluate line integrals.
- 6) Verification of Green's theorem.
- 7) Solution of Lagrange's linear partial differential equations.
- 8) Regula Falsi and Newton Raphson method.
- 9) Interpolation.
- 10) Numerical integration.
- 11) Taylor's method.
- 12) Modified Euler's method.
- 13) Fourth order Runge -Kutta method.

14) Milne's method.

Suggested software: Mathematica/ MatLab/ Python/ Scilab

Software used: Python

Reference books:

1. B.S. Grewal, Higher Engineering Mathematics, Khanna Publishers, 44thEd., 2021.
2. E. Kreyszig, Advanced Engineering Mathematics, John Wiley & Sons, 10thEd., 2018.
3. B.V. Ramana, Higher Engineering Mathematics, McGraw-Hill Education, 11th Ed., 2017.

26UPHYCV22

Physics for CV Stream

(42-0-28-50)4

Total Hours: 120

Course Learning Objective (CLO):

- Physics for Civil stream course designed to deliver the optimum knowledge of the concepts of applied physics highly relevant to the civil engineering students.
- Content explores the fundamental theories; experimental demonstrations and their applications applied to oscillations and waves and application.
- Scope of the curriculum includes the study of Acoustics and safety of civil structure against the natural hazards like earthquake and tsunami etc.
- The subject also deals with various methods of NDT and related instrumentation.
- The subject aims to study different smart materials like dielectric, magnetic piezo electric materials and related equipment.

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-11)		
		Substantial Level(3)	Moderate Level(2)	Slight Level(1)
CO-1	Describe and implement the concepts of oscillatory motion in mechanical systems like springs, beams and real time applications.	1	2	11
CO-2	Determine the elastic properties of material and implement the principle in the development of various engineering structures and to find material strength.	1	2	11
CO-3	Articulate and implement concepts to achieve the best audible effect inside the Hall and get the basic knowledge of radiometry/photometry.	1	2	11

SDMCET: Syllabus

CO-4	Explain the principles involved and various methods perform the non-destructive testing (NDT) and significant applications.	1	2	11
CO-5	Explain the various types of smart materials and their application in sensing and automation applications.	1	2	11

POs	1	2	3	4	5	6	7	8	9	10	11
MappingLevel	3	2	-	-	-	-	-	-	-	-	1

UnitI

Oscillations: Simple harmonic motion (SHM), Differential equation for SHM, Springs: Stiffness factor and its physical significance, Series and Parallel combination of springs (Derivation), Types of springs and their applications. Theory of damped oscillations (Qualitative), Types of damping (Graphical Approach). Engineering applications of Damped oscillations, Theory of forced oscillations, Resonance, Sharpness of resonance. Resonance in LCR Circuits (Qualitative), Numerical Problems.

8 hours

Unit II

Waves and their role in structural behavior: Types of waves, Wave propagation in beams, rods, and slabs, Boundary effects, Wave dispersion, Damping in structures, Energy dissipation techniques in structures, Introduction to earthquakes, General characteristics, P-waves, S-waves, Love waves, and Rayleigh waves, Ground motion and structural response, Site effects and soil-structure interaction, Physics of earthquakes, Richter scale of measurement and earthquake-resistant measures, Tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineering structures to withstand tsunami), Seismometer and Seismograph, Accelerometer.

8

hours

UnitIII

Acoustics, Radiometry and Photometry: 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: Electromagnetic spectrum and classification of radiations Radiation quantities, Spectral quantities, Relation between luminance and Radiant quantities, Reflectance and Transmittance, Photometry (cosine law and inverse square law).

