Hyderabad Karnataka Education Society's

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING

Aiwan-E-Shahi Area, Kalaburagi-585102, Karnataka
(An Autonomous Institution Affiliated to VTU, Belagavi.)

Grant-in- Aid Institution
(Government of Karnataka) Accredited by NBA, New Delhi.
Approved by AICTE, New Delhi.

Website: www.pdacek.ac.in
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SCHEME & SYLLABUS (1ST YEAR)

BACHELOR DEGREE IN ENGINEERING

CIVIL ENGINEERING STREAM

(With effect from 2022 Academic Year)

Out Come Based Education With

Choice Based Credit System

PREFACE

Poojya Doddappa Appa College of Engineering, Kalaburagi is the first institution established by the society in 1958. The college has celebrated its golden jubilee year, setting new standards in the field of education and achieving greater heights.

The college started with 50% central assistance and 50% state assistance, with a desire to impart quality technical education to this part of Karnataka State. The initial intake was 120 with degrees offered in three branches of engineering viz, Civil, Mechanical and Electrical Engineering. Now, it houses 12 undergraduate courses, 10 post Graduate courses and 13 recognized research centres, offering Ph.D. programs. All the courses are affiliated to Visveswaraya Technological University, Belagavi.

At present the total intake at UG level is 930 and PG level 184. The college receives grant in aid funds from state government. A number of projects have been approved by MHRD/AICTE, Govt. of India for Research and Modernization of laboratories. The Karnataka State Council for Science and Technology, Govt. of Karnataka is providing financial assistance regularly for the student's projects.

The National Board of Accreditation, New Delhi, has accredited the College twice once in the year 2004 with 09 UG programs out of which 08 programs were accredited for three years and 01 course was accredited for five years. At present the college is reaccredited by National Board of Accreditation for 05 UG programs.

Recognizing the excellent facilities, faculty, progressive outlook, high academic standards and record performance, the VTU Belagavi reposed abundant confidence in the capabilities of the College and conferred Autonomous Status from the academic year 2007-08, to update its own programme and curriculum, to devise and conduct examinations, and to evaluate student's performance based on a system of continuous assessment. The academic programs are designed and updated by a Board of Studies at the department level and Academic Council at the college level. These statutory bodies are constituted as per the guidelines of the VTU Belagavi. A separate examination section headed by a Controller of Examinations conducts the examinations.

One of the unique features of our college is, it is the first college in Karnataka State to start the Electronics and Communication Engineering branch way back in the year 1967, to join NIT Surathkal and IISc, Bangalore. Also, it is the only college in the state and one among the three colleges across the country, offering a course in Ceramic and Cement Technology. This is the outcome of understanding by faculty and management about the basic need of this region, keeping in view of the available raw material and existing Cement Industries.

PDA College of Engineering is one among the top 25 Institutions at National Level and Top Two Institutions at State Level as per ATAL Ranking of Technical Institutions. The rank is awarded for Innovation activities, Publications of faculty and students, Patents, Start-ups, Incubation Centers, reserving the budget for innovation activities, and involvement of Faculty and Students in Innovative and Skill Enrichment Activities.

Vision of the Institution

To be an institute of excellence in technical education and research to serve the needs of the industry and society at local and global levels.

Mission of the Institution

• To provide a high-quality educational experience for students with values and ethics that enables them to become leaders in their chosen professions.

• To explore, create and develop innovations in engineering and science through research and development activities.

• To provide beneficial service to national and multinational industries and communities through educational, technical and professional activities.

A.   Program Outcomes

Engineering Graduates will be able to:

1. **Engineering knowledge**: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. **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.

3. **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 the public health and safety, and the cultural, societal, and environmental considerations.

4. **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.

5. **Modern tool usage**: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. **The engineer and society**: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. **Environment and sustainability**: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. **Ethics**: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. **Individual and team work**: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. **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.

11. **Project management and finance**: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. **Life-long learning**: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

POOJYA DODDAPPA APPA COLLEGE OF ENGINEERING, KALABURAGI
SCHEME OF TEACHING AND EXAMINATION 2022
OUTCOME-BASED EDUCATION(OBE) AND CHOICE BASED CREDIT SYSTEM (CBCS)
(WITH EFFECT FROM THE ACADEMIC YEAR 2022-23)

I Semester CIVIL ENGJINEERING   **Chemistry Group**

Sl.No.	Course Course Code		Course Title	Teaching Dept. / PSB	Theory Lecture	Tutorial	Practical/ Drawing	SDA	Duration in Hours	CIE MARKS	SEE MARKS	TOTAL MARKS	Credits
					L	T	P	S					
1.	*ASC(IC)	22MATC11	Mathematics for Civil Engg. Stream-I	Maths	3	0	2	0	03	50	50	100	04
2.	#ASC(IC)	22CHEC12	Chemistry for Civil Engg. Stream	Chemistry	3	0	2	0	03	50	50	100	04
3.	ESC	22CED13	Computer Aided Engineering Drawing	Civil/Mech Dept.	2	0	2	0	03	50	50	100	03
4.	ESC-I(IC)	22ESC145	Introduction to C Programming	Respective Engg. Dept.	2	0	2	0	03	50	50	100	03
5.	ETC	22ETC15X	Emerging Technology Courses	Any Engg. Dept.	3	0	0	0	03	50	50	100	03
6.	AEC	22ENG16	Communicative English	Humanities	1	0	0	0	1.5	50	50	100	01
7.	HSMS	22ICO17	Indian Constitution	Humanities	1	0	0	0	1.0	50	50	100	01
8.	HSMS	22SFH18	Scientific Foundation of Health	Any Department	1	0	0	0	1.5	50	50	100	01
				TOTAL						400	400	800	20

SDA-Skill Development Activities, **TD/PSB**- Teaching Department / Paper Setting Board, **ASC**-Applied Science Course, **ESC**- Engineering Science Courses, **ETC**-Emerging Technology Course, **AEC**- Ability Enhancement Course, **HSMS**-Humanity and Social Science and management Course, **SDC**- Skill Development Course, **CIE**–Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)
All 01 Credit- courses shall have the SEE of 01 hour 30 Minutes duration and the pattern of the question paper shall be MCQ
*-22MATS21 Shall have the 03 hours of theory examination(SEE), however, practical sessions question shall be included in the theory question papers
#-22CHES22- SEE shall have the 03 hours of theory examination and 02-03 hours of practical examination
ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required experimental learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0),

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II Semester CIVIL ENGJINEERING Physics Group

Sl.No.	Course Course Code		Course Title	Teaching Dept. / PSB	Theory Lecture L	Tutorial T	Practical/ Drawing P	SDA S	Duration in Hours	CIE MARKS	SEE MARKS	TOTAL MARKS	Credits
1.	*ASC(IC)	22MATC21	Mathematics for Civil Engg. Stream-II	Maths	3	0	2	0	03	50	50	100	04
2.	#ASC(IC)	22PHYC22	Physics for Civil Engg. Stream	Physics	3	0	2	0	03	50	50	100	04
3.	ESC	22CIV23	Engineering Mechanics	Civil Engg. Dept.	3	0	0	0	03	50	50	100	03
4.	ESC-II	22ESC242	Introduction to Electrical Engg.	Respective Engg. Dept.	3	0	0	0	03	50	50	100	03
5.	PLC (IC)	22PLC25X	Progrmming Language Courses	Any Engg. Dept.	2	0	2	0	03	50	50	100	03
6.	AEC	22PWS26	Professional Writing Skills in English	Humanities	1	0	0	0	1.5	50	50	100	01
7.	HSMS	22KSK17/27 22KBK17/27	Samskrutika Kannada/ Balake Kannada	Humanities	1	0	0	0	1.5	50	50	100	01
8.	AEC/SDC	22IDT28	Innovation and Design Thinking	Any Department	1	0	0	0	1.5	50	50	100	01
				TOTAL						400	400	800	20

SDA-Skill Development Activities, **TD/PSB**- Teaching Department / Paper Setting Board, **ASC**-Applied Science Course, **ESC**- Engineering Science Courses, **ETC**-Emerging Technology Course, **AEC**- Ability Enhancement Course, **HSMS**-Humanity and Social Science and management Course, **SDC**- Skill Development Course, **CIE**–Continuous Internal Evaluation, **SEE**- Semester End Examination, **IC** – Integrated Course (Theory Course Integrated with Practical Course)
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ESC or ETC of 03 credits Courses shall have only a theory component (L:T :P:S=3:0:0:0) or if the nature the of course required experimental learning syllabus shall be designed as an Integrated course (L:T:P:S= 2:0:2:0),

ESC-I - Engineering Science Courses - I				
Code	Title	L	T	P
22ESC141	Introduction to Civil Engineering	3	0	0
22ESC142	Introduction to Electrical Engineering	3	0	0
22ESC143	Introduction to Electronics Engineering	3	0	0
22ESC144	Introduction to Mechanical Engineering	3	0	0
22ESC145	Introduction to C Programming	2	0	2

ETC-I - Emerging Technology Courses - I				
Code	Title	L	T	P
22ETC15A	Green Buildings	3	0	0
22ETC15B	Introduction to Solar PV Systems	3	0	0
22ETC15C	Renewable Energy Sources	3	0	0
22ETC15D	Introduction to Internet of Things (IoT)	3	0	0
22ETC15E	Introduction to Cyber Security	3	0	0

PLC-I - Programming Language Courses - I				
Code	Title	L	T	P
22PLC15A	Introduction to Web Programming	2	0	2
22PLC15B	Introduction to Python Programming	2	0	2
22PLC15C	Introduction to C++ Programming	2	0	2
22PLC15D	C and UNIX Programming	2	0	2
22PLC15E	Basics of JAVA Programming	2	0	2

The course 22ESC145/245, Introduction to C Programming and all courses under PLC and ETC groups can be taught by faculty of ANY DEPARTMENT

ESC-II - Engineering Science Courses - II				
Code	Title	L	T	P
22ESC241	Introduction to Civil Engineering	3	0	0
22ESC242	Introduction to Electrical Engineering	3	0	0
22ESC243	Introduction to Electronics Engineering	3	0	0
22ESC244	Introduction to Mechanical Engineering	3	0	0
22ESC245	Introduction to C Programming	2	0	2

ETC-II - Emerging Technology Courses - II				
Code	Title	L	T	P
22ETC25A	Green Buildings	3	0	0
22ETC25B	Introduction to Solar PV Systems	3	0	0
22ETC25C	Renewable Energy Sources	3	0	0
22ETC25D	Introduction to Internet of Things (IoT)	3	0	0
22ETC25E	Introduction to Cyber Security	3	0	0

PLC-I - Programming Language Courses - I				
Code	Title	L	T	P
22PLC25A	Introduction to Web Programming	2	0	2
22PLC25B	Introduction to Python Programming	2	0	2
22PLC25C	Introduction to C++ Programming	2	0	2
22PLC25D	C and UNIX Programming	2	0	2
22PLC25E	Basics of JAVA Programming	2	0	2

The course 22ESC145/245, Introduction to C Programming and all courses under PLC and ETC groups can be taught by faculty of ANY DEPARTMENT

MATHEMATICS FOR CIVIL STREAM - I

[As per Choice Based Credit System (CBCS) scheme]
(From the academic year 2022-23)

Course Code	22MATC11	CIE Marks	50
Credits	04	SEE Marks	50
Course Type	Integrated		
Lecture Hours/Week (L-T-P)	3-0-2	Total Marks	100
Total Hours	40 Hours Theory+12 Lab Hours	SEE Hours	03

Course Objectives:

Familiarize the importance of calculus associated with one variable and two variables, the importance of Integral calculus for civil engineering.

Analyze Civil engineering problems applying Ordinary Differential Equations.

Develop the knowledge of Linear Algebra refereeing to matrices.

MODULES	Hours
Module-1 Calculus **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. Simple Problems.**Self-study:** Center and circle of curvature, evolutes and involutes.**Applications:** Applied Mechanics, Structural design and paths, Strength of materials, Elasticity.	**08 Hours**
Module-2 Series Expansion and Multivariable Calculus **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 – Simple 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	**09 Hours**
Module-3 Ordinary Differential Equations (ODEs) of first order **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 $\frac{1}{N}\left(\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}\right)$ and $\frac{1}{M}\left(\frac{\partial N}{\partial x}-\frac{\partial M}{\partial y}\right)$ Orthogonal trajectories and Newton's law ofcooling. **Nonlinear differential equations:** Introduction to general and singular solutions, Solvable for p only, Clairaut's equations, reducible to Clairaut's equations - Problems**.**	**08 Hours**

Modules	Hours
Self-Study: Applications of ODE's 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.	**08 Hours**
Module-4 Integral Calculus **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, Center of gravity. **Applications:** Applications to mathematical quantities (Area, Surface area, Volume), Analysis of probabilistic models.	**08 Hours**
Module-5 Linear Algebra **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. Eigen values 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.	

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	Program to compute surface area, volume and centre of gravity
7	Evaluation of improper integrals
8	Numerical solution of system of linear equations, test for consistency and graphical representation
9	Solution of system of linear equations using Gauss-Seidel iteration
10	Compute eigen values and eigenvectors and find the largest and smallest eigen value by Rayleigh power method

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

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

CO 1	Apply the knowledge of calculus to solve problems related to polar curves
CO 2	Learn the notion of partial differentiation to compute rate of change of multivariate functions
CO 3	Analyze the solution of linear and nonlinear ordinary differential equations
CO 4	Apply the knowledge of multiple integrals to compute area and volume.
CO 5	Make use of matrix theory for solving for system of linear equations and compute eigen values and eigen vectors. Familiarize with modern mathematical tools namely MATHEMATICA/ MATLAB/ PYTHON/SCILAB

CHEMISTRY FOR CIVIL ENGINEERING STREAM

Course Code:	22CHEC12/22	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:2:2:0	Exam Hours	03
Total Hours of Pedagogy	40 Hours Theory + 12 Lab Hours	Credits	04

Pre-requisite

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

Module-1: Structural Materials	
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).	**08 Hours**

Module-2: Energy Conversion and Storage, Corrosion **Energy conversion:** Introduction, construction, working, and applications of Na-ion cell, methanol-oxygen fuel cell. **Storage devices:** Introduction, construction and working of Li-ion battery. **Corrosion:** Introduction, mechanism of electrochemical corrosion with iron as an example, types (differential metal and aeration), Stress corrosion, corrosion control galvanization, anodization and sacrificial anode method. Factors affecting corrosion (EMF, Temperature, pH, relative area of anode and cathode and polarization). **Self-learning:** Corrosion inhibitors.	**08 Hours**
Module-3: Water Technology and Nanotechnology **Water technology:** Introduction, sources and nature of impurities of water, hardness of water, determination of temporary, permanent and total hardness by EDTA method, numerical problems, softening of water by Lime-Soda Process, determination of COD, numerical problems. Purification of water by Reverse osmosis and chlorination methods. **Nanotechnology:** Introduction, properties and engineering application of carbon nanotubes, graphene and nanomaterials for water treatment(metal oxide) **Self-learning:** Introduction, classification, properties and application of silicon carbide. **Module-4:Polymer and Composites**	**08 Hours**
Polymers: Introduction, types of polymerization, free radical mechanism of addition polymerization, techniques of addition polymerization, molecular weight; number average and weight average, numerical problems. Synthesis, properties and industrial applications of polyvinylchloride (PVC) and polystyrene. **Conducting polymers** – synthesis and conducting mechanism of Polyacetylene **Fibers:** Introduction, synthesis, properties and industrial applications of Kevlar and Polyester. **Plastics:** Introduction, synthesis, properties and industrial applications of poly(methyl methacrylate) (PMMA) and Teflon. **Adhesives:** Introduction, synthesis, properties and application of epoxy resin. **Polymer Composite:** Introduction, properties and applications of fibre reinforced polymer composites. **Self-learning: Biopolymer**: Introduction, structural properties, and applications of cellulose and lignin, synthesis of polylactic acid and their application.	**08 Hours**
Module-5:Phase Rule and Analytical Techniques **Phase rule:** Introduction, Definition of terms: phase, components, degree of freedom, phase rule equation. Phase diagram: Two component-lead-silver system. **Analytical techniques**: Introduction, principle, instrumentation of potentiometric sensors; its application in the estimation of iron, Optical sensors (colorimetry); its application in the estimation of the copper, pH-sensor (Glass electrode); its application in the determination of pH of beverages. **Self-learning:** Determination of viscosity of biofuel and its correlation with temperature.	**08 Hours**

PRACTICAL MODULE

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 waste water 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

Course outcome (Course Skill Set)

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

CO 1	Identify the terms and processes involved in scientific and engineering applications
CO 2	Explain the phenomena of chemistry to describe the methods of engineering processes
CO 3	Solve for the problems in chemistry that are pertinent in engineering applications
CO 4	Apply the basic concepts of chemistry to explain the chemical properties and processes
CO 5	Analyze properties and processes associated with chemical substances in multidisciplinary situations

COMPUTER AIDED ENGINEERING DRAWING

Course Code	22 CED13/23	CIE Marks	50
Course Type (Theory/Practical/Integrated)	THEORY	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	42 hours theory	Credits	03

Pre-requisite

Course Objectives

Engineering drawing is an important tool for all Engineers and for many others professionals. It is the language of Engineers. Engineering Drawing communicates all needed information from the engineer who designed a part to the workers who will manufacture it. The aim of the subject is to equip students with the fundamentals of Computer Aided Engineering Drawing and to further the ability to communicate information by graphical means.