9

hours

UnitIV

Non-Destructive Testing: Introduction to NDT, Need for inspection, Types of inspection system, Benefits of NDT. Visual inspection, Liquid penetration test: Principles surface preparation, penetrate application and development, Eddy

presents testing: Inspection probes, Display methods, Ultrasonic testing: Principle, Generation of Ultrasonic, Probes, and Radiography: Radiation sources, Attenuation of radiation, Shadow formation and distortion, Identification Markers, Numerical Problems. **8 hours**

UnitV

Smart Materials for Sustainable Structures: Types of smart materials, Dielectric materials and application in piezo- electric applications, Magnetic materials and its Magnetostriction property and application, Electrostriction, Electro-rheological, Magneto-rheological, Shape memory alloys, Phase transformation in shape memory alloys, Overview of sensor technology, uses of sensors in intelligent structures, Classification of sensors, Temperature sensor, Vibration Sensor, Strain Gauge sensors, Basic concepts of structural health monitoring.

9 hours

Reference books:

1. A P French, Vibrations and Waves, MIT introductory Physics, 2003.
2. R. K. Gaur and S. L. Gupta, Engineering Physics 2010 edition, Dhanpat Rai Publications Ltd., New Delhi 110002.
3. S L Kakani, Shubra Kakani, Engineering Physics, 3rd Edition, 2020, CBS Publishers and Distributors Pvt. Ltd., 2018.
4. Stein, Seth, and Michael Wyssession. Introduction to Seismology, Earthquakes, and Earth Structure, Blackwell Publishing, 2003.
5. Micheal Bukshtab, Photometry Radiometry and Measurements of Optical Losses, Springer, 2nd edition.

List of Experiments:

1. Study of Forced Mechanical Oscillations and Resonance.
2. Study of the frequency response of Series & Parallel LCR circuits.
3. Determination of effective spring constant of the given springs in series and parallel combinations.
4. Kundt's Dust Tube – Determination of Velocity of Sound.
5. Verification of Inverse Square Law of Intensity of Light.
6. Study on types of damping (Pendulum and Damper).
7. Determination of wavelength of ultrasonic using Ultrasonic Interferometer.
8. Determination of Young's Modulus of the material of the given bar using Single Cantilever.
9. Determination of Rigidity modulus of the Material of the wire using Torsional Pendulum.
10. STEP Interactive Physical Simulations. (Relevant to Theory part).
11. PHET Interactive Simulations (Relevant to Theory part).
12. Interpretation of graphs and images using XRD and SEM.
13. Simple case study on acoustics (Auditorium, Cinema Hall, Etc).
14. Data Analysis using Spread Sheets.

Course Learning Objective (CLO):

- Understand the concepts of centroid, centre of gravity and moment of inertia of plane areas.
- Apply the principles of kinematics and kinetics to analyse the motion of particles and connected systems.
- Analyse plane trusses using standard analytical methods for determination of member forces.
- Understand the behaviour of materials under different types of stresses and strains and apply the basic principles of solid mechanics.
- Develop problem-solving skills in engineering mechanics using mathematical, physical, and engineering fundamentals.

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-11)		
		Substantial Level(3)	Moderate Level(2)	Slight Level(1)
CO-1	Determine the centroid and center of gravity of regular, composite, and built-up plane areas using standard analytical methods.	1, 2	-	10,11
CO-2	Evaluate the second moment of area, polar moment of inertia, radius of gyration, and product of inertia for regular and composite sections.	1, 2	-	10,11
CO-3	Apply the principles of kinematics and kinetics, including D'Alembert's principle, to analyze the motion of particles and connected systems.	1, 2	-	10,11
CO-4	Analyze plane perfect trusses using the method of joints and method of sections to determine member forces.	1, 2	3	10,11
CO-5	Apply the concepts of simple stresses, strains, elastic constants, and thermal effects to analyze structural members under axial loading.	1, 2	-	10,11

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

Unit I

Centroid of Plane areas: Introduction, Centre of gravity of regular geometrical area, centroid by integration, problems on centroids of composite areas and built-up sections.

9 hours

Unit II

Second moment or moment of inertia of an area: Moment of inertia of regular shapes by integration method, Parallel axes theorem and Perpendicular axis theorem, Polar moment of inertia and radius of gyration, product of Inertia, problems on moment of composite areas and built-up sections.

9 hours

Unit III

Kinematics and Kinetics of Particles: Introduction to linear motion of particles; concepts of displacement, speed, velocity, and acceleration; acceleration due to gravity; equations of motion for uniformly accelerated linear motion.

Introduction to dynamics; D'Alembert's principle and its application to dynamic equilibrium of particles; analysis of in-plane motion of connected bodies, including pulleys and simple mechanical systems; numerical examples. **8 hours**

Unit IV

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

8 hours

Unit V

Introduction to Solid Mechanics: Simple Stresses and Strains: Introduction, Assumptions, Properties of materials, Types of stresses and strains, definition and units, Hooke's law, Poisson's ratio, volumetric strain, elastic constants and the relationship among them, Stress–Strain diagrams for ferrous and non-ferrous materials. **8 hours**

Reference Books:

1. R. C. Hibbeler, Engineering Mechanics: Principles of Statics and Dynamics, Pearson Press, 2016.
2. F P. Beer, E. R Johnston and J T De Wolf, Mechanics of Materials, Tata McGraw-Hill, Seventh Edition, SI Units, 2014.
3. Bhavikatti S S, Engineering Mechanics, New Age International, 2019.
4. Ramamruthum and R Narayan, "Theory of structures", Dhanpat Rai Publishing company, 9th Edition, 2014.
5. S. S.Bhavikatti, "Structural analysis Volume 1", Vikas publishing House Pvt. Ltd 5th edition,2021.
6. R Vaidyanathan and P Perumal," Structural analysis vol 1", Laxmi Publications, 3rd edition,2016.
7. Dr. R. K. Bansal, "Engineering Mechanics", Laxmi Publications, 4th edition,2007.

26UESC242**Introduction to Mechanical Engineering****(42-0-0-48)3****Total Hours: 90****Course Learning Objective (CLO):**

- 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 (1-11)		
		Substantial Level(3)	Moderate Level(2)	Slight Level(1)
CO-1	Explain the concepts of Role of Mechanical Engineering and Energy sources.	1	-	2,3
CO-2	Describe the Machine Tool Operations and advanced Manufacturing process.	1	-	2,3
CO-3	Explain the Working Principle of IC engines and EV vehicles.	1	-	2,3
CO-4	Discuss the Properties of Common Engineering Materials and various Metal Joining Processes.	1	-	2,3
CO-5	Explain the Concepts of Mechatronics, Robotics and Automation in IoT.	1	-	2,3

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

Unit I

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

8 hours

Unit II

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. **9**

hours

Unit III

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.

10 hours

Unit IV

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. **8 hours**

Unit V

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. **7**

hours

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 3rd Ed., 2003.
5. Internal Combustion Engines, V. Ganesan, Tata McGraw Hill Education; 4th edition, 2017.

26UPLC252

Introduction to C Programming

(42-0-0-48)3

Total Hours: 90

Course Learning Objective (CLO): 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 (1-11)		
		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	Explain 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 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
Mapping Level	1.8	2	2	-	-	-	-	-	-	-	-

Unit I

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.

8 Hours

Unit II

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

8 Hours

Unit III

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

Applications of arrays: case study with sorting and searching techniques: Bubble sort, LinearSearch. **9Hours**

Unit IV

Functions: Introduction to user defined functions, Function definition, function declaration, function call, return statement, passing parameters to functions, recursive functions. **9**

Hours

Unit V

Strings: String taxonomy, string operations
Pointers: Introduction to Pointers, Declaring Pointer Variables. Structures: Introduction to structures. **8**

Hours

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. Reema Thareja, "Computer fundamentals and Programming in C", Oxford University, 2/E, 2017.