MODULES	Teaching Hours
Module-1 **Introduction: for CIE only** 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 (For CIE only)**	**09 Hours**
Module-2 **Orthographic Projection of Solids:** Orthographic projection of right regular solids (**Solids Resting on HP only**): Prisms & Pyramids (square, pentagon, hexagon), Cylinders, Cones, Cubes . **Projections of Frustum of cone and pyramids (For practice only, not for CIE and SEE).**	**09 Hours**

Module-3	
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).**	**08 Hours**

Module-4	
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.	**08 Hours**

Module-5	
Multidisciplinary Applications & Practice (For CIE Only): **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.	**08 Hours**

Text Book
Text book:1) Engineering Drawing - N.D. Bhatt & V.M. Panchal, 48th edition, 2005- Charotar Publishing House, Gujarat. 2) "Computer Aided Engineering Drawing" by Dr. M H Annaiah, Dr C N Chandrappa and Dr B Sudheer Premkumar Fifth edition, New Age International Publishers

Reference Book
1. 1) Computer Aided Engineering Drawing - S. Trymbaka Murthy, - I.K. International Publishing House Pvt. Ltd., New Delhi, 3rd revised edition- 2006. 2) Engineering Graphics - K.R. Gopalakrishna, 32nd edition, 2005- Subash Publishers Bangalore. 3) Fundamentals of Engineering Drawing with an Introduction to Interactive Computer Graphics for Design and Production- Luzadder Warren J., Duff John M., Eastern Economy Edition, 2005- Prentice-Hall of India Pvt. Ltd., New Delhi. 4) A Primer on Computer Aided Engineering Drawing-2006, Published by VTU, Belgaum.

Course Outcomes
At the end of the course the student will be able to:
CO 1. Draw and communicate the objects with definite shape and dimensions
CO 2. Recognize and Draw the shape and size of objects through different views
CO 3. Develop the lateral surfaces of the object
CO 4. Create a Drawing views using CAD software.
CO 5. Identify the interdisciplinary engineering components or systems through its graphical representation.

INTRODUCTION TO C PROGRAMMING

Course Code:	**22ESC145/245**	CIE Marks	50
Course Type (Theory/Practical /Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	30 Hours Theory + 12 Hours Practical	Credits	03

Course Objectives
- Learn the concepts of C Language.
- Develop skills to solve computational problems

MODULES	Teaching Hours
Module-I **Algorithms, Flowcharts, Introduction to C:** Algorithms, Flowcharts, Basic Structure of C Program, Executing a "C" program, Constants, Variables and Data types. **Operators and Expressions, Managing Input/ Output:** Arithmetic operators, relational operators, logical operators, assignment operators, increment/ decrement operators, conditional operators, bit wise operators, special operators. Evaluation of expression, precedence of arithmetic operators, type conversions in expression, operator precedence and associativity. Formatted Input and Output. Examples & exercises.	**09 Hours**
Module-II **Decision making and branching:** Decision Making with if statement, Simple if statement, the if else , nested if statements, the else if ladder, Switch statement, The ? : operator, Unconditional control Statements. **Decision Making and Looping:** While statement, Do-While statement, For statement, jumps in loop. Examples & exercises.	**09 Hours**
Module-III **Arrays:** One dimensional Array, declaration, Initialization, Two dimensional Arrays declaration, Initialization, examples and exercises. **Strings:** Declaring and Initializing String Variables, Reading Strings from Terminal, Writing strings to Screen, Arithmetic Operations on Characters, String-handling functions, examples and exercises.	**08 Hours**
Module -IV **Functions and Recursion :** Need for User-defined Functions, A multi-function program, Elements of User-defined Functions, Definition of functions, Return value and their types, Function calls, Function declaration, Category of functions, Recursion, examples and exercises.	**08 Hours**

Structures and Unions: Defining a Structures, Declaration of Structure variables, Accessing Structure Members, Structure Initialization, Copying and comparing structure variables, operations on individual members, array of structures. **Unions**: Union**,** Size of Structures, bit fields , examples & exercises.	**08 Hours**

Module-V	
Pointers: Introduction, Understanding pointers, Accessing the address of a variable, Declaring pointer variables, Initializing of pointer variables, accessing a variable through its pointer, Examples & exercises. **File Management:** Defining and opening a file, closing file, input, output operations on files, error handling during I/O operations. Examples & exercises.	**08 Hours**

Text book:

1. E. Balagurusamy, "Programming in ANSI C", Tata Mcgraw Hill Education Private Limited– V Edition, 2016

Reference books:

1. Herbert Schildt, **"**Complete Reference in C",Fourth Edition, Tata McGraw Hill Publication, 2017
2. Yashwant P. Kanetakar, "Let us C**",** Fifth Edition, BPB Publications, 2016.
3. Brian W Kernighan & Dennis M Ritchie**"** The C Programming Language", Prentice Hall Publisher, Second Edition, 2004.
4. Behrouz A.Forouzan and Richard F.Gilberg,"Computer Program: A structured programming Approach Using C.", Third edition, Thomson Learning, 2005.

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

CO1	Develop Algorithm and flowcharts and understand the different data types and Operators in C language
CO2	Identify and use proper decision /control constructs for solving different type of problems
CO3	Apply arrays and Strings functions to develop programs for a given problem.
CO4	Demonstrate the use of structures and apply modular programming concepts
CO5	Develop C program for real world problems using pointers and file operations.

List of Programs – 22ESC145/245

Practice Programs:

1. Write a C program using printf statement:
   a) Print your name and Address.
   b) Print the pattern:

```
          +
      +       +
   +     +       +
      +       +
          +
```

2. Write a C Program using Scanf statements
   a) Read int, char and float values from the keyboard and display the same.
3. Write a c program to find :
   i) Area of rectangle
   ii) Area of Square
   iii) Area of circle
4. Write a c program using if , if...else , nested if and else...if ladder.
   i) To find whether number is odd or even.
   ii) To find whether number is +ve or –ve.
   iii) To find largest of two numbers.
   iv) To find largest of three numbers.
5. Write a c program using while , do-while and for looping statement.
   i) Print 1 to 10 numbers using all the three looping statements.
6. Write a c program using arrays:
   i) Read 1 to 10 array elements and display the same.
   ii) Read float elements and display the same.
   iii) Read character and display the same.
7. Write c program using strings:
   i. Read a string from keyboard and display the same.

Programming Assignments:

1. C Program to find Mechanical Energy of a particle using $E = mgh + 1/2\ mv^2$.
2. C Program to convert Kilometers into Meters and Centimeters.
3. C Program To Check the Given Character is Lowercase or Uppercase or Special Character.
4. Program to balance the given Chemical Equation values x, y, p, q of a simple chemical equation of the type: The task is to find the values of constants b1, b2, b3 such that the equation is balanced on both sides and it must be the reduced form.
5. Implement Matrix multiplication and validate the rules of multiplication.
6. Compute sin(x)/cos(x) using Taylor series approximation. Compare you result with the built-in library function. Print both the results with appropriate inferences.
7. Sort the given set of N numbers using Bubblesort.
8. Write functions to implement string operations such as compare, concatenate, string length. Convince the parameter passing techniques.
9. Implement structures to read, write and compute average-marks and the students scoring above and below the average marks for a class of N students.
10. Develop a program using pointers to compute the sum, mean and standard deviation of all elements stored in an array of N real numbers

COMMUNICATIVE ENGLISH

Course Code	22ENG16	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	1:30Min.
Total Hours of Pedagogy	15 Hours Theory	Credits	01

Prerequisite: Nil

Course objectives: The course Communicative English (22ENG16) will enable the students,
1. To know about Fundamentals of Communicative English and Communication Skills in general.
2. To learn sensible writing
3. To impart basic English grammar and essentials of important language skills.
4. To enhance with English vocabulary and language proficiency for better Communication skills.
5. To learn employment communication.

MODULES	Teaching Hours
Module-I **Introduction to Communication English**: Meaning, Definition, Purpose of Communication, Types of Communication, 7c's of communication, Barriers to Communication. Interpersonal Communication Skills – Teamwork – Definition, Advantage and Disadvantages of utilizing the team work, Stages of the development of a team, Characteristic of Successful teams, challenges in team working,	**03 Hours**
Module-II **Nature and Style of sensible writing:** Writing - Purpose of Writing, Clarity in Writing, Principle of Effective Writing. Sensible writing – Types of writing styles, Writing Introduction and Conclusion.	**03 Hours**
Module-III **Basic English Communicative Grammar and Vocabulary PART - I**: Grammar: Basic English Grammar and Parts of Speech, Articles and Preposition. Question Tags, One Word Substitutes. Introduction to Vocabulary - Definition and Importance of vocabulary, All Types of Vocabulary, ways to improve vocabulary – Exercises on it	**03 Hours**
Module-IV **Basic English Communicative Grammar and Vocabulary PART - II**: Words formation - Prefixes and Suffixes -– Exercises, Contractions and Abbreviations. Word Pairs (Minimal Pairs) – Exercises, Homonyms, Homographs, and Homophones -– Exercises, Tense and Types of tenses,	**03 Hours**

MODULES	Teaching Hours
Module-V **Communication Skills for Employment:** What is a presentation – Essential Element of Presentation, Designing and delivering Presentation/Public Speaking, Effective power point presentation, Communication through telephonic, videoconference & Skype. Mother Tongue Influence (MTI), Various Techniques for Neutralization of Mother Tongue Influence.	**03 Hours**

Text Books:

1. Communication Skills by Sanjay Kumar & Pushp Lata, Oxford University Press India Pvt Ltd - 2019.
2. A Textbook of English Language Communication Skills, (ISBN-978-81-955465-2-7), Published by Infinite Learning Solutions, Bengaluru - 2022.
3. Scotofer, contemporary business communication, Biztant ra
4. Chaturvedi P D & Mukesh chaturvedi - Business communication:Concepts, cases & applications-2/e, pearson education.
5. Essential of Business communication – Rajendra Pal and J.S Korlhall – Sultan Chand & Sons, New Delhi.

Reference Books:

1. Technical Communication by Gajendra Singh Chauhan and Et al, (ISBN- 978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised   Edition] - 2019.
2. English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge   University Press – 2018.
3. English Language Communication Skills – Lab Manual cum Workbook, Cengage learning India Pvt Limited [Latest Revised Edition] – (ISBN-978-   93-86668-45-5), 2019.
4. A Course in Technical English – D Praveen Sam, KN Shoba, Cambridge
    University Press – 2020.
5. Practical English Usage by Michael Swan, Oxford University Press – 2016.   6. Business Communication – K.K. Sinha – Galgotio Publishing Company, New
        Delhi.

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

CO 1	Understand and apply the Fundamentals of Communication Skills in their communication skills.
CO 2	Learn sensible writing
CO 3	To impart basic English grammar and essentials of language skills as per present requirement.
CO 4	Understand and use all types of English vocabulary and language proficiency
CO 5	Adopt the Techniques of Information Transfer through presentation.

INDIAN CONSTITUTION

Course Code	22ICO17/27	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	1.0
Total Hours of Pedagogy	15 Hours Theory	Credits	01

Prerequisite: Nil

Course Objectives :

To enable the students to obtain the basic knowledge about Indian Constitution in the following topics:-

■ To know about the basic structure of Indian constitution
■ To know the Fundamental Rights (FR's) & Fundamental Duties (FD's) , And DPSP's of our constitution.
■ To know the State Executive
■ To know about our Union Government
■ To Learn emergency provisions and Elections process/system of India

MODULES	Teaching Hours
Module-I **Introduction to Indian constitution** : The Constituent Assembly of India. Sources and Features of the Indian Constitution. Preamble to the Constitution of India.	**03 Hours**
Module-II **Fundamental rights & duties and Directive Principles of the State Policy** Salient Features of Fundamental Rights and their classification. General exercise of Fundamental Rights and their limitations. Fundamental Duties. and Directive Principles of the State Policy	**03 Hours**
Module-III **The State Executive**: The Governor- Appointment, Powers and Functions of the Governor. The Chief Minister - Appointment, Powers and Functions of CM. The State Council of Ministers and their Functions. The State legislature(MLA) and The State Council(MLC). The High Court of the State - Appointment and Qualifications of High Court Judges., its Powers and Jurisdiction	**03 Hours**
Module-IV **The Union Executive**: The President of India - His Election, Powers and Functions. The Vice-President of India - His Election, qualifications, Powers and Functions. The Supreme Court of India - Appointment and Qualification of Supreme Court Judges and its Powers and Jurisdiction..The Parliament of India. The Prime Minister - His Appointment, Qualification ,Powers and Functions. Union cabinet – Its Functions	**03 Hours**

MODULES	Teaching Hours
Module-V **Emergency Provisions and Election Process** : Different types of Emergencies under Article 352, 356 and 360 of the Constitution of India. The Election Commission of India- its Powers and Functions. The State Election Commission	**03 Hours**

Text Books :

1. An introduction to the constitution of India and Profession Ethics. By B. R. Venkatesh and Merunandan K. B. Publisher : Idea International Publication Bangalore.
2. The Constitution of India and Professional Ethics. By K. R. Phaneesh. Publisher : Sudha Publication Bangalore.
3. Professional Ethics. By S. Chand. Publisher : S. Chand & Company Ltd. Ram Nagar, New Delhi - 110055.

Reference Books :

1. Constitution of India and Professional Ethics
   By : M Raja Ram. Publisher : New Age International(P) Limited, New Delhi.
2. The Constitutional law of India
   By : J.N.Pandhey . Publisher : Central Law agency , Allahabad.

https://legislative.gov.in/constitution-of-india
https://www.constitutionofindia.net/

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

CO 1	Analyse the basic structure of Indian Constitution - Constituent Assembly , Sources, features and preamble to the Constitution of India
CO 2	Describe the Fundamental rights & duties and Directive Principles of the State Policy
CO 3	Understand our State Executive
CO 4	Understand our Union Executive
CO 5	Explain the types of emergencies and election process in India

SCIENTIFIC FOUDATIONS OF HEALTH

Course Code	22SFH18/28	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	
1:30Min Total Hours of Pedagogy	15 Hours Theory	Credits	01

Pre-requisite : NIL

Course Objectives : The course Scientific Foundations of Health (22SFH18/28) will enable the students:

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

MODULES	Teaching Hours
Module-I **Good Health & It's balance for positive mindset:** Health -Importance of Health, Influencing factors of Health, Health beliefs, Advantages of good health, Health & Behavior, Health & Society, Health & family, Health & Personality, Psychological disorders-Methods to improve good psychological health, Changing health habits for good health.	**03 Hours**
Module-II **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.	**03 Hours**
Module-III **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.	**03 Hours**

Module-IV	
Avoiding risks and harmful habits: Characteristics of health compromising behaviors, Recognizing and avoiding of addictions, How addiction develops, Types of addictions, influencing factors of addictions, Differences between addictive people and non addictive people & their behaviors. Effects of addictions Such as..., how to recovery from addictions.	**03 Hours**
Module-V	
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.	**03 Hours**

Text book:

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.