22UENG26

Communicative English

(14-0-0-16)1

Total Hours: 30

Course Learning Objective (CLO): 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 (1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO-1	Apply the Fundamentals of Communication Skills in their Career.	-	9,11	-
CO-2	Identify the nuances of phonetics, intonation and enhance pronunciation skills.	-	9,11	-
CO-3	Communicate basic English grammar and essentials of	9,11	-	-

SDMCET: Syllabus

	language skills as per present requirement.			
CO-4	Acquire vocabulary and language proficiency.	-	9,11	-
CO-5	Adopt the Techniques of Information Transfer through presentation.	9,11	-	-

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

Unit I

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. **3 hours**

Unit II

Introduction to Phonetics: Sounds- Consonants, vowels and diphthongs, Syllables and Structure. Word Accent, Stress Shift and Intonation, Phonetic Transcription, Common Errors in Pronunciation. **3 hours**

Unit III

Vocabulary: Word formation Synonyms, Antonyms, Homophones, Homonyms, Affixes, Abbreviations, Strong and Weak forms of Words, Word pairs, One-Word Substitutes and Error identification. **3 hours**

Unit IV

Grammar: Parts of Speech, Articles and Preposition Tense, Sentences, Kinds of sentences, types of sentences, Transformation. of sentences Question Tags. **2 hours**

Unit V

Communication Skills for Employment: Presentation Skills, Extempore, Public Speaking, Mother Tongue Influence (MTI), Reading and Listening Comprehensions. **3 hours**

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. A Course in Technical English – D Praveen Sam, KN Shoba, Cambridge University Press – 2020.
4. Yadugiri, M A. Making Sense of English - A Textbook of Sounds, Words and Grammar, Viva Books, 2020.

26UKSK27 **ಆಕಾಶವಾಣಿ ಪಾಠಶಾಲೆ/Samskrutika Kannada** **(14-0-0-16)**

1

Total Hours: 30

ಆಕಾಶವಾಣಿ ಪಾಠಶಾಲೆ- ಪಾಠಶಾಲೆ ಸಂಸ್ಥೆ ಆಯಾ ವರ್ಷಕ್ಕೆ ಪಾಠಶಾಲೆ ಸಂಸ್ಥೆ ಆಯಾ ವರ್ಷಕ್ಕೆ «ಆಯಾ ವರ್ಷಕ್ಕೆ»

ಆಕಾಶವಾಣಿ ಪಾಠಶಾಲೆ ಸಂಸ್ಥೆ ಪಾಠಶಾಲೆ ಸಂಸ್ಥೆ

1. «ZÁÿðUÀ¼ÁVgÄÄÅZàJAzÀ PÆÀßQÀ "sÁMé, Á»vÀå ÆÄvVÄÜ
A, ÀìøwAiÄÄ ¥AjZÀAiÄÄ æÀiÁrPÉ£qÄæÀÅzÄÄ. DzsÄÄxPA ¥ÀÆæÀð
æÄÄvÄÄÜ DzsÄÄxPA PÁæÀåUÀ¼ÆÄÄß ¥AjZÀ-Ä, ÄæÀÅzÄÄ.
2. «ZÁÿðUÀ¼À°è Á»vÀå æÄÄvVÄÜ ,AA, ÀìøwAiÄÄ §UEÍ CjæÀÅ °ÁUÀÆ
D, ÀQÛAiÄÄÆÄß æÄÄEr, ÄæÀÅzÄÄ. vÁAwæPA æÀåQÛUÀ¼À ¥AjZÀAiÄÄ
°ÁUÀÆ CæÀö , Ácü¹zÀ «µÄAiÄÄUÀ¼ÆÄÄß ¥AjZÀ-Ä, ÄæÀÅzÄÄ

WÀIPÀ-I

PÀÈÀßqÀ ,ÀÀ,Àìøw ðÄÄvÄÄÛ "sÁµÉ PÄÄjvÁzÀ -ÉÃŘÀUÀ¼ÄÄ

1. PÀÉÁǾIPÀ ,ÀA,Àìøw - æ A¥À ÉÁUÀgÁdAiÀÄå
2. PÀÉÁǾIPÀ KQǾPàgÀt – MAzÀÀ C¥ÀÆªÀǾ ZÀjvÉæ – f. ¢ÉAPÀl,ÀÄ\$âAiÀÄå
3. DqÀ½vÀ “sÁµÉAiÀiÁV PÀÉÀßqÀ–qÁ. J“i. wªÉÄäÃ±À ¢ÀÄvÀÄÛ ¥ÉÆæÃ. «.
PÉÃ±ÀªÀªÀÄÆwǾ 03 Hrs

WÀIPÀ-11

DzsÀÄxPÀ ¥ÀÆªÀđzÀ PÁªÀå "sÁUÀ

æÀZÀ£ÀUÀ¼ÄÄ: §,ÀàÀtÚ, CPÀìÀÄ°ÁzÉ«», C®èàÀÄ¥Àæ¨sÀÄ, DAiÀÄÝQì
 æÀiÁgÀAiÀÄå,

eÉÃqÀgÀzÁ¹àÄÄiÄÄå, DAiÄÄÝQì®PÀìÄÄä

1. QÃvÀð£ÉUÀ¼ÄÄ: CzÀjAzÉÃ£ÄÄ ¥sÀ® EzÀjAzÉÃ£ÄÄ ¥sÀ® -
 ¥ÄÄgÀAzÀgÀzÁ,ÀgÄÄ,
 vÀ®ètÂ,ÀçgÄÄ PÀAqÀå vÁ¼ÄÄ æÄÄ£ÄæÉÄ -
 PÀ£ÀPÀzÁ,ÀgÄÄ
2. vÀvÀé¥ÄzÀUÀ¼ÄÄ: ,Á«gÀ PÉ£qÀUÀ¼Ä ,ÄÄIÄÖ - ²±ÄÄ£Á¼Ä ±Äðe ¥sÀ
- 03 Hrs

WÀIPÀ-III

DzsÀÄxPÀ PÁªÀª "sÁUÀ

1. r«f gÀ³AgÀ ³ÄÄAPÄÄw³ÄÄä£Ä PÄUÄîèÇAzÄ DAiÄÄÝ PÉ®³ÄÄ
 "sÁUÄUÄ¼ÄÄ
2. PÄÄgÄÄqÄÄ PÁAZÁt: ∞ . gÁ. "ÉÄAzÉæ **03 Hrs**

WÀIPÀ-IV

vÁAwæPÀ ¢ÀåQÛUÀ¼À ¥ÀjZÀAiÄ

1. qÁ. ,Àgì.JA.«±ÉéÃ±ÀégÀAiÀÄå: ðÀåQÛ ðÄÄvÄÄÛ LwºÀå – J. Jñ .
ðÄÄÆwðgÁð
2. PÀgÀPÄÄ±À® PÀ´ÉUÀ¼ÄÄ ðÄÄvÄÄÛ ¥ÀgÀA¥ÀgÉAiÀÄ «eÁÕ£À:
PÀjÃUËqÀ ©ÃZÀ£ÀºÀ½î
- 03 Hrs

WÀIPÀ-v

ÁÀØwPÀ, d£À¥ÀzÀ PÀxÉ æÄvÄÛ ¥ÀæÁÀ PÀx£À

1. AiÄÄUÁç: ðÀ,ÄÄzsÉÃAzÀæ
 2. ðÉÄUÁ£É JA\$ Vjd£À ¥ÀðÄðvÀ: ». a. ``ÉÆÃgÀ°AUÀAiÄÄå
- Hrs

02

Course Outcome:

,ÁÀ,ÀøwPÀ PÀ£ÀßqÀ 26UKSK17 ¥ÀoÀå PÀ°PÉAiÀÄ £ÀAvÀgÀ
 «zÁâyðUÀ¼À°è:

ಲ. ಸಂ	ಘಾತ ವಿಷಯ	Mapping to POs(1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
CO1	ಪಾಠ್ಯಕ್ರಮದ ಸಮೀಕ್ಷೆ, ಸಂಶೋಧನೆ ಮತ್ತು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಪಾಠ್ಯಕ್ರಮದ ಬಗ್ಗೆ ಅರಿವು ನೀಡುವ ಕಾರ್ಯಕ್ರಮಗಳನ್ನು ಆಯೋಜಿಸುವುದು.	—	9	11
CO2	ಪಾಠ್ಯಕ್ರಮದ ಸಮೀಕ್ಷೆ ಮತ್ತು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಪಾಠ್ಯಕ್ರಮದ ಬಗ್ಗೆ ಅರಿವು ನೀಡುವ ಕಾರ್ಯಕ್ರಮಗಳನ್ನು ಆಯೋಜಿಸುವುದು. ಪಾಠ್ಯಕ್ರಮದ ಸಮೀಕ್ಷೆ ಮತ್ತು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಪಾಠ್ಯಕ್ರಮದ ಬಗ್ಗೆ ಅರಿವು ನೀಡುವ ಕಾರ್ಯಕ್ರಮಗಳನ್ನು ಆಯೋಜಿಸುವುದು.	—	9	11
CO3	«ಸಂಶೋಧನೆಯು ಸಮೀಕ್ಷೆ ಮತ್ತು ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಪಾಠ್ಯಕ್ರಮದ ಬಗ್ಗೆ ಅರಿವು ನೀಡುವ ಕಾರ್ಯಕ್ರಮಗಳನ್ನು ಆಯೋಜಿಸುವುದು.	—	9	11
CO4	ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಪಾಠ್ಯಕ್ರಮದ ಬಗ್ಗೆ ಅರಿವು ನೀಡುವ ಕಾರ್ಯಕ್ರಮಗಳನ್ನು ಆಯೋಜಿಸುವುದು. ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಪಾಠ್ಯಕ್ರಮದ ಬಗ್ಗೆ ಅರಿವು ನೀಡುವ ಕಾರ್ಯಕ್ರಮಗಳನ್ನು ಆಯೋಜಿಸುವುದು.	—	9	11
CO5	ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಪಾಠ್ಯಕ್ರಮದ ಬಗ್ಗೆ ಅರಿವು ನೀಡುವ ಕಾರ್ಯಕ್ರಮಗಳನ್ನು ಆಯೋಜಿಸುವುದು. ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಪಾಠ್ಯಕ್ರಮದ ಬಗ್ಗೆ ಅರಿವು ನೀಡುವ ಕಾರ್ಯಕ್ರಮಗಳನ್ನು ಆಯೋಜಿಸುವುದು.	—	9	11

POs	1	2	3	4	5	6	7	8	9	10	11
-----	---	---	---	---	---	---	---	---	---	----	----

SDMCET: Syllabus

Mapping Level	-	-	-	-	-	-	-	-	2.0	-	1.0
---------------	---	---	---	---	---	---	---	---	-----	---	-----

Reference Books:

1. **ÀÁ,ÀìøwPÀ PÀ£ÀßqÀ:** qÁ. ».a. "ÉÆÃgÀ°AUÀAiÀÄå ðÄÄvÄÄÛ qÁ. J-ï. ß ðÉÄÄÄ±À. ¥ÀæPÀluÉ: ¥Àæ,ÁgÁAUÀ. «±ÉéÄ±ÀégÀAiÀÄå vÁAwæPÀ «±Àé«zÁå®AiÀÄ, "É¼ÀUÁ«.