Reference books:

1. Health Psychology (Second edition) by Charles Abraham, Mark Conner, Fiona Jones and Daryl O'Connor – Published by Routledge 711 Third Avenue, New York, NY 10017.
2. HEALTH PSYCHOLOGY (Ninth Edition) by SHELLEY E. TAYLOR - University of California, Los Angeles, McGraw Hill Education (India) Private Limited - Open University Press.
3. SWAYAM / NPTL/ MOOCS/ We blinks/ Internet sources/ YouTube videos and other materials / notes.
4. Scientific Foundations of Health (Health & Welness) - General Books published for university and colleges references by popular authors and published by the reputed publisher.

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

CO1	To understand and analyse about Health and wellness (and its Beliefs) & It's balance for positive mindset.
CO2	Develop the healthy lifestyles for good health for their better future.
CO3	Build a Healthy and caring relationships to meet the requirements of good/social/positive life
CO4	To learn about Avoiding risks and harmful habits in their campus and outside the campus for their bright future.
CO5	Prevent and fight against harmful diseases for good health through positive mindset.

GREEN BUILIDNG

Course Code	22ETC15A/25A	CIE Marks	50
Course Type (Theory/Practical/Integrated)	THEORY	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	42 Hours Theory	Credits	03

Pre-Requisite: NIL

Course objectives: This course will enable students to:
■ Understand the Definition, Concept & Objectives of the terms cost effective construction and green building
■ Apply cost effective techniques in construction
■ Apply cost effective Technologies and Methods in Construction
■ Understand the Problems due to Global Warming · State the Concept of Green Building · Understand Green Buildings

MODULES	Hours
Module-I Environmental implications of buildings energy, carbon emissions, water use, waste disposal. Introduction to green building, benefits, site selection, selection of materials.	**09 Hours**
Module - II Resources, efficiency, Materials impacts increasing energy efficiency, recycling of industrial and building waste, biomass resources for building, use of renewable energy systems and impacts.	**09 Hours**
Module-III Comforts in buildings, thermal, light ventilation in buildings, heat transfer characteristics in buildings, incidence of solar energy in materials for lightening and ventilation comfort.	**08 Hours**
Module -IV Energy conservation, concepts of solar passive cooling and heating of building, low energy cooling, Case studies on residential and commercial buildings	**08 Hours**
Module-V Water conservation, Rain water harvesting: definition, types and advantages, concepts of green composite	**08 Hours**

Text book:

1. K.S. Jagadish, B. U. Venkataramareddy and K. S. Nanjundarao. Alternative Building Materials and Technologies. New Age International, 2007.
2. Michael Bauer, Peter Mösle and Michael Schwarz "Green Building - Guidebook for Sustainable Architecture" Springer, 2010
3. Environmental Engineering vol-II By S.K.Gerg, Khanna publications

Reference books:

1. Osman Attmann Green Architecture Advanced Technologies and Materials. McGraw Hill, 2010. Michael F. Ashby Materials and the Environment, Elsevier, 2009.
3. Jerry Yudelson Green building Through Integrated Design.McGraw Hill, 2009.
4. Mili M. Ajumdar (Ed) Energy Efficient Building in India.Teri and Mnes, 2001 / 2002.
5. Low Energy Cooling For Sustainable Buildings. John Wiley and Sons Ltd, 2009.
6.Green My Homel: 10 Steps to Lowering Energy Costs and Reducing Your Carbon Footprint,by Dennis
C. Brewer, ISBN:9781427798411, Publisher: Kaplan Publishing, Publication Date: October 2008.
7. B. Givoni, Man, Climate and Architecture Elsevier, 1969.
8. T. A. Markus and E. N. Morris Buildings Climate and Energy. Pitman, London, 1980. ArvindKishan et al (Ed)

Course Outcomes

CO1: To understand the Concepts, Benefits, and the materials for Green building.

CO2: To know the energy efficiency, recycling of wastes for Green building.

CO3: To understand the Thermal, Heat Transfer and ventilation of Buildings

CO4: To acquire knowledge of energy conservation in buildings

CO5: To understand the practices for water conservation.

INTRODUCTION TO SOLAR PV SYSTEMS

Course Code	22ETC15B/25B	CIE Marks	50
Course Type (Theory/Practical/Integrated)	THEORY	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	42 Hours Theory	Credits	03

Prerequisite: Students should have the knowledge of
1. Energy Fundamentals.
2. Renewable energy sources

Course objectives.
- Understanding the need of energy and basics of solar radiations.
- Study different solar thermal energy applications.
- Expose to PV Industry and different PV technologies.
- Study Inverters and different components of PV system.
- Study the installation of PV systems and O&M.

MODULES	Hours
Module-I **Solar Resource and Radiation** **An introduction to Energy Sources:** Energy consumption as a measure of Prosperity, world energy futures and energy sources and their availibity. **Solar Resource and Radiation:** Solar resources, Quantifying solar radiation, The effect of the Earth's atmosphere on solar radiation, Sun geometry, Geometry for installing solar arrays.	**09 Hours**
Module - II **Solar thermal energy The solar energy option – An overview of thermal applications:** Devices for thermal collection and storage, thermal applications and some observations.	**09 Hours**
Module-III **PV Industry and Technology** **PV Industry and Technology:** Semiconductor devices, Mainstream technologies, Mono crystalline silicon, Multi crystalline/polycrystalline silicon, Thin film solar cells, Contacts, Buying solar modules, Standards, Certifications, Warranties, Emerging technologies, Dye-sensitized solar cells, Sliver cells, Hetero junction with intrinsic thin layer (HIT) photovoltaic cells, Solar concentrators. **PV Cells, Modules and Arrays:** Characteristics of PV cells, Graphic representations of PV cell performance, Connecting PV cells to create a module, Specification sheets, Creating a string of modules, Creating an array, Photovoltaic array performance, Irradiance, Temperature, Shading.	**08 Hours**
Module -IV **Inverters and Other System Components** **Inverters and Other System Components:** Introduction, Inverters, Battery inverters, Grid-interactive inverters, Transformers, Mainstream inverter technologies,	

MODULES	Hours
String inverters, Multi-string inverter, Central inverter, Modular inverters, Inverter protection systems, Self-protection, Grid protection. Balance of system equipment: System equipment excluding the PV array and inverter, Cabling, PV combiner box, Module junction box, Circuit breakers and fuses, PV main disconnects/isolators, Lightning and surge protection, System monitoring, Metering, Net metering, Gross metering. Mounting Systems: Roof mounting systems, Pitched roof mounts, Pitched roof mounts for tiled roofs, Pitched roof mounts for metal roofs Rack mounts, Direct mounts, Building-integrated systems, Ground mounting systems, Ground rack mounts, Pole mounts, Sun-tracking systems, Wind loading.	08 Hours
Module-V **Installing Grid-connected PV Systems** **Installing Grid-connected PV Systems:** PV array installation, DC wiring, Cabling routes and required lengths, Cable sizing, PV combiner box, System grounding/earthling, Inverter installation, Installation checklist, Interconnection with the utility grid, Required information for installation, Safety. **System Commissioning:** Introduction, Final inspection of system installation, Testing, Commissioning, System documentation. **System Operation and Maintenance:** System maintenance, PV array maintenance, Inverter maintenance, System integrity, Troubleshooting, Identifying the problem, Troubleshooting PV arrays, Troubleshooting underperforming systems, Troubleshooting inverters, Other common problems.	08 Hours

Question paper pattern:
Total ten questions will be asked, two from each module. The student has to answer five questions, selecting at least one from each module.

Reference Books

1. Chetan Singh Solanki, Solar Photovoltaic Technology And Systems - A Manual For Technicians, Trainers And Engineers, PHI Publication New Delhi- 2013 Edition.

2. Geoff Stapleton Susan Neill, Grid-connected Solar Electric Systems: The Earthscan Expert Handbook for Planning, Design and Installation, Routledge; 1st edition 2021.

3. Chetan Singh Solanki, Solar Photovoltaic's: Fundamentals, Technologies And Applications , PHI Publication New Delhi, 3rd Edition

4. GD Rai, Non Convention Sources of Energy, Khanna Publishers, New Delhi, 5th Edition

5..SP Sukhatme, JK Nayak, Solar Energy, TMH Publishing Company limited New Delhi, 3rd Edition

Course outcomes: On completion of the course, the student will have the ability to

CO1	Understand the needs of energy and discuss the solar radiation.
CO2	Appreciate the solar thermal energy applications.
CO3	Discuss the PV technology and Industry.
CO4	Identify the components of PV system and Inverters.
CO5	Understand the installation of PV system and O&M of PV systems

RENEWABLE ENERGY SOURCES

Course Code	22ETC15C/25C	CIE Marks	50
Course Type (Theory/Practical/Integrated)	THEORY	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	42 Hours Theory	Credits	03

Prerequisite: Nil

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.

MODULES	Hours
Module-I **Introduction: INTRODUCTION:** Principles of renewable energy and there types. energy and sustainable development,– Environmental Aspects of Energy Utilization– Renewable Energy Scenario in India and around the World and Potentials – Achievements / Applications	**09 Hours**
Module - II **SOLAR ENERGY:** Solar Radiation – Measurements of Solar Radiation - Flat Plate and Concentrating Collectors - Fundamentals of Solar Photo Voltaic Conversion – Solar PV Power Generation – Solar energy Applications	**09 Hours**
Module-III **WIND ENERGY:** Wind Data and Energy Estimation – Wind Energy Conversion Systems – Performance – Site Selection–– Safety and Environmental Aspects. **BIOMASS ENERGY:** Introduction; Photosynthesis Process; Biofuels; Biomass Resources; Biomass conversion technologies-fixed dome and floating type; Urban waste to energy conversion. Biomass Applications.	**08 Hours**
Module -IV **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, advantages and disadvantage with OTEC.	**08 Hours**
Module-V **Green Energy:** Introduction, Fuel cells: Classification of fuel cells – H_2; Operating principles, Zero energy Concepts. Benefits of hydrogen energy, hydrogen production technologies (electrolysis method only), hydrogen energy storage, applications of hydrogen energy, problem associated with hydrogen energy.	**08 Hours**

Suggested Learning Resources:
Text Books:
1. Nonconventional Energy sources, G D Rai, Khanna Publication, Fourth Edition,
2. Energy Technology, S.Rao and Dr. B.B. Parulekar, Khanna Publication.Solar energy, Subhas P Sukhatme, Tata McGraw Hill, 2nd Edition,1996.

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

Course outcome (Course Skill Set)

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

CO1	Describe the environmental aspects of renewable energy resources. In Comparison with various conventional energy systems, their prospects and limitations.
CO2	Describe the use of solar energy and the various components used in the energy production with respect to applications like-heating, cooling, desalination, power generation.
CO3	Understand the conversion principles of wind and tidal energy
CO4	Understand the concept of biomass energy resources and green energy
CO5	Acquire the basic knowledge of ocean thermal energy conversion and hydrogen energy.

INTRODUCTION TO INTERNET OF THINGS

Course Code	22ETC15D/25D	CIE Marks	50
Course Type (Theory/Practical/Integrated)	THEORY	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	42 Hours Theory	Credits	03

Prerequisite: NIL

Course objectives:
- Understand about the fundamentals of Internet of Things and its building blocks along with their characteristics.
- Understand the recent application domains of IoT in everyday life.
- Gain insights about the current trends of Associated IOT technologoes and IOT Anlaytics

MODULES	Hours
Module-I **Basics of Networking:** Introduction, Network Types, Layered network models **Emergence of IoT:** Introduction, Evolution of IoT, Enabling IoT and the Complex Interdependence of Technologies, IoT Networking Components Textbook 1: Chapter 1- 1.1 to 1.3 Chapter 4 – 4.1 to 4.4	**09 Hours**
Module - II **IoT Sensing and Actuation:** Introduction, Sensors, Sensor Characteristics, Sensorial Deviations, Sensing Types, Sensing Considerations, Actuators, Actuator Types, Actuator Characteristics. Textbook 1: Chapter 5 – 5.1 to 5.9	**09 Hours**
Module-III IoT Processing Topologies and Types: Data Format, Importance of Processing in IoT, Processing Topologies, IoT Device Design and Selection Considerations, Processing Offloading. Textbook 1: Chapter 6 – 6.1 to 6.5	**08 Hours**
Module -IV ASSOCIATED IOT TECHNOLOGIES Cloud Computing: Introduction, Virtualization, Cloud Models, Service-Level Agreement in Cloud Computing, Cloud Implementation, Sensor-Cloud: Sensors-as-a-Service. IOT CASE STUDIES Agricultural IoT – Introduction and Case Studies Textbook 1: Chapter 10– 10.1 to 10.6; Chapter 12- 12.1-12.2	**08 Hours**

MODULES	Hours
Module-V IOT CASE STUDIES AND FUTURE TRENDS Vehicular IoT – Introduction Healthcare IoT – Introduction, Case Studies IoT Analytics Introduction Textbook 1: Chapter 13– 13.1; Chapter 14- 14.1-14.2; Chapter 17- 17.1	**08 Hours**

Text book:
1. Sudip Misra, Anandarup Mukherjee, Arijit Roy, "Introduction to IoT", Cambridge University Press 2021.

Reference:

Reference books:
1. S. Misra, C. Roy, and A. Mukherjee, 2020. Introduction to Industrial Internet of Things and Industry 4.0. CRC Press.
2. Vijay Madisetti and Arshdeep Bahga, "Internet of Things (A Hands-on-Approach)",1st Edition, VPT, 2014.
3. Francis daCosta, "Rethinking the Internet of Things: A Scalable Approach to Connecting Everything", 1st Edition, Apress Publications, 2013.

Course outcome (Course Skill Set)

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

CO1	Describe the evolution of IoT, IoT networking components, and addressing strategies in IoT.
CO2	Classify various sensing devices and actuator types.
CO3	Demonstrate the processing in IoT.
CO4	Explain Associated IOT Technologies
CO5	Illustrate architecture of IOT Applications

INTRODUCTION TO CYBER SECURITY

Course Code	22ETC15E/25E	CIE Marks	50
Course Type (Theory/Practical/Integrated)	THEORY	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	3:0:0:0	Exam Hours	03
Total Hours of Pedagogy	42 Hours Theory	Credits	03

Course objectives·
- To familiarize cybercrime terminologies and perspectives·
- To understand Cyber Offenses and Botnets·
- To gain knowledge on tools and methods used in cybercrimes·
- To understand phishing and computer forensics

MODULES	Hours
Module-I **Cybercrime:** Definition and Origins of the Word, Cybercrime and Information Security, Who are Cybercriminals? Classifications of Cybercrimes, An Indian Perspective, Hacking and Indian Laws., Global Perspectives Textbook:1 Chapter 1 (1.1 to 1.5, 1.7-1.9)	**09 Hours**
Module - II **Cyber Offenses:** **How Criminals Plan Them:** Introduction, How criminals plan the attacks, Social Engineering, Cyber Stalking, Cybercaafe & cybercrimes. **Botnets:** The fuel for cybercrime, Attack Vector. Textbook:1 Chapter 2 (2.1 to 2.7)	**09 Hours**
Module-III **Tools and Methods used in Cybercrime:** Introduction, Proxy Servers, Anonymizers, Phishing, Password Cracking, Key Loggers and Spyways, Virus and Worms, Trozen Horses and Backdoors, Steganography, DoS and DDOS Attackes, Attacks on Wireless networks. Textbook:1 Chapter 4 (4.1 to 4.9, 4.12)	**08 Hours**
Module -IV **Phishing and Identity Theft:** Introduction, methods of phishing, phishing,phising techniques, spear phishing, types of phishing scams, phishing toolkits and spy phishing, counter measures, Identity Theft Textbook:1 Chapter 5 (5.1. to 5.3)	**08 Hours**
Module-V **Understnading Computer Forensics:** Introdcution, Historical Background of Cyberforensics, Digital Foresics, Science, Need for Computer Foresics, Cyber Forensics and Digital Evidence, Digital Forensic Life cycle, Chain of Custody Concepts, network forensics. Textbook:1 Chapter 7 (7.1. to 7.5, 7.7 to 7.9)	**08 Hours**

Text book:1.
1. Sunit Belapure and Nina Godbole, "Cyber Security: Understanding Cyber Crimes, Computer Forensics And Legal Perspectives", Wiley India Pvt Ltd, ISBN: 978-81- 265-21791, 2011, First Edition (Reprinted 2018)

Reference books:

Course outcome (Course Skill Set)

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

CO1	Explain the cybercrime terminologies
CO2	Describe Cyber offenses and Botnets
CO3	Illustrate Tools and Methods used on Cybercrime
CO4	Explain Phishing and Identity Theft
CO5	Justify the need of computer forensics

MATHEMATICS FOR CIVIL ENGINEERING STREAM - II
[As per Choice Based Credit System (CBCS) scheme]
(From the academic year 2022-23)

Course Code	22MATC21	CIE Marks	50
Credits	04	SEE Marks	50
Course Type	Integrated		
Contact Hours/Week (L-T-P)	2-2-2	Total Marks	100
Contact Hours of Pedagogy	42 hours Theory +10 Lab slots	Exam Hours	03

Prerequisite: Nil

Course objectives:

Familiarize Vector calculus essential for civil engineering. ·

Analyze Civil engineering problems by applying Partial Differential Equations. ·

Develop the knowledge of solving civil engineering problems numerically.

MODULES	Hours
Module-1 Vector Calculus **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.	**09 Hours**
Module-2 Ordinary Differential Equations of higher order **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.	**08 Hours**
Module-3 Partial Differential Equations (PDEs) **Importance of partial differential equations for Civil Engineering applications** Formation of PDE's by elimination of arbitrary constants and functions. Solution of nonhomogeneous PDE by direct integration. Homogeneous PDEs involving derivatives	**08 Hours**

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)		
Module-4 Numerical Methods -1 **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. N**umerical 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.	**09 Hours**	
Module-5 Numerical Methods -2 **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	**08 Hours**	

Suggested Learning Resources:
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)
Text Books
   1. **B. S. Grewal**: "Higher Engineering Mathematics", Khanna publishers, 44th Ed., 2021.
   2. **E. Kreyszig**: "Advanced Engineering Mathematics", John Wiley & Sons, 10th Ed., 2018.
Reference Books
   1. **V. Ramana:** "Higher Engineering Mathematics" McGraw-Hill Education, 11th Ed.,   2017
     2. **Srimanta Pal & Subodh C. Bhunia**: "Engineering Mathematics" Oxford University Press,3rd Ed., 2016.
   3. **N.P Bali and Manish Goyal**: "A textbook of Engineering Mathematics" Laxmi Publications, 10th Ed., 2022.
   4. **C. Ray Wylie, Louis C. Barrett:** "Advanced Engineering Mathematics" McGraw – Hill Book Co., Newyork, 6th Ed., 2017.
   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.

6. **H. K. Dass and Er. Rajnish Verma:** "Higher Engineering Mathematics" S. Chand Publication, 3rd Ed., 2014.
7. **James Stewart: "**Calculus" Cengage Publications, 7th Ed., 2019.
8. **David C Lay:** "Linear Algebra and its Applications", Pearson Publishers, 4th Ed., 2018.
9. **Gareth Williams:** "Linear Algebra with applications", Jones Bartlett Publishers Inc., 6th Ed., 2017.

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

CO1	Understand the applications of vector calculus refer to solenoidal, irrotational vectors, line integral and surface integral.
CO2	Analyze the solution of higher order ordinary differential equations.
CO3	Demonstrate partial differential equations and their solutions for physical interpretations.
CO4	Apply the knowledge of numerical methods in solving physical and engineering phenomena.
CO5	Get familiarize with modern mathematical tools namely Mathematica/MatLab/Python/Scilab

Practical Module

1. Finding gradient, divergent, curl and their geometrical interpretation

2. Verification of Green's theorem

3Solutions of Second-order ordinary differential equations with initial/boundary conditions

4. Solution of a differential equation of oscillations of a spring/deflection of a beam with

different loads

5. Solution of one-dimensional heat equation and wave equation

6. Solution of algebraic and transcendental equations by Regula-Falsi and Newton-Raphson method

7. Interpolation/Extrapolation using Newton's forward and backward difference formula

8. Computation of area under the curve using Trapezoidal, Simpson's $(1/3)^{rd}$ and $(3/8)^{th}$ rule

9. Solution of ODE of first order and first degree by Taylor's series and Modified Euler's   method

10. Solution of ODE of first order and first degree by Runge-Kutta 4th order and Milne's predictor-corrector method

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

PHYSICS FOR CIVIL ENGINEERING STREAM

Course Code:	**22PHYC12/22**	CIE Marks	50
Course Type (Theory/Practical/Integrated)	Integrated	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P: S)	3:0:2:0	Exam Hours	03
Total Hours of Pedagogy	40 hours Theory + 12 Hours Lab	Credits	04

Prerequisite:
Basics of Oscillations, Elasticity, Stress & Strain,
Basics of Sound, Waves & light properties, Properties of light. Oscillations.

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 disaster and safety

Modules	Teaching Hours
Module-1 **Module -I: Oscillations and Shock waves:** **Oscillations:** Simple Harmonic motion (SHM), Differential equation for SHM (No derivation), Sprigs: Stiffness Factor and its Physical Significance, Series and Parallel combination of springs (Derivation), Types of Springs and their applications. Theory of Damped oscillations (Qualitative), Types of Damping (Graphical Approach). Engineering applications of Damped oscillations, Theory of Forced oscillations (Qualitative), Resonance, Sharpness of resonance. Numerical Problems. **Shock waves:** Mach number and Mach Angle, Mach Regimes, Definition and Characteristics of Shock waves, Construction and working of Reddy Shock tube, Applications of Shock Waves, Numerical problems. **Pre-requisites: Basics of Oscillations** **Self-learning: Simple Harmonic motion, Differential equation for SHM**	**08 Hours**
Module-2 **Elasticity** Stress-Strain Curve, Stress hardening and softening. Elastic Moduli, Poisson's ratio, Relation between Y, n and $\acute{o}$ (with derivation), mention relation between K, Y and $\acute{o}$, 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. **Pre requisites: Elasticity, Stress & Strain Self-learning: Stress-Strain Curve**	**08 Hours**

Module-3	
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:** Radiation Quantities, Spectral Quantities, Relation between luminance and Radiant quantities, Reflectance and Transmittance, Photometry (cosine law and inverse square law). **Prerequisites: Basics of Sound, Waves & light properties. Self-learning: Introduction to acoustics.**	**08 Hours**
Module-4	
Photonics: **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 **re requisite: Properties of light.** **Self-learning: Total Internal Reflection.**	**08 Hours**
Module-5	
Natural hazards and Safety Introduction, Earthquake, (general characteristics, Physics of earthquake, Richter scale of measurement and earth quake resistant measures), Tsunami (causes for tsunami, characteristics, adverse effects, risk reduction measures, engineering structures to withstand tsunami), Landslide (causes such as excess rain fall, geological structure, human excavation etc., types of land slide, adverse effects, engineering solution for landslides). Forest Fires and detection using remote sensing. Fire hazards and fire protection, fire-proofing materials, fire safety regulations and firefighting equipment-Prevention and safety measures. Numerical Problems. **Pre requisite: Oscillations. Self-learning: Richter scale.**	**08 Hours**

Course outcome (Course Skill Set)
At the end of the course the student will be able to:
   CO1 **Elucidate** the concepts in oscillations, waves, elasticity and material failures
   CO2 **Summarize** concepts of acoustics in buildings and explain the concepts in radiation and photometry
   CO3 **Discuss** the principles photonic devices and their application relevant to civil engineering.
   CO4 **Describe** the various natural hazards and safety precautions.
   CO5 **Practice** working in groups to conduct experiments in physics and **perform** precise and honest measurements.	

Laboratory Component:
Any Ten Experiments have to be completed from the list of experiments
Note: The experiments have to be classified into
  (a) Exercise
  (b) Demonstration
  (c) Structured Inquiry
  (d) Open Ended
Based on the convenience classify the following experiments into 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 :
17. Fly wheel
18. Interference of air wedge
(https://phet.colorado.edu/en/simulations/filter?subjects=physics&type=html,prototype)

ENGINEERING MECHANICS

Course Code	22CIV13/23	CIE Marks	50
Credits	03	SEE Marks	50
Course Type	Theory		
Contact Hours/Week (L-T-P)	2-2-0-0	Total Marks	100
Contact Hours of Pedagogy	42 hours Theory	Exam Hours	03

Prerequisite: Physics and Mathematics

Course Learning Objectives:
To enable the student to acquire the knowledge in the following topics

1) Understanding and solving the problems involving forces, loads and reactions, Moments and its applications of concurrent force system.
2) Solving the problems of couples and equilibrium of bodies.
3) To determine support reactions and friction of rigid bodies on horizontal and inclined planes.
4) To determine the center of gravity and moment of inertia of planar sections.
5) To study the concept of work, power &energy.

MODULES	Teaching Hours
Module-I Introduction to Engineering Mechanics, force Systems, Basic concepts, Particle equilibrium; Rigid Body equilibrium; System of Forces; Coplanar Concurrent Forces, Composition and resolution of force systems, Resultant force, Moment of Forces and its Application; law of transmissibility of forces, Application based numerical examples	**10 Hours**
Module-II Varignon's theorem of moments Couple system, equivalent force couple system, composition of coplanar non concurrent force system, Resultant of Force System, Equilibrium of System of Forces, Free body diagrams, Equations of Equilibrium of Coplanar Systems and conditions of equilibrium law of superposition of forces. Application based Numerical examples	**10 Hours**
Module-III Types of supports, types of loads, concept of statically determinate and indeterminate beams, support reactions for statically determinate beams. Friction, Types of friction, Limiting friction, Laws of Friction, Static and Dynamic Friction; Impending motion on horizontal and inclined planes, wedge friction, ladder friction. Application based Numerical examples	**10 Hours**

Module-IV	
Centroid of plane figures, Centroid of simple figures from first principle, centroid of composite sections; Centre of Gravity and its implications; locating the centroid of triangle, semicircle, quadrant of a circle and sector of a circle, centroid of the simple built sections & composite sections, Moment of inertia concept, Moment of inertia of plane sections from first principles, Theorems of moment of inertia, Moment of inertia of standard sections and composite sections. Numerical examples	**10 Hours**
Module-V	
Work, Power & Energy, Introduction, Work of a force, Energy of a particle, principle of work & energy for a system of particles, Potential energy and conservative forces, principles of conservation of energy, Power. Application based Numerical example	**10 Hours**

Text book:

  Text Books:
 1. S.S.Bhavikatti,"Elementsofcivilengineering",Vikaspublishinghouse Pvt. Ltd., New Delhi.
 2.Jagadeesh T.R. and Jayaram, "Elements of civil engineering", Sapna Book House,Bangalore.
 3. A.K. Tayal, "Engineering mechanics (Statics & Dynamics)", Ninth edition, Umesh publications, New Delhi.

Reference books:
   1. Timoshenko and Young,Engineering Mechanics",McGraw Book Company, New Delhi.
   2. Ferdinand P. Beer and E. Russel Johnston Jr., "Mechanics for Engineers: Statics" McGraw Book Company, NewDelhi.
   3. K.L. Kumar, "Engineering Mechanics", Tata-McGraw-Hill Publishing company, New Delhi

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

CO1	Determine the resultant of coplanar concurrent force system
CO2	Determine the resultant of non-concurrent force system and analyze the equilibrium of forces
CO3	Determine support reactions and apply of laws of friction for solving engineering problems
CO4	Determine the center of gravity and moment of inertia of plane figures
CO5	Solve the numerical on work, power and energy

INTRODUCTION TO ELECTRICAL ENGINEERING

Course Code	22ESC142/242	CIE Marks	50
Credits	03	SEE Marks	50
Course Type	Theory		
Contact Hours/Week (L-T-P)	3-0-0-0	Total Marks	100
Contact Hours of Pedagogy	42 hours Theory	Exam Hours	03

Prerequisite: Students should have the knowledge of

1. Ohms Law, Kirchhoff's Current and Voltage Law.

2. Fundamentals of AC and DC Circuits.

3. Basics of Magnetism.

Course Objectives

1. Understanding the concept and analysis of Single phase and Three phase AC circuits.

2. Study of construction and performance analysis of single phase transformer.

3. Study of construction and working principle of DC machines

4. Study of construction and working principle of Three phase AC Machines.

5. Study of Power Generation stations, Tariff, measuring instruments and electric safety measures.

MODULES	Hours
Module-I **Introduction:** Conventional and non-conventional energy resources; **Power Generation:** Hydel, Nuclear, Solar & wind power generation (Block Diagram approach). **Electromagnetism:** Faraday Laws of Electromagnetic Induction, Fleming's rules, Lenz's law, types of EMF and numerical.	**8 hrs**
Module-II **A.C. Fundamentals:** Equation of AC Voltage and current, waveform, time period, frequency, amplitude, phase, phase difference, average value, RMS value, form factor, peak factor. (only definitions) Voltage and current relationship with phasor diagrams in R, L, and C circuits. Concept of Impedance. Analysis of R-L, Active power, reactive power and apparent power. Concept of power factor. (Simple Numerical). **Three Phase Circuits:** Advantages, three phase connections (Star & Delta) (Excluding Derivations).	**8 hrs**
Module-III **DC Machines:** **DC Generator**: Principle of operation, constructional details, induced emf expression, types of generators. Relation between induced emf and terminal voltage. Simple numerical. **DC Motor:** Principle of operation, back emf and its significance. Torque equation, types of motors, Applications of DC motors. Simple numerical. 3-point starter.	**8 hrs**

	Module-IV	
	Transformers: Necessity of transformer, principle of operation, Types and construction of singlephase transformers, EMF equation, losses, variation of losses with respect to load. Efficiency and simple numerical. Three-phase induction **Motors:** Concept of rotating magnetic field, Principle of operation, constructional features of motor, types – squirrel cage and wound rotor. Slip and its significance simple numerical.	**8 hrs**

	Module-V	
	Domestic Wiring: Requirements, Types of wiring: casing, capping. Two way and three way control of load. **Electricity Bill**: Power rating of household appliances including air conditioners, PCs, laptops, printers, etc. Definition of "unit" used for consumption of electrical energy, two-part electricity tariff, calculation of electricity bill for domestic consumers. **Equipment Safety measures:** Working principle of Fuse and Miniature circuit breaker (MCB), merits and demerits. **Personal safety measures:** Electric Shock, Earthing and its types, Safety Precautions to avoid shock.	**8 hrs**

Question paper pattern: Total ten questions will be asked,two from each module. The student has to answer five questions, selecting at least one from each module.

Reference books:
1. J P Tiwari," Basic Electrical Engineering", New age Publications, 2nd edition, 2011.
2. Rajendra Prasad "Fundamentals of Electrical Engineering", PHI 3rd edition, 2014.
3. B L Theraja& A K Theraja" Electrical Technology", Vol 1 , 2nd edition.
4. B L Theraja& A K Theraja" ABC of Electrical Engineering", 2nd edition.
5. D.P. Kothari and Nagrath "Theory and Problems in electrical Engineering", PHI edition 2011.
6. V. N. Mittal and Arvind Mittal;, " Basic Electrical Engineering" McGraw Hill.
7. R.V. Srinivasa Murthy "Basic Electrical Engineering" Sanguine Technical Publisher2004.

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO's	Course Outcome (CO)
22ESC142/242	**CO1**	Understand the concepts of various energy sources and Electric circuits.
	CO2	Apply the basic Electrical laws to solve circuits.
	CO3	Discuss the construction and operation of various Electrical Machines.
	CO4	Identify suitable Electrical machine for practical implementation.
	CO5	Explain the concepts of electric power transmission and distribution, electricity billing, circuit protective devices and personal safety measures.