26UKBK27ಬಳಕೆಕನ್ನಡ /Balake Kannada (14-0-0-16) 1

Total Hours: 30

Course Objectives/ಬಳಕೆಕನ್ನಡ ' ಪಠ್ಯಕಲಿಕೆಯಉದ್ದೇಶಗಳು :

The course will enable the students,

Description of the Course Outcome:		Mapping to POs(1-11)		
		Substantial Level (3)	Moderate Level (2)	Slight Level (1)
At the end of the course the student will be able to:				
CO1	To Create the awareness regarding the necessity of learning local language for comfortable and healthy life.	-	9	11
CO2	To enable learners to Listen and understand the Kannada language properly.	-	9	11
CO3	To speak, read and write Kannada language as per requirement.	-	9	11
CO4	To train the learners for correct and polite conversation.	-	9	11
CO5	To know about Karnataka state and its language, literature and General information about this state	-	9	11

POs	1	2	3	4	5	6	7	8	9	10	11
Mapping Level	-	-	-	-	-	-	-	-	2.0	-	1.0

Unit-I

Introduction, Necessity of learning a local language. Methods to learn the Kannada language.

Easy learning of a Kannada Language: A few tips. Hints for correct and polite conversation, Listening And Speaking Activities, Key to Transcription.

ವೈಯಕ್ತಿಕ

ಸ್ವಾಮ್ಯಸೂಚಕ /ಸಂಬಂಧಿತಸರ್ವನಾಮಗಳುಮತ್ತುಪ್ರಶ್ನಾರ್ಥಕಪದ

ಗಳು - Personal Pronouns, Possessive Forms, Interrogative words

03Hrs**Unit-II**

ನಾಮಪದಗಳಸಂಬಂಧಾರ್ಥಕರೂಪಗಳು ,
 ಸಂದೇಹಾಸ್ಪದಪ್ರಶ್ನೆಗಳುಮತ್ತುಸಂಬಂಧವಾಚಕನಾಮಪದಗಳು -
 Possessive forms of nouns, debitive question and Relative nouns
 ಗುಣ , ಪರಿಮಾಣಮತ್ತುವರ್ಣಬಣ್ಣವಿಶೇಷಣಗಳು ,
 ಸಂಖ್ಯಾವಾಚಕಗಳು - Qualitative, Quantitative and Colour Adjectives,
 Numerals
 ಕಾರಕರೂಪಗಳುಮತ್ತುವಿಭಕ್ತಿಪ್ರತ್ಯಯಗಳು -
 ಸಪ್ತಮಿವಿಭಕ್ತಿಪ್ರತ್ಯಯ - (ಅ , ಅದು , ಅವು , ಅಲ್ಲಿ) , Predictive forms,
 Locative case. **03Hrs**

Unit-III

ಚತುರ್ಥಿವಿಭಕ್ತಿಪ್ರತ್ಯಯದಬಳಕೆಮತ್ತುಸಂಖ್ಯಾವಾಚಕಗಳು -
 Dative Cases, and Numerals
 ಸಂಖ್ಯಾಗುಣವಾಚಕಗಳುಮತ್ತುಬಹುವಚನನಾಮರೂಪಗಳು - Ordinal numerals
 and Plural markers
 ನ್ಯೂನ /ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳುಮತ್ತುವರ್ಣಗುಣವಾಚಕಗಳು -
 Defective/Negative Verbs & Colour Adjectives. **03Hrs**