PROFESSIONAL WRITING SKILLS IN ENGLISH

Course Code	22 PWS 26	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	1:30Min
Total Hours of Pedagogy	15 Hours Theory	Credits	01

Prerequisite: NIL

Course objectives:

The course Communicative English (22PWS26) will enable the students
1. To Identify the Common Errors in Writing and Speaking of English.
2. To Learn effective writing.
3. To read Technical proposals properly and make them to write good technical reports.
4. To Acquire Employment communication skills.
5. To Acquire communication skills at Workplace

MODULES	Teaching Hours
Module-I **Identifying Common Errors in Writing and Speaking English:** Common errors identification in parts of speech, Use of verbs and phrasal verbs, Auxiliary verbs and their forms, Subject Verb Agreement (Concord Rules), Common errors in Subject-verb agreement, Sequence of Tenses and errors identification in Tenses. Words Confused/Misused.	**03 Hours**
Module-II **Effective Writing:** Importance of Proper Punctuation, Precise writing and Techniques in Essay writing, Better writing using personal Experiences – Describing a person, situation, memorable events etc…. Sentence arrangements and Corrections activities. Misplaced modifiers, Collocations, Word Order.	**03 Hours**
Module-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 and basic principles of technical writing. Grammar – Cloze Test and Theme Detection Exercises	**03 Hours**
Module-IV **Professional Communication for Employment:** Writing different types of letters – writing for employment, joining letter, complaints & follows up, Enquiries, representation etc. Writing Curriculum Vitae(CV), Official Communication – E-mail & Social Media	**03 Hours**

MODULES	Teaching Hours
Module-V **Professional Communication at Workplace:** Group Discussion – Do and Don't in Group discussion. Debate – Do and Don't in Debate. Group Communication- Meetings, Notice, Planning Meetings, objectives, leading meetings, Minutes of meeting, press conference. Interview – candidates preparation, grooming and Just A Minute (JAM). Speaking for better communication – Speaking about yourself.	**03 Hours**

Text Books:

1."Professional Writing Skills in English" published by Fillip Learning – Education (ILS), Bangalore – 2022. 2)
2."Functional English" (As per AICTE 2018 Model Curriculum) (ISBN-978-93-5350-047-4) Cengage learning India Pvt Limited [Latest Edition 2019].
3.Murphy – Effective Business Communication – Mc Graw Hill.
4.Nageshwar Rao and Rajendra Das – Business Skills – HPH.
5.Advance Business Communcation – Penrose, Rasberry, Myers, 5/e, cengage learning 2004.
6.Prasad P. Communication Skills, S.K. Kataria & Sons.

Reference Books:

1.English for Engineers by N.P.Sudharshana and C.Savitha, Cambridge University Press – 2018.
2.Technical Communication by Gajendra Singh Chauhan and Et al, (ISBN-978-93-5350-050-4), Cengage learning India Pvt Limited [Latest Revised Edition] - 2019.
3.Technical Communication – Principles and Practice, Third Edition by Meenakshi Raman and Sangeetha Sharma, Oxford University Press 2017.
4. High School English Grammar & Composition by Wren and Martin, S Chandh & Company Ltd – 2015.
5.Effective Technical Communication – Second Edition by M Ashraf Rizvi, McGraw Hill Education (India) Private
6.Mc Grath – Basic Mangerial Skills – New Delhi – Prentic Hall India learning pvt ltd.
7.Business Communcation – K.K. Sinha – Galgotio Publishing Company, New Delhi.
8.Sen, leena Communication Skills, Prentice Hall of India, New Delhi.

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

CO1	To understand and identify the Common Errors in Writing and Speaking.
CO2	To learn effective writing.
CO3	To read Technical proposals properly and make them to Write good technical reports.
CO4	Acquire Employment and Workplace communication skills.
CO5	Acquire communication skills at workplace

ಸಾಂಸ್ಕೃತಿಕ ಕನ್ನಡ - ಕನ್ನಡ ಬಲ್ಲ ಮತ್ತು ಕನ್ನಡ ಮಾತೃಭಾಷೆಯ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಕ್ರಮ

Subject Code	Subject	Stream	Th– Tut-Pr	Credits
22KSK17 / 27	**SAMSKRUTHIKA KANNADA**	**Humanities and Social Sciences (H.S.S)**	**1 - 0 - 0**	**01**

CIE : 50   **SEE : 50**   **SEE : 1 hours 30 Minutes**   **Total : 15 Hours**

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 ಪರಿಚಯಿಸಿವುದು.
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.

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. ಎ. ಕೇಶವಮೂರ್ತಿ

ಘಟಕ - 2   ಆಧುನಿಕ ಪೂರ್ವದ ಕಾವ್ಯ ಭಾಗ   (03 hours of pedagogy)
1. ವಚನಗಳು : ಬಸವಣ್ಣ, ಅಕ್ಕಮಹಾದೇವಿ, ಅಲ್ಲಮಪ್ರಭು, ಆಯ್ದಕ್ಕಿ ಮಾರಯ್ಯ, ಜೇಡರದಾಸಿಮಯ್ಯ, ಆಯ್ದಕ್ಕಿ ಲಕ್ಕಮ್ಮ.
2. ಕೀರ್ತನೆಗಳು : ಅದರಿಂದೇನು ಫಲ ಇದರಿಂದೇನು ಫಲ – ಪುರಂದರದಾಸರು ತಲ್ಲಣಿಸದಿರು ಕಂಡ್ಯ ತಾಳು ಮನವೇ - ಕನಕದಾಸರು
3. ತತ್ವಪದಗಳು : ಸಾವಿರ ಕೊಡಗಳ ಸುಟ್ಟು - ಶಿಶುನಾಳ ಶರೀಫ

ಘಟಕ -3   ಆಧುನಿಕ ಕಾವ್ಯಭಾಗ   (03 hours of pedagogy)
1. ಡಿ.ವಿ.ಜಿ 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. ಮೇಗಾನೆ 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:

CO1	ಕನ್ನಡ ಭಾಷೆ, ಸಾಹಿತ್ಯ ಮತ್ತು ಕನ್ನಡದ ಸಂಸ್ಕೃತಿಯ ಕುರಿತು ಅರಿವು ಮೂಡಿರುತ್ತದೆ.
CO2	ಕನ್ನಡ ಸಾಹಿತ್ಯದ ಆಧುನಿಕ ಪೂರ್ವ ಮತ್ತು ಆಧುನಿಕ ಕಾವ್ಯಗಳನ್ನು ಸಾಂಕೇತಿಕವಾಗಿ ಕಲಿತು ಹೆಚ್ಚಿನ ಓದಿಗೆ
	ಮತ್ತು ಜ್ಞಾನಕ್ಕೆ ಸ್ಫೂರ್ತಿ ಮೂಡುತ್ತದೆ.
CO3	ವಿದ್ಯಾರ್ಥಿಗಳಲ್ಲಿ ಸಾಹಿತ್ಯ ಮತ್ತು ಸಂಸ್ಕೃತಿಯ ಬಗ್ಗೆ ಅರಿವು ಹಾಗೂ ಆಸಕ್ತಿಯನ್ನು ಹೆಚ್ಚಾಗುತ್ತದೆ.
CO4	ತಾಂತ್ರಿಕ ವ್ಯಕ್ತಿಗಳ ಪರಿಚಯ ಹಾಗೂ ಅವರುಗಳ ಸಾಧಿಸಿದ ವಿಷಯಗಳನ್ನು ತಿಳಿದುಕೊಂಡು ನಾಡಿನ ಇನ್ನಿತರ ವ್ಯಕ್ತಿಗಳ ಬಗ್ಗೆ ತಿಳಿದುಕೊಳ್ಳಲು ಕೌತುಕತೆ ಹೆಚ್ಚಾಗುತ್ತದೆ.
CO5	ಸಾಂಸ್ಕೃತಿಕ, ಜನಪದ ಹಾಗೂ ಪ್ರವಾಸ ಕಥನಗಳ ಪರಿಚಯ ಮಾಡಿಕೊಡುವುದು.

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.

ಬಳಕೆ ಕನ್ನಡ - baLake Kannada (Kannada for Usage)
ಕನ್ನಡ ಕಲಿಕೆಗಾಗಿ ನಿಗದಿಪಡಿಸಿದ ಪಠ್ಯಪುಸ್ತಕ - (Prescribed Textbook to Learn Kannada)

Subject Code	Subject	Stream	Th– Tut-Pr	Credits
22KBK17 / 27	**BALAKE KANNADA**	**Humanities and Social Sciences (H.S.S)**	**1 - 0 - 0**	**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 conservation.

5. To know about Karnataka state and its language, literature and General information about this state.

Course outcome (Course Skill Set)

ಬಳಕೆ ಕನ್ನಡ ಪಠ್ಯ ಕಲಿಕೆಯಿಂದ ವಿದ್ಯಾರ್ಥಿಗಳಿಗೆ ಆಗುವ ಅನುಕೂಲಗಳು ಮತ್ತು ಫಲಿತಾಂಶಗಳು:

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

CO1	To understand the necessity of learning of local language for comfortable life.
CO2	To speak, read and write Kannada language as per requirement.
CO3	To communicate (converse) in Kannada language in their daily life with kannada speakers.
CO4	To Listen and understand the Kannada language properly.
CO5	To speak in polite conservation.

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 conservation, Listening and Speaking Activities, Key to Transcription
3. ವೈಯಕ್ತಿಕ, ಸ್ವಾಮ್ಯಸೂಚಕ/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 –ಸಪ್ತಮಿ ವಿಭಕ್ತಿ ಪ್ರತ್ಯಯ – (ಆ, ಆದು, ಅವು, ಆಲ್ಲಿ) –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. ನ್ಯೂನ/ನಿಷೇಧಾರ್ಥಕ ಕ್ರಿಯಾಪದಗಳು & ವರ್ಣ ಗುಣವಾಚಕಗಳು –Defective/Negative Verbs & Colour Adjectives

Module- 4 (03 hours of pedagogy)

1. ಅಪ್ಪಣೆ / ಒಪ್ಪಿಗೆ, ನಿರ್ದೇಶನ, ಪ್ರೋತ್ಸಾಹ ಮತು 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, - ಇತು, - ಆಗಿ, - 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

Pattern of question paper

1. SEE Paper shall be set for 50 questions, each carrying 1 mark. The pattern of the question paper is MCQ

INNOVATION AND DESIGN THINKING

Course Code	22 IDT 18/28	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	1:30Min
Total Hours of Pedagogy	15 Hours Theory	Credits	01

Prerequisite: NIL

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.

MODULES	Hours
Module-I	
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	**03 Hours**
Teaching-Learning Process: Introduction about the design thinking: Chalk and Talk method Theory and practice through presentation MVP and Prototyping through live examples and videos	
Module-II	
Tools for Design Thinking Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design	**03 Hours**
Teaching-Learning Process: Case studies on design thinking for real-time interaction and analysis Simulation exercises for collaborated enabled design thinking Live examples on the success of collaborated design thinking	
Module-III	
Design Thinking in IT Design Thinking to Business Process modeling – Agile in Virtual collaboration environment – Scenario based Prototyping	**03 Hours**
Teaching-Learning Process: Case studies on design thinking and business acceptance of the design Simulation on the role of virtual eco-system for collaborated prototyping	
Module-IV	
DT For strategic innovations Growth – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.	**03 Hours**
Teaching-Learning Process: Business model examples of successful designs Presentation by the students on the success of design Live project on design thinking in a group of 4 students	

Module-V Design thinking workshop Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test	03 Hours
Teaching-Learning Process	8 hours design thinking workshop from the expect and then presentation by the students on the learning from the workshop

Text book:
1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design",Cengage learning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
4. Idris Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

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

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

CO1	Appreciate various design process procedure
CO2	Generate and develop design ideas through different technique
CO3	Identify the significance of reverse Engineering to Understand products
CO4	Draw technical drawing for design ideas

INTRODUCTION TO WEB PROGRAMMING

Course Code	22PLC15A/25A	CIE Marks	50
Course Type (Theory/Practical/Integrated)	INTEGRATED	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	42 Hours	Credits	03

Prerequisite: Nil

Course objectives:

- To use the syntax and semantics of HTML and XHTML l
- To develop different parts of a web page
- To understand how CSS can enhance the design of a webpage.
- To create and apply CSS styling to a webpage
- To get familiarity with the JavaScript language and understand Document Object Model handling of Java Script

MODULES	Teaching Hours
Module-I **Traditional HTML and XHTML :** First Look at HTML and XHTML, Hello HTML and XHTML World, HTML and XHTML: Version History, HTML and XHTML DTDs: The Specifications Up Close, (X)HTML Document Structure, Browsers and (X)HTML, The Rules of (X)HTML, Major Themes of (X)HTML, The Future of Markup—Two Paths?	**08 Hours**
Module-II **HTML5:** Hello HTML5, Loose Syntax Returns, XHTML5, HTML5: Embracing the Reality of Web Markup, Presentational Markup Removed and Redefined, HTML5 Document Structure Changes, Adding Semantics, HTML5's Open Media Effort, Client-Side Graphics with <canvas>, HTML5 Form Changes, Emerging Elements and Attributes to Support Web Applications	**08 Hours**
Module-III **Cascading Style Sheets (CSS) :** Introduction, CSS Overview , CSS Rules, Example with Type Selectors and the Universal Selector, CSS Syntax and Style, Class Selectors, ID Selectors, span and div Elements, Cascading, style Attribute, style Container, External CSS Files, CSS Properties, Color Properties, RGB Values for Color, Opacity Values for Color, HSL and HSLA Values for Color, Font Properties, line-height Property, Text Properties, Border Properties, Element Box, padding Property, margin Property , Case Study: Description of a Small City's Core Area.	**09 Hours**
Module-IV **Tables and CSS, Links and Images:** Table Elements, Formatting a Data Table: Borders, Alignment, and Padding, CSS Structural Pseudo- Class Selectors, thead and tbody Elements, Cell Spanning, Web Accessibility, CSS display Property with Table Values, a Element, Relative URLs, Navigation Within a Web Page, CSS for Links, Bitmap Image Formats: GIF, JPEG, PNG, img Element, Responsive Images, Positioning Images, Shortcut Icon, iframe Element.	**08 Hours**

MODULES	Teaching Hours
Module - V **Introduction to JavaScript: Functions, DOM, Forms, and Event Handlers :** History of JavaScript, Hello World Web Page, Buttons, Functions, Variables, Identifiers, Assignment Statements and Objects, Document Object Model, Forms and How They're Processed: Client-Side Versus Server-Side, form Element, Controls, Text Control, Accessing a Form's Control Values, reset and focus Methods	**09 Hours**

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

CO1	Explain the historical context and justification for HTML over XHTML
CO2	Develop HTML5 documents and adding various semantic markup tags
CO3	Analyse various attributes, values and types of CSS
CO4	Implement core constructs and event handling mechanisms of JavaScript.

List of Programs – 22ESC145/245Programming Assignments:

1. Create an XHTML page using tags to accomplish the following:
   (i) A paragraph containing text "All that glitters is not gold". Bold face and italicize this text
   (ii) Create equation:

$$x = 1/3(y_1^2 + z_1^2)$$

   (iii) Put a background image to a page and demonstrate all attributes of background imageCreate unordered list of 5 fruits and ordered list of 3 flowers2.

2. Create following table using XHTML tags. Properly align cells, give suitable cell padding and cell spacing, and apply background color, bold and emphasis necessary

Department	Sem1	Subject A
		Subject B
		Subject C
	Sem2	Subject E
		Subject F
		Subject G
	Sem3	Subject H
		Subject I
		Subject J

3. Use HTML5 for performing following tasks:
(i) Draw a square using HTML5 SVG , fill the square with green color and make 6px brown stroke width
(ii) Write the following mathematical expression by using HTML5 MathML. d=x2-y2
(iii) Redirecting current page to another page after 5 seconds using HTML5 meta tag

4. Demonstrate the following HTML5 Semantic tags- <article>, <aside>, <details>, <figcaption>, <figure>, <footer>, <header>, <main>, <mark>, <section> for a webpage that gives information about travel experience.5.

5. Create a class called **income**, and make it a background color of #0ff.
Create a class called **expenses**, and make it a background color of #f0f.
Create a class called **profit**, and make it a background color of #f00.Throughout the document, any text that mentions income, expenses, or profit, attach the appropriate class to that piece of text.
Further create following line of text in the same document:~~The current price is 50~~ and new price is 40~~6~~.

6. Change the tag **li** to have the following properties:·
A display status of inline·
A medium, double-lined, black border·
No list style typeAdd the following properties to the style for **li**
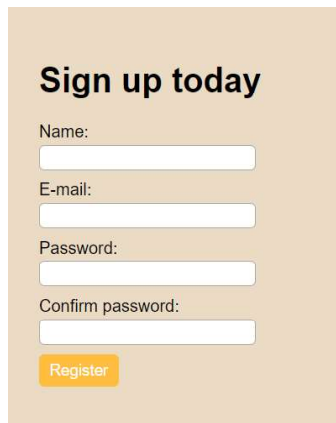
Margin of 5px
Padding of 10px to the top, 20px to the right, 10px to the bottom, and 20px to the leftAlso demonstrate list style type with user defined image logos
7.Create following web page using HTML and CSS with tabular layout**.**

8.Create following calculator interface with HTML and CSSWrite a Java Script program that on clicking a button, displays scrolling text which moves from left to right with a small delay
9.Create a webpage containing 3 overlapping images using HTML, CSS and JS. Further when the mouse is over any image, it should be on the top and fully displayed.
Suggested Learning Resources:
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)

TextBook-1: HTML & CSS: The Complete Reference Thomas A. Powell, , Fifth Edition, Tata McGraw Hill,
TextBook-2: WEB PROGRAMMING with HTML5, CSS and JavaScript, John Dean, Jones & Bartlett Learning, First Edition

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

INTRODUCTION TO PYTHON PROGRAMMING

Course Code	22PLC15B/25B	CIE Marks	50
Course Type (Theory/Practical/Integrated)	INTEGRATED	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	42 Hours	Credits	03

Prerequisite: Nil

Course objectives:

■ Learn the syntax and semantics of the Python programming language.

■ Illustrate the process of structuring the data using lists, tuples

■ Appraise the need for working with various documents like Excel, PDF, Word and Others.

■ Demonstrate the use of built-in functions to navigate the file system.

■ Implement the Object Oriented Programming concepts in Python.

MODULES	Teaching Hours
Module-I **Python Basics**: Entering Expressions into the Interactive Shell, The Integer, Floating-Point, and String Data Types, String Concatenation and Replication, Storing Values in Variables, Your First Program, Dissecting Your Program, **Flow control:** Boolean Values, Comparison Operators, Boolean Operators,Mixing Boolean and Comparison Operators, Elements of Flow Control, Program Execution, Flow Control Statements, Importing Modules,Ending a Program Early with sys.exit(), **Functions:** def Statements with Parameters, Return Values and return Statements,The None Value, Keyword Arguments and print(), Local and Global Scope, The global Statement, Exception Handling, A Short Program: Guess the Number	**08 Hours**
Module-II **Lists:** The List Data Type, Working with Lists, Augmented Assignment Operators, Methods, Example Program: Magic 8 Ball with a List, List-like Types: Strings and Tuples, References, **Dictionaries and Structuring Data:** The Dictionary Data Type, Pretty Printing, Using Data Structures to Model Real-World Things,	**08 Hours**
Module-III **Manipulating Strings:** Working with Strings, Useful String Methods, Project: Password Locker, Project: Adding Bullets to Wiki Markup **Reading and Writing Files:** Files and File Paths, The os.path Module, The File Reading/Writing Process, Saving Variables with the shelve Module,Saving Variables with the print.format() Function, Project: Generating Random Quiz Files, Project: Multiclipboard,	**09 Hours**
Module-IV **Organizing Files:** The shutil Module, Walking a Directory Tree, Compressing Files with the zipfile Module, Project: Renaming Files with American-Style Dates to European-Style Dates, Project: Backing Up a Folder into a ZIP File, **Debugging:** Raising Exceptions, Getting the Traceback as a String, Assertions, Logging, IDLE s Debugger.	**08 Hours**

	Module - V	
	Classes and objects: Programmer-defined types, Attributes, Rectangles, Instances as return values, Objects are mutable, Copying, **Classes and functions:** Time, Pure functions, Modifiers, Prototyping versus planning, **Classes and methods:** Object-oriented features, Printing objects, Another example, A more complicated example, The init method, The _str_ method, Operator overloading, Type-based dispatch, Polymorphism, Interface and implementation,.	**09 Hours**

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

CO1	Demonstrate proficiency in handling loops and creation of functions.
CO2	Identify the methods to create and manipulate lists, tuples and dictionaries.
CO3	Develop programs for string processing and file organization
CO4	Develop programs for exception handling
CO5	Demonstrate the concepts of Object-Oriented Programming in Python.

List of Programs – 22PLC15B/25B

Programming Exercises:1.

1. Develop a program to read the student details like Name, USN, and Marks in three subjects. Display the student details, total marks and percentage with suitable messages.b. Develop a program to read the name and year of birth of a person. Display whether the person is a senior citizen or not.2.

2. Develop a program to generate Fibonacci sequence of length (N). Read N from the console.b. Write a function to calculate factorial of a number. Develop a program to compute binomial coefficient (Given N and R).3.

3. Read N numbers from the console and create a list. Develop a program to print mean, variance and standard deviation with suitable messages.4.

4. Read a multi-digit number (as chars) from the console. Develop a program to print the frequency of each digit with suitable message.5.

5. Develop a program to print 10 most frequently appearing words in a text file. [Hint: Use dictionary with distinct words and their frequency of occurrences. Sort the dictionary in the reverse order of frequency and display dictionary slice of first 10 items6.

6. Develop a program to sort the contents of a text file and write the sorted contents into a separate text file. [Hint: Use string methods strip(), len(), list methods sort(), append(), and file methods open(), readlines(), and write()].7.

7. Develop a program to backing Up a given Folder (Folder in a current working directory) into a ZIP File by using relevant modules and suitable methods.8.

8. Write a function named DivExp which takes TWO parameters a, b and returns a value c (c=a/b). Write suitable assertion for a>0 in function DivExp and raise an exception for when b=0. Develop a suitable program which reads two values from the console and calls a function DivExp.9.

9. Define a function which takes TWO objects representing complex numbers and returns new complex number with a addition of two complex numbers. Define a suitable class 'Complex' to represent the complex number. Develop a program to read N (N >=2) complex numbers and to compute the addition of N complex numbers.10.

10. Develop a program that uses class Student which prompts the user to enter marks in three subjects and calculates total marks, percentage and displays the score card details. [Hint: Use list to store the marks in three subjects and total marks. Use init () method to initialize name, USN and the lists to store marks and total, Use getMarks() method to read marks into the list, and display() method to display the score card details.

Suggested Learning Resources:
Text Books
1. Al Sweigart,**"Automate the Boring Stuff with Python",**1ˢᵗEdition, No Starch Press, 2015. (Available under CC-BY-NC-SA license at https://automatetheboringstuff.com/)
(Chapters 1 to 18, except 12) for lambda functions use this link: https://www.learnbyexample.org/python-lambda-function/
2. Allen B. Downey, **"Think Python: How to Think Like a Computer Scientist",** 2ⁿᵈ Edition, Green Tea Press, 2015. (Available under CC-BY-NC license at http://greenteapress.com/thinkpython2/thinkpython2.pdf
(Chapters 13, 15, 16, 17, 18) (Download pdf/html files from the above link)

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

CO1	Demonstrate proficiency in handling loops and creation of functions.
CO2	Identify the methods to create and manipulate lists, tuples and dictionaries.
CO3	Develop programs for string processing and file organization
CO4	Interpret the concepts of Object-Oriented Programming as used in Python.

INTRODUCTION TO C++ PROGRAMMING

Course Code	22PLC15C/25C	CIE Marks	50
Course Type (Theory/Practical/Integrated)	INTEGRATED	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	42 Hours	Credits	03

Course objectives.

- Understanding about object oriented programming and Gain knowledge about the capability to store information together in an object.
- Understand the capability of a class to rely upon another class and functions.
- Understand about constructors which are special type of functions.
- Create and process data in files using file I/O functions
- Use the generic programming features of C++ including Exception handling

MODULES	Teaching Hours
Module-I Introduction to Object Oriented Programming: Computer programming background-C++ overview. First C++ Program -Basic C++ syntax, Object Oriented Programming: What is an object, Classes, methods and messages, abstraction and encapsulation, inheritance, abstract classes, polymorphism.	**09 Hours**
Module-II Functions in C++: Tokens – Keywords – Identifiers and constants – Operators in C++ – Scope resolution operator – Expressions and their types – Special assignment expressions – Function prototyping – Call by reference – Return by reference – Inline functions -Default arguments – Function overloading	**08 Hours**
Module-III Inheritance & Polymorphism: Derived class Constructors, destructors-Types of Inheritance- Defining Derived classes, Single Inheritance, Multiple, Hierarchical Inheritance, Hybrid Inheritance.	**08 Hours**
Module-IV I/O Streams: C++ Class Hierarchy- File Stream-Text File Handling- Binary File Handling during file operations.	**08 Hours**
Module - V Exception Handling: Introduction to Exception - Benefits of Exception handling- Try and catch block Throw statement- Pre-defined exceptions in C++	**09 Hours**

Suggested Learning Resources:
Books (Title of the Book/Name of the author/Name of the publisher/Edition and Year)
Textbooks
1. Bhushan Trivedi, "Programming with ANSI C++", Oxford Press, Second Edition, 2012.
Balagurusamy E, Object Oriented Programming with C++, Tata McGraw Hill Education Pvt.Ltd , Fourth Edition 2010.

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

CO1	Able to understand and design the solution to a problem using object-oriented programming concepts.
CO2	Able to reuse the code with extensible Class types, User-defined operators and function Overloading.
CO3	Achieve code reusability and extensibility by means of Inheritance and Polymorphism
CO4	Implement the features of C++ including file stream and file handling
CO5	Demonstrate exception handling in C++

List of Programs – 22PLC15D/22PLC25D

Programming Assignments:

1. Write a C++ program to sort the elements in ascending and descending order.

2. Write a C++ program to find the sum of all the natural numbers from 1 to n.

3. Write a C++ program to swap 2 values by writing a function that uses call by reference technique.

4. Write a C++ program to demonstrate function overloading for the following prototypes.

add(int a, int b) add(double a, double b)

5. Create a class named Shape with a function that prints "This is a shape". Create another class named Polygon inheriting the Shape class with the same function that prints "Polygon is a shape". Create two other classes named Rectangle and Triangle having the same function which prints "Rectangle is a polygon" and "Triangle is a polygon" respectively. Again, make another class named Square having the same function which prints "Square is a rectangle".Now, try calling the function by the object of each of these classes.

6. Suppose we have three classes Vehicle, FourWheeler, and Car. The class Vehicle is the base class, the class FourWheeler is derived from it and the class Car is derived from the class FourWheeler. Class Vehicle has a method 'vehicle' that prints 'I am a vehicle', class FourWheeler has a method 'fourWheeler' that prints 'I have four wheels', and class Car has a method 'car' that prints 'I am a car'. So, as this is a multi-level inheritance; we can have access to all the other classes methods from the object of the class Car. We invoke all the methods from a Car object and print the corresponding outputs of the methods.So, if we invoke the methods in this order, car(), fourWheeler(), and vehicle(), then the output will be I am a carI have four wheels I am a vehicleWrite a C++ program to demonstrate multilevel inheritance using this.

7. Write a C++ program to create a text file, check file created or not, if created it will write some text into the file and then read the text from the file.

8. Write a C++ program to write and read time in/from binary file using fstream

9. Write a function which throws a division by zero exception and catch it in catch block. Write a C++ program to demonstrate usage of try, catch and throw to handle exception.

10. Write a C++ program function which handles array of bounds exception using C++.

C AND UNIX PROGRAMMING

Course Code	22PLC15D/25D	CIE Marks	50
Course Type (Theory/Practical/Integrated)	INTEGRATED	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	42 Hours	Credits	03

Prerequisite: Nil

Course objectives:

■   To learn advanced concepts in pointers to functions, arrays, strings and structures.

■   To learn Unix operating system and shell programming

MODULES	Teaching Hours
Module-I Introduction to pointers: The & and * operator, Pointer expressions, Jargon of Pointers, passing addresses to functions, Functions returning pointers, problems. Pointers and arrays: Passing array elements to a function, Pointers and arrays, passing an entire array to a function, Pointers and 2-D arrays, pointer to an array, passing 2D array to a function. problems., File pointers, pointers to functions, argc and argv-Arguments to main( ), pointers and variable number of arguments.	**09 Hours**
Module-II Array of pointers, Dynamic Memory allocation, problems, Pointers and Strings: pointers and strings, const qualifier**,** 2D array of characters, array of pointers to strings, Limitation of array of pointers to strings. Problems. Pointers and Structures: Array of structures, structure pointers, offsets of Structure Elements. problems.	**08 Hours**
Module-III Architecture of Unix, Features of Unix, Unix Commands - PATH, echo, printf, script, passwd, uname, who, date, stty, pwd, cd, mkdir, rmdir, ls, cp, mv, rm, cat, more, wc, lp, ls-l, ls-d, file ownership, file permissions, chmod, Directory permissions, changing file ownership.	**08 Hours**
Module-IV Process basics, ps, process creation and killing, at , batch and cron commands, File Systems and Inodes, Hard link, symbolic links and ln, The Directory, umask, find, Filters- cut, paste, sort, uniq, tr, grep. System administration, administrators privileges, maintaining security, user management, startup and shutdown, managing Disk space ,Device files, cpio, tar, partitions and file systems, standard file systems and types, creating partitions and file systems, mounting and unmounting file systems.	**09 Hours**

Module - V Shell programming: shell's interpretive cycle, pattern matching, Escaping and Quoting, Redirection, pipes, tee, command substitution, shell variables. shell scripts-simple shell programs using read, if, test, case, expr, while ,for, set, shift.	**09 Hours**

Text Books:

1. Understanding Pointers in C, Yashwant Kanetkar, 3rd Edition, BPB Publisher
2. Unix concepts and applications, Sumitabha Das, 4th edition, Mcgraw Hill Education

Reference Books:

1. The C Companion – Prentice-Hall, INC. Englewood Cliffs, New Jersey 07632 , Allen I. Holub- 1987
2. C Programming – A Modern Approach, K. N. King, 2nd Edition, Mcgraw Hill Education
3. Unix and Shell programming, Dehrouza A Forouzan, Richard F Gilberg, Cengage Learning India 1st Edition

List of Programs

1. Write a C program to convert a number from given base b to decimal.
2. Write a C program to find largest/smallest element using pointers and dynamic memory allocation.
3. Write a C program to implement following built-in string functions using pointers :
     strcat( ) , strcmp( ) , strlen( ), strcpy( )
4. Write a C program to find substring of a string using function and pointers.
5. Write a C program to sort dynamic 2D-array of strings.
6. Write a C program to find whether a given matrix is symmetric or not using pointers.
7. Write a C program to create structure called course with structure members subject name and marks & display the same using dynamic memory allocation..
8. Write a C program to find distance between two coordinates x & y using pointers to structures as function arguments.
9. Write a C program to demonstrate command line arguments argc( ) and argv( ), such that the input given as argv[1] is converted to int , argv[2] is converted to float and open a file whose path is given as argv[3].

Open-Ended-Program:

10. Write a C program to declare and call a function using function pointers.

Part-B

1. Practice all basic shell commands.
2. Write a Shell Script to display multiplication table using different looping statements .
3. Write a script to find whether a given number is odd or even.
4. Write a shell script to execute various shell commands using case statement.
5. Write a shell script to find sum of all digits from a given number.
6. Write a script to find greatest of three numbers.
7. Write a shell script to backup the files with **.bak** extension and display the completion message after every file is copied.

8. Write a shell script to check whether a given number is Armstrong or not.

9. Write a shell script to reverse a string and check whether a given string is palindrome or not.

10. Write a shell script to count the number of lines, words and characters of an input file.

11. Write a shell script to accept system time and display the message Good Morning / Good afternoon /Good Evening.

12. Write a shell script to find the factorial of a given number.

13. Write a shell script to remove duplicate lines from Files.

Open-Ended-Programs:

14. a) Write a shell script to display the appropriate message when no arguments are input, runs **grep** if two arguments are entered and displays an error massage otherwise.

14b) Write shell script to check user input for null string values, when run without arguments it should turn interactive and takes two inputs from user. It then runs 14a. script with supplied inputs as arguments.

15) Write an interactive shell script that accepts input from the user and looks up a code list of the departments. Accept and validate a department code, display department name and employee-id on the terminal.

Course outcome (Course Skill Set)

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

CO1	Apply pointers in expressions, functions and arrays.
CO2	Illustrate dynamic memory allocation, array of pointers , pointers to strings and structures.
CO3	Demonstrate architecture of unix, unix commands related to files and directories
CO4	Demonstrate lifecycle of Process, system administration and related commands.
CO5	Develop simple shell scripts and demonstrate pattern matching.