Unit-IV

ಅಪ್ಪಣೆ /ಒಪ್ಪಿಗೆ , ನಿರ್ದೇಶನ ,
 ಪ್ರೋತ್ಸಾಹಮತ್ತುಒತ್ತಾಯಾರ್ಥರೂಪಪದಗಳುಮತ್ತುವಾಕ್ಯಗಳು -
 Permission, Commands, encouraging and Urging words (Imperative words and
 sentences).
 ಸಾಮಾನ್ಯಸಂಭಾಷಣೆಯಲ್ಲಿದ್ದೀತಿಯವಿಭಕ್ತಿಪ್ರತ್ಯಯಗಳುಮತ್ತು
 ಏಕಸಂಭವನೀಯಪ್ರಕಾರಗಳು - Accusative Cases and Potential Forms used in
 General Communication.
 'ಇರು ' ಮತ್ತು 'ಇರಲ್ಲ ' ಸಹಾಯಕಕ್ರಿಯಾಪದಗಳು ,
 ಸಂಭಾವ್ಯಸೂಚಕಮತ್ತುನಿಷೇಧಾರ್ಥಕಕ್ರಿಯಾಪದಗಳು - 'Helping Verbs "iru
 and iralla", Corresponding Future and Negation Verbs.
 ಹೋಲಿಕೆ (ತರತಮ), ಸಂಬಂಧಸೂಚಕ ,
 ವಸ್ತುಸೂಚಕಪ್ರತ್ಯಯಗಳುಮತ್ತುನಿಷೇಧಾತ್ಮಕಪದಗಳಬಳಕೆ -
 Comparative, Relationship, Identification and Negation Words. **03Hrs**

Unit-V

ಕಾಲಮತ್ತುಸಮಯಹಾಗೂಕ್ರಿಯಾಪದಗಳವಿವಿಧಪ್ರಕಾರಗಳು - Different
 types of Tense, Time and Verbs.

-ದ್ ,ತ್ , -ತು , -ಇತು , -ಆಗಿ , -ಅಲ್ಲ , ಗ್ , ಕ್ , 'ಇದೆ ' ,
 ಮೊದಲಾದಕ್ರಿಯಾಪ್ರತ್ಯಯಗಳೊಂದಿಗೆಭೂತ ,
 ಭವಿಷ್ಯತ್ಪ್ರತ್ಯಯವರ್ತಮಾನಕಾಲದವಾಕ್ಯರಚನೆ - Formation of Past,
 Future and Present Tense Sentences with Verb Forms.

Kannada Vocabulary List – ಸಂಭಾಷಣೆಯಲ್ಲಿದಿನೋಪಯೋಗಿಕನ್ನಡಪದಗಳು
 Kannada Words in Conversation. **02Hrs**

Reference Books: ವಿಶ್ವವಿದ್ಯಾಲಯನಿಗದಿಪಡಿಸಿದಪಠ್ಯಪುಸ್ತಕ

1. ಪಠ್ಯಪುಸ್ತಕ : ಬಳಕೆಕನ್ನಡ
 ಲೇಖಕರು : ಡಾ . ಎಲ್ . ತಿಮ್ಮೇಶ್
 ಪ್ರಕಟಣೆ : ಪ್ರಸಾರಾಂಗ ,
 ವಿಶ್ವೇಶ್ವರಯ್ಯತಾಂತ್ರಿಕವಿಶ್ವವಿದ್ಯಾಲಯ , ಬೆಳಗಾವಿ .

26UIDT28

Innovation and Design Thinking

(14-0-0-16)1

Total Hours: 30

Course Learning Objective (CLO):

- Apply design thinking and innovation principles to develop efficient systems focusing on product design, process optimization, safety, and sustainability.

Course outcomes:

Description of the Course Outcome: At the end of the course the student will be able to:		Mapping to POs (1-11)		
		Substantial Level(3)	Moderate Level(2)	Slight Level(1)
CO-1	Appreciate various design process procedure.	-	-	3
CO-2	Generate and develop design idea through different technique.	-	-	3
CO-3	Identify the significance of reverse Engineering to Understand products.	-	-	6
CO-4	Strategize technical drawing for design ideas.	-	-	1
CO-5	Assess design thinking process.	-	-	1

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

Unit I

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. **3 hours**

Unit II

Tools for Design Thinking - Real-Time design interaction captures and analysis – Enabling efficient collaboration in digital space– Empathy for design – Collaboration in distributed Design. **3 hours**

Unit III

Design Thinking in IT design - Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping. **3 hours**

Unit IV

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. **3 hours**

Unit V

Design thinking process and social pitch: Innovation showcase, poster design, project pitching with impact for assessment, prototype and sustainability plan.

2 hours

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.