BASICS OF JAVA PROGRAMMING

Course Code	22PLC15E/25E	CIE Marks	50
Course Type (Theory/Practical/Integrated)	INTEGRATED	SEE Marks	50
		Total Marks	100
Teaching Hours/Week (L:T:P:S)	2:0:2:0	Exam Hours	03
Total Hours of Pedagogy	42 Hours	Credits	03

Prerequisite: Nil

Course objectives:

- Learn fundamental features of object oriented language and JAVA
- Set up Java JDK environment to create, debug and run simple Java programs.
- Learn object oriented concepts using programming examples.
- Study the concepts of importing of packages and exception handling mechanism

MODULES	Teaching Hours
Module-I An Overview of Java: Object-Oriented Programming, A First Simple Program, A Second Short Program, Two Control Statements, Using Blocks of Code, Lexical Issues, The Java Class Libraries, Data Types, Variables, and Arrays: Java Is a Strongly Typed Language, The Primitive Types, Integers, Floating-Point Types, Characters, Booleans, A Closer Look at Literals, Variables, Type Conversion and Casting, Automatic Type Promotion in Expressions, Arrays, A Few Words About Strings	**09 Hours**
Module-II Operators: Arithmetic Operators, The Bitwise Operators, Relational Operators, Boolean Logical Operators, The Assignment Operator, The ? Operator, Operator Precedence, Using Parentheses, Control Statements: Java s Selection Statements, Iteration Statements, Jump Statements	**08 Hours**
Module-III Introducing Classes: Class Fundamentals, Declaring Objects, Assigning Object Reference Variables, Introducing Methods, Constructors, The this Keyword, Garbage Collection, The finalize( ) Method, A Stack Class, A Closer Look at Methods and Classes: Overloading Methods, Using Objects as Parameters, A Closer Look at Argument Passing, Returning Objects, Recursion, Introducing Access Control, Understanding static, Introducing final, Arrays Revisited	**08 Hours**
Module-IV Inheritance: Inheritance, Using super, Creating a Multilevel Hierarchy, When Constructors Are Called, Method Overriding, Dynamic Method Dispatch, Using Abstract Classes, Using final with Inheritance, The Object Class.	**09 Hours**

Module - V Packages and Interfaces: Packages, Access Protection, Importing Packages, Interfaces, Exception Handling: Exception-Handling Fundamentals, Exception Types, Uncaught Exceptions, Using try and catch, Multiple catch Clauses, Nested try Statements, throw, throws, finally, Java s Built-in Exceptions, Creating Your Own Exception Subclasses, Chained Exceptions, Using Exceptions.	**09 Hours**

LIST OF PROGRAMS

Programming Assignments

1. Write a JAVA program that prints all real solutions to the quadratic equation $ax^2+bx+c=0$. Read ina, b, c and use the quadratic formula.

2. Write a JAVA program for multiplication of two arrays.

3. Demonstrate the following operations and sign extension with Java programs (i) << (ii) >> (iii) >>>

4. Write a JAVA program to sort list of elements in ascending and descending order

5. Create a JAVA class called Student with the following details as variables within it.

USN

NAME

BRANCH

PHONE

PERCENTAGE

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

6. Write a JAVA program demonstrating Method overloading and Constructor
overloading.

7. Design a super class called Staff with details as StaffId, Name, Phone, Salary. Extend this class by writing three subclasses namely Teaching (domain, publications), Technical (skills), and Contract (period). Write a JAVA program to read and display at least 3 staff objects of all three categories.

8. Demonstrate dynamic dispatch using abstract class in JAVA.

9. Create two packages P1 and P2. In package P1, create class A, class B inherited from A, class C . In package P2, create class D inherited from class A in package P1 and class E. Demonstrate working of access modifiers (private, public, protected, default) in all these classes using JAVA.

10. Write a JAVA program to read two integers a and b. Compute a/b and print, when b is not zero. Raise an exception when b is equal to zero. Also demonstrate working of ArrayIndex Out Of BoundException

Course outcome (Course Skill Set)

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

CO1	To illustrate basics of JAVA programming
CO2	To demonstrate working of operators in JAVA
CO3	To create classes and objects for applications
CO4	To develop simple programs based on polymorphism and inheritance
CO5	To describe the concepts of importing packages and exception handling mechanism
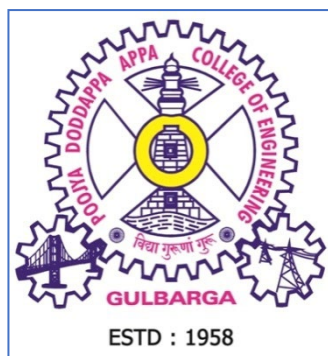
Hyderabad Karnataka Education Society's

Poojya Doddappa Appa College of Engineering

(An Autonomous Institution &Affiliated to

Visvesvaraya Technological University, Belagavi)

Aiwan E-Shahi Area KALABURAGI 585 102 Karnataka India

CURRICULUM

FOR B.E.III SEMESTER AND IV SEMESTER

FOR THE ACADEMIC YEAR 2023-24

DEPARTMENT OF CIVIL ENGINEERING

About College:

Poojya Doddappa Appa College of Engineering (PDACE) is the first institution of Hyderabad Karnataka Education (HKE) Society, Kalaburagi, which was established in the year 1958. The foundation stone of this college was laid by the then Vice President of India Dr.Sarvapalli Radhakrishnan in 1958.

At present, PDA College of Engineering is offering 11 UG programs, 10 PG Programs and 12 Research centers, spreading and imparting technical education in North Karnataka Region. The college has state of the art laboratories, digitalized smart class rooms having highly qualified and experienced faculty with highest no. of Ph.D. and M. Tech degrees.

PDACE is the only Autonomous Institution in the region, which was sponsored under TEQIP I , TEQIP-II and TEQIP-III from World Bank and received grants of Rs.10.43 crores, Rs. 17.5 crores and 7 crores respectively. This is one among 12 institutions having TEQIP-I and TEQIP -II sponsorship. At present, college is selected in TEQIP-III as Mentor Institution for Bundelkhand Institute of Engineering & Technology, Jhansi.

The Vision and Mission of PDA College of Engineering are as mentioned below.

VISION

- To be an institute of excellence in technical education and research to serve the needs of the industry and society at local and global levels.

MISSION

- To provide a high-quality educational experience for students with values and ethics that enables them to become leaders in their chosen professions.

- To explore, create and develop innovations in engineering and science through research and development activities.

- To provide beneficial service to the national and multinational industries and communities through educational, technical and professional activities.

About Department of Civil Engineering

The Civil Engineering Department was established in the year 1958 with an intake of 60 students. In 1994 the intake was increased to 90 and further increased to 180 in the year 2014. Presently the department runs both UG and PG (Environmental Engineering and Structural Engineering) programs with intake of 180 in UG program and 18 in each PG program. Department is recognized as Research Centre by Visvesvaraya Technological University Belagavi in the year 2002 and at present 35 research scholars are pursuing their Ph.D. and seven research scholars have been awarded with Ph D degree.

The Department has signed MoU with various industries like Medini, Sharan Technical consultancy, Canter Technologies Pvt. Ltd, Sharan Chandra Consultant, JGD Consultants, Jalavahini Management Services Pvt. Ltd. Dharwad, Shah Technical Consultants Pvt. Ltd., PP Raju & Co., Design Consortium, KRIDL, Bharath Dal and Oil Industries, Ultratech, ACC, Alstom, Karnataka State Pollution Control Board & HCC. These MoUs have helped the students in getting exposure to industrial environment and also for conducting Industry Institute Interaction events.

The Vision, Mission and Program educational objectives of Civil Engineering Department are as follows:

VISION

- To be the preeminent department for imparting technical knowledge and skills in the Civil Engineering field to meet the social, industrial, environmental and research needs at local and global levels.

MISSION

- To provide technical education to meet the challenges in the profession through a well-structured curriculum.
- To inculcate innovation and research ideas for sustainable development with ethical background.
- To impart entrepreneurial skills for serving the needs of the society through technical and professional activities.
- To create Civil Engineering professionals to serve the needs of the industry at local and global levels.

PROGRAM EDUCATIONAL OBJECTIVES(PEO'S)

Program educational objectives are broad statements that describe the Career and Professional accomplishments that the program is preparing graduates to achieve. The program educational objectives of the B.E. in Civil Engineering Program at PDA College of Engineering, Kalaburagi are:

PEO1: To provide the knowledge of mathematics, science and engineering fundamentals for solving civil engineering problems.

PEO2: To enable the graduates to exhibit their technical knowledge and skills of recent practices to identify and solve civil engineering problems.

PEO3: To enable the graduates to conduct and interpret the results of laboratory/ field experiments in basic sciences, engineering sciences and civil engineering.

PEO4: To enable the graduate for pursuing higher education and lifelong learning.

PEO5: To enable the graduates to acquire communication, team work and entrepreneurial skills along with the values of professional ethics.

PROGRAM OUTCOMES

1. Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.

2. Problem analysis: Identify, formulate, review research literature, and analyse complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.

3. 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 the public health and safety, and the cultural, societal, and environmental considerations.

4. 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.

5. Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations.

6. The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.

7. Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

8. Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.

9. Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

10. 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.

11. Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.

12. Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.

PROGRAM SPECIFIC OUTCOMES

The Civil Engineering graduates are able to:

PSO1: Plan, Analyze and Design buildings, Water supply and Sewerage systems, Hydraulic structures and Transportation infrastructure using sustainable materials and conceptual knowledge of Geotechnical engineering.

PSO2: Conduct survey and Laboratory experiments/ field investigations and interpret the data for application to real life problems.

PSO3: Prepare detailed estimate of civil Engineering works and Execute the civil Engineering Projects with optimum resources using effective communication skills and Professional ethics
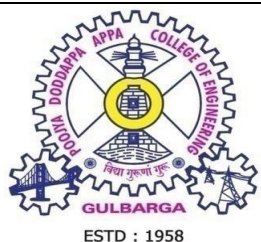
Hyderabad Karnataka Education Society's
P. D. A COLLEGE OF ENGINEERING, KALABURAGI
B.E in Civil Engineering
Scheme of Teaching and Examination 2022
Outcome Based Education (OBE) and Choice-Based Credit System (CBCS)
Effective from the Academic Year 2023-24

III Semester

Sl. No	Course	Course Code	Couse Title	Teaching Department and Question paper Setting Board	Theory Lecture	Tutorial	Practical/ Drawing	Duration in Hours	CIE Marks	SEE Marks	Total Marks	Credits
					Teaching Hours/Week			Examination				
1	BSE	22MATC31	Mathematics for Civil Engg Stream-III	Mathematics	2	2	0	3	50	50	100	3
2	IPCC	22CV32	Strength of Materials	Civil Engg Dept	3	0	2	3	50	50	100	4
3	IPCC	22CV33	Building Planning & Drawing	Civil Engg Dept	3	0	2	3	50	50	100	4
4	PCC	22CV34	Surveying	Civil Engg Dept	2	2	0	3	50	50	100	3
5	PCCL	22CVL35	Surveying Lab	Civil Engg Dept	0	0	2	3	50	50	100	1
6	ESC	22CV36x	Engg Science Course	Civil Engg Dept	3	0	0	1	50	50	100	3
7	UHV	22UHV37	Social Connect and Responsibilty	Any Department	0	0	2	1	50	50	100	1
8	AEC	22CVAE38x	AEC/SEC-III	Civil Engg Dept	0	0	2	2	50	50	100	1
9	MC	22xx39	Mandatory Course	NSS/Physical Education/Yoga	0	0	2		50	--	50	0
					13	4	12	Total	450	400	850	20

Engineering Science Course (ESC/ETC/PLC)	
22CV36A	**Building materials.**
22CV36B	Rural, Urban Planning and Architecture
22CV36C	Sustainable Design Concept for Building Services
22CV36D	Environmental Protection and Management

Ability Enhancement Course – III	
22CVAE381	Microsoft Excel and Visual Basic Applications (Lab)
22CVAE382	Smart Urban Infrastructure
22CVAE383	**Digital Drafting for Civil Engineers (Lab)**
22CVAE384	Personality Development for Civil Engineers
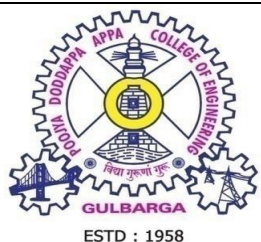
Hyderabad Karnataka Education Society's
P. D. A COLLEGE OF ENGINEERING, KALABURAGI
B.E in Civil Engineering
Scheme of Teaching and Examination 2022
Outcome Based Education (OBE) and Choice-Based Credit System (CBCS)
Effective from the Academic Year 2022-23
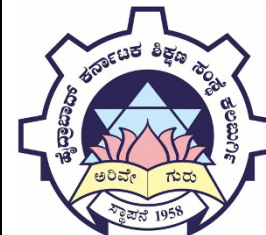
IV Semester

Sl. No	Course	Course Code	Couse Title	Teaching Department	Teaching Hours/Week			Examination				
					Theory Lecture	Tutorial	Practical/ Drawing	Duration in Hours	CIE Marks	SEE Marks	Total Marks	Credits
1	PCC	22CV41	Structural Analysis	Civil Engg Dept	2	2	0	3	50	50	100	3
2	IPCC	22CV42	Fluid mechanics	Civil Engg Dept	3	0	2	3	50	50	100	4
3	IPCC	22CV43	Building Construction and Geology	Civil Engg Dept	3	0	2	3	50	50	100	4
4	PCCL	22CVL44	Concrete Technology Lab	Civil Engg Dept	0	0	2	3	50	50	100	1
5	ESC	22CV45x	Engg Science Course		3	0	0	3	50	50	100	3
6	BSC	22CV46	Biology for Engineers		3	0	0	3	50	50	100	3
7	UHV	22UHV47	Universal Human Values	Any Department	1	0	0	1	50	50	100	1
8	AEC	22CVAE48x	AEC/SEC-IV	Civil Engg Dept	0	0	2	2	50	50	100	1
9	MC	22XX49	Mandatory Course	NSS/Physical Education/Yoga	0	0	2		50	--	50	0
					15	2	8	Total	450	400	850	20

Engineering Science Course (ESC/ETC/PLC)	
22CV45A	Building Information Modelling in Architecture, Engineering and Construction (BIM)
22CV45B	Construction Equipment, Plants and Machinery
22CV45C	**Concrete Technology**
22CV45D	Hydrology

Ability Enhancement Course / Skill Enhancement Course - IV	
22CVAE481	Finance for Professionals
22CVAE482	**Total station application in Civil Engineering (Lab)**
22CVAE483	Electronic Waste Management - Issues and Challenges
22CVAE484	Components of a Smart City

Course Title: STRENGTH OF MATERIALS		
Course Code	22CV32	CREDIT: 03
Lecture Hours/Week	3 Hrs. (Theory)+2 hrs. (Practical)	SEE: 50
Total Lecture Hours: 70	CIE: 50 Marks (40 M Theory + 10M Practical.)	SEE: 03 Hours

Prerequisite: Elements of Civil Engineering and Engineering mechanics.

Course objectives:

To enable the student to acquire the knowledge in the following topics

1. To understand the behavior of materials under stress and strain.
2. To Analyse an element subjected to compound stress to assess the various stresses in thin and thickcylinders.
3. To understand the concept of shear force and bending moments for beams subjected to various system.
4. To evaluate the bending and shear stress in beam to understand the behavior and design of columns.
5. Strength evaluation and design of circular shaft subjected to torsion and to evaluate the deflection of beams.

Modules	Teaching Hours
Module I **SIMPLE STRESSES AND STRAINS**: Introduction to various strengths of material, concept and definition of stress and strain, types of stresses and strains, Assumptions in strength of materials, stress-strain diagrams for mil for mild steel, ferrous and non-ferrous materials, St Venant's Principle, Hook's Law, Modulus of Elasticity, Poission's ratio, Deformation of bars of uniform cross section, varying cross section. Elongation due to self-weight. Compound bars, Temperature stresses. Elastic constants and their relationship, volumetric strain, application problems.	14 hours
Module II **COMPOUND STRESSES:** Determination of stresses on oblique/inclined plane due to uniaxial, biaxial and general 2D stresses, (Analytical method), Determination of Principal Planes and Principal Stresses, Maximum Shear Stress and their plane (Analytical method)	14 hours

THIN AND THICK CYLINDERS: THIN CYLINDERS: Determination of Longitudinal and Circumferential/Hoop's stress, change in dimensions and volume THICK CYINDERS: Assumptions, Lami's equation derivation and problems, radial pressure and hoop stress distribution diagrams.	
Module III **SHEAR FORCE AND BENDING MOMENT IN BEAMS:** Introduction to types of loads, beams and support with reaction. Definition of Shear force and bending moment, sign conventions. Relationship between load intensity, bending moment and shear force. Shear force diagram (SFD) and Bending moment diagram (BMD) for simply supported beams (both without overhang and with overhangs) and cantilever beams, beams subjected to point loads, UDL, UVL, Couples and their combinations.	14 hours
Module IV **BENDING STRESSES AND SHEAR STRESSES IN BEAMS.** BENDINF STRESSES: Assumptions, Bernoulli's theory of Pure Bending, relationship between bending moment, bending stress and radius of curvature, Moment of Resistance, Section Modulus, flexural rigidity, Modulus of rupture. Bending stress diagram for rectangular, circular, 'I', 'T' and 'L' sections (simple problems), Bending test on Wood under two-point loading. SHEAR STRESS: Expression for transverse shear stressing beams, Shear stress diagram for rectangular, circular, 'I', 'T' and 'L' sections.Bending test on Wood under two-point loading. **TORSION OF CIRCULAR SHAFTS:** Equation for theory of pure Torsion, Assumptions, Torsion equation for circular shaft, Strength and stiffness, torsional rigidity, polar modulus, strengths of solid and hollow shafts, power transmitted by solid and hollow shafts.	14 hours
Module V **ELASTIC STABILITY OF COLUMNS AND STRUTS.** Introduction to short and long columns. Definition of effective length, slenderness ratio, radius of gyration, buckling/critical load. Assumption and derivation of Euler's Buckling load for different end conditions. Problems and limitations of "Euler's theory. Rankine's theory, numerical problems. Compression test of Wood **DEFLECTION OF BEAMS:** Definition of stiffness, elastic curve, deflection in simple bending, relation between curvature, Slope and deflection. Double Integration method for cantilever and simply supported beams for point load, UDL, UVL and couple, Macaulay's method, numerical problems.	

STRENGTH OF MATERIALS LAB

Course objectives:

To enable the student to acquire the knowledge in the following topics

- ➢ Determine tensile, compressive, torsional, shear and Impact strength of steel samples and interpret the results.
- ➢ Determine compressive strength and bending strength of wood samples and interpret the results
- ➢ Determine strength properties of brick and tile and interpret the results.

	Teaching Hours
1. Tension test on Mild Steel.	2 Hrs
2. Tension test on HYSD bar	2 Hrs
3. Torsion test on Mild Steel circular sections.	2 Hrs
4. Bending test on Wood under two-point loading.	2 Hrs
5. Compression test of Mild Steel, Cast iron and Wood.	2 Hrs
6. Impact test on Mild steel (Charpy & Izod)	2 Hrs
7. Hardness test on metals-Brinell's Test	2 Hrs
8. Test on Bricks: Compressive strength, Water absorption and Efflorescence.	2 Hrs
9. Demonstration of Strain gauges and Strain indicators.	2 Hrs
10. Demonstration of loading frame	2 Hrs
	2 Hrs

Course outcomes:

CO1	Demonstrate the concepts of SOM theory course through series of experiments.
CO2	Share the responsibilities in small teams of 4-5 members for conducting the experiments.
CO3	Perform the experiments and determination of Tension test, Compression test, Torsion test, Bending test, Shear Test, Impact test on Mild steel (Charpy & Izod), Hardness test, Test on Bricks: Compressive strength, Water absorption and Efflorescence, Demonstration of Strain gauges and Strain indicators parameters.
CO4	Analyze the data and interpret the results
CO5	Prepare a well-organized laboratory report.

Question paper pattern:

Two questions to be set from each Module by intermixing the syllabus of respective module. Students have to answer any five full questions by selecting one question from each module. CIE for laboratory is to be conducted with one external examiner from within department.

Text books:

1. S.S.Bhavikatti "Strength of Materials", New age Publications

2. B.S. Basavarajaiah, P Mahadevappa "Strength of Materials" in SI Units, University Press (India) Pvt. Ltd., 3rd Edition (2010)

3. Shesha Prakash MN and Suresh GS, Mechanics of Materials, Prentice Hall, New Delhi,2011

4. R.Subramanian "Strength of Materials" Oxford University Press. 3rdEdition (2016)

Reference Books:

1. D.H. Young, S.P. Timoshenko "Elements of Strength of Materials "East West Press Pvt. Ltd., 5th Edition (Reprint 2014)

2. S.S. Rattan "Strength of Materials" McGraw Hill Education (India)Pvt. Ltd., 2nd Edition (Sixth reprint 2013).

E books and online course materials:

www.civilenggebooks.com

COURSE TITLE: BUILDING PLANNING AND DRAWING

Course code	22CV33	Credit: 4
Hours/Week	3 Hours (Lectures) 2 Hours (practical)	SEE:50 Marks
Total hours: 42	CIE:50 Marks	SEE:4 hours

Prerequisite:

Course objectives:
To enable the student to acquire the knowledge in the following topics.

Modules	Teaching Hours
Module I **Principles of Planning:** Aspect, prospect, grouping, space requirement, normal dimensions as per IS 962 orientation of building, building Standards, rules and bye laws of sanctioning Authority. Plot area, built up area, super build up area, carpet area and floor area ratio	7hours
Module II Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings, i) Drawing of single storied Residential building (2BHK) with stair case, ii) Drawing Two storied framed building.	12hours
Module-III Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram only for following building i) Primary health centre ii) Primary school building iii) College canteen **iv)** Office building **v)** Hostel Building **vi)** Bus Terminal	10hours
Module -IV To prepare working drawing of component of buildings 1. Stepped wall footing. 2. Fully paneled and flush doors 3. Half paneled and half-glazed window 4. Dog legged Staircase and Open well staircase.	8hours
Module – V Preparation of water supply, sanitary and electrical layouts for a given plan.	5hours

Course Outcomes: On completion of this course, students are able to:

CO	
CO1:	Understand the concepts of Principles of Planning.

CO2:	To prepare drawing of plan, elevation, section of Residential building.
CO3:	To prepare bubble diagram and line diagram of public buildings.
CO4	To prepare working drawing of component of buildings of buildings .
CO5	Prepare the Layout of water supply, sanitary and electrical works.

Question paper pattern:
i) Answer **Question No. 3** which is compulsory   (40marks) .
ii) Answer any **three-question** selecting one question from remaining modules
(20+20+20=60)

BUILDING PLANNING AND DRAWING LAB

		Teaching Hours
1.	Lettering and Numerals with specific dimension	

2.	Functional design of building using inter connectivity diagrams (bubble diagram), development of line diagram only for following building:
	    i) Residential building
	    ii) Primary health center,
	    iii) Primary school building
		2Hrs

3.	Development of plan, elevation, section and schedule of openings from the given line diagram of residential buildings, i) Drawing of single storied Residential building (2BHK) with stair case, ii) Drawing Two storied framed Building.	**2Hrs** **4Hrs**

4.	To prepare working drawing of component of buildings
	    i. Stepped wall footing.
	    ii. Fully paneled and flush doors,
	    iii. Half paneled and half-glazed window.
	    iv. Dog legged Staircase and Open well staircase.
		3Hrs

Reference books:
1. Shah M.H and Kale C.M "Building Drawing", Tata Mc Graw HillPublishing co. Ltd., New Delhi.
2. Gurucharan Singh "Building Construction", Standard Publishers & distributors, New Delhi.
3. National Building Code, BIS, New Delhi

E books and online course materials:
www.civilenggebooks.com

SURVEYING		
Subject Code	22CV34	Credit 03
Number of Lecture Hours/Week	3Hours (Theory)	SEE: 50
Total Hours: 42	CIE: 50	SEE Hours: 03

Prerequisite: Mathematics.

Course objectives:

To enable the student to acquire the knowledge in the following topics

1. Understand the concept of surveying and leveling.
2. Identify the components of surveying and leveling.
3. Interpret the different measurement techniques for various applications.
4. Apply principles of surveying for solving relevant engineering problems.

Modules	Teaching Hours
Module-1 **INTRODUCTION:** Surveying, Objectives and importance of surveying. Classification of surveys. Principles of surveying. Units of measurements, Surveying measurements and errors, types of errors, precision and accuracy. Topographic maps. **CHAIN SURVEY-** Fundamental terms, chain types & Tape types, booking of chain survey work, Field book, entries, Conventional symbols, Obstacles in chain survey. **MEASUREMENT OF DIRECTIONS:** Compass survey: Basic definitions; Types of meridians, bearings and their types, magnetic and true bearings. Prismatic and surveyor's compasses, temporary adjustments, declination and Dip. Quadrantal bearing system, whole circle bearing system, local attraction and numerical problems, latitudes and departures-consecutive coordinate method.	9 Hours
Module-2 **LEVELING:** Principles of levelling, Fundamental axes and parts of a dumpy level, temporary adjustments and permeant adjustments i.e., two peg test only and objectives, Types of leveling - Simple leveling, Profile leveling and Cross sectioning, fly leveling. Computation of levels using Rise and fall method and Height of instrument method - comparison, Arithmetic checks. Numerical problems.	9 Hours
Module-3 **CONTOUR SURVEY:** Contours and their characteristics, Methods of contouring - direct and indirect methods (squares and cross section methods), contour interpolation, Uses of	8 Hours

contours. **AREAS AND VOLUMES:** Computation of area and volume by trapezoidal, Simpson rules and prismoidal formulae. Planimeter- Principle, working and uses, Digital Planimeter.	
Module-4 **THEODOLITE SURVEY:** Theodolite and types, Fundamental axes and their relationship, parts of Vernier transit theodolite, uses of theodolite, Temporary adjustments, measurement of horizontal angles (Repetition and Reiteration methods) and vertical angles. **TRIGONOMETRIC LEVELLING:** Determination of Heights and Distances of an accessible and Inaccessible object by single plane and double plane methods, Numerical problems.	8 Hours
Module-5 **CURVES:** **SIMPLE CURVES**: Types, Elements, Designation of curves, setting out of simple curves by linear methods (numerical problems on offsets from long chord & chord produced method), Setting out curves by Rankine's deflection angle method (No derivation), Numerical problems. **COMPOUND CURVES:** Elements, Design of compound curves, Setting out of compound curves, numerical problems (Case - 1 only). **REVERSE CURVE:** Between two Parallel straights (numerical problems on Equal radius and unequal radius).	8 Hours

Reference Books:

1. Surveying Vol I and Vol II, Punmia B.C, 16" Edition, 2016, Laxmi Publications, (P) Ltd, New Delhi ISBN- 10: 9788170088530 ISBN-10; 817008883
2. Plane surveying, Chandra A.M, 2'd Edition, 2015, New age International (P) Ltd., ISBN- 10: 8122438806
3. Surveying Vol I& Il, Duggal S.K, g' Edition, 2017, Tata Mc Craw Hill Publishing Co, ISBN- 10: 9781259028991 ISBN-10: 978125902899
4. Surveying, Vol I& I, Arora K.R, 2016, Standard Book House, ISBN-10: 8189401246 ISBN- 10: 8189401238
5. Surveying vol. I and II S.K. Duggal, 4th Edition, Tata McGraw Hill – Publishing Co. Ltd., New Delhi.

E books and online course materials:
www.civilenggebooks.com

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO	Course Outcome (CO)	Bloom Level
22CV34	CO1	Possess the knowledge of principles of surveying, methodologies and the techniques of measurement.	C2
	CO2	Understand use of leveling instruments and techniques of leveling operations and its applications.	C3
	CO3	Acquire Knowledge about contouring and calculate the areas and volumes.	C3
	C04	Use of Theodolite in execution of different civil engineering problems determination of Height of inaccessible object using Trigonometric Levelling.	C3
	CO5	To set out the simple, compound and reverse curves.	C3

SURVEYING LAB

Course Code	22CVL35	CREDIT: 01
Number of Lecture Hours/Week	2 hrs (Practical)	SEE: 50 Marks
Total Number of Lecture Hours: 28	CIE: 50Marks	SEE: 03 Hours

Prerequisite: Mathematics

Course objectives:
To enable the student to acquire the knowledge in the following topics

Experiments	Teaching Hours
1.a) To Measure distance between two points by direct Ranging	02 Hours
1.b) To Set out perpendiculars at various points on a given line by linear methods.	02 Hours
2. Setting out of rectangle, pentagon and hexagon by compass and Chain	02 Hours
3. Closed traverse of a small area using chain and compass & adjustment of closing error by Bowditch's rule	02 Hours
4. Determination of reduced level of points using dumpylevel/auto level (simple leveling)	02 Hours
5. Determination of reduced level of points using dumpylevel/auto level (differential leveling and inverted leveling)	02 Hours
6. Determination of reduced level of points using dumpylevel/auto level (differential leveling and inverted leveling)	02 Hours
7. To determine the difference in elevation between two points using Reciprocal leveling and to determine the collimation error.	02 Hours
8. To conduct profile leveling, cross sectioning and block leveling. Plotting profile and cross sectioning in excel. Block contour on graph paper to scale.	02 Hours
9. To Determine the difference in elevation between two points by conducting Fly Levelling Also Carryout Fly Back Levelling calculate the RL of Points by RISE and FALL method	02 Hours
10. Measurements of horizontal angles by Reiteration method using transit theodolite.	02 hours
11. Measurement of vertical angle using transit Theodolite.	02hours
12. To Determine Distance and elevation of an inaccessible object using single plane	02hours

method.	
13. To Determine the Distance and Elevation of an object using double plane method when the base of an object is inaccessible.	02 hours
14. To Setout simple circular curve using Rankine's deflection angle method	02 Hours
15. Demonstration of Digital Planimeter.	02 Hours

Question paper pattern:

Conduct any one experiment by picking up student and he has to prepare writeup and conduct experiment.

Text books:

1. B.C. Punmia, "Surveying Vol.1 & 2", Laxmi Publications pvt. Ltd., New Delhi –2009.
2. Kanetkar T P and S V Kulkarni, Surveying and Leveling Part I & II, Pune VidyarthiGrihaPrakashan,1988

Reference Books:

1. S.K. Duggal, "Surveying Vol.1", Tata McGraw Hill Publishing Co. Ltd. NewDelhi.2009.
2. K.R. Arora, "Surveying Vol. 1 & 2" Standard Book House, New Delhi. –2010
3. R Subramanian, Surveying and Leveling, Second edition, Oxford UniversityPress, New Delhi

A. Bannister, S. Raymond, R. Baker, "Surveying", Pearson, 7th ed., New Delhi

E books and online course materials:
www.civilenggebooks.com

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)	Blooms Level
22CVL35	**CO1**	Demonstrate the concepts of Surveying through series of experiments.	C2
	CO2	Share the responsibilities in small teams of 4-5 members for conducting the experiments.	C3
	CO3	Perform the various experiments on surveying and leveling.	C3
	CO4	Analyse the data and interpret the results.	C4
	CO5	Prepare a well-organized laboratory report.	C3

<table>
<tr><td colspan="3" align="center">**BUILDING MATERIALS**</td></tr>
<tr><td align="center">Course code</td><td align="center">22CV36A</td><td align="center">Credit: 03</td></tr>
<tr><td align="center">Hours/Week</td><td align="center">3 hours. (Theory)</td><td align="center">SEE: 50 Marks</td></tr>
<tr><td align="center">Total hours: 42Hrs</td><td align="center">CIE: 50 Marks</td><td align="center">SEE: 3 hours</td></tr>
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Prerequisite:

Course objectives:
To enable the student to acquire the knowledge in the following topics.
1 Understand the behaviour and properties of Engineering materials
2 Recognize various types of engineering materials used in construction industry
3 Compare behaviour of various engineering materials in construction industry
4 Describe properties of Smart engineering materials and fibres in civil engineering

Modules	Teaching Hours
Module I **Stones:** Engineering Rock Classification, Physical properties of minerals, major rock forming minerals, occurrence and use of minerals. Introduction to major rock types (Igneous, sedimentary and metamorphic rocks); their genesis, classification and structures; Engineering properties of rocks, advantages and disadvantages of different rock types at constructions sites. Common building stones in India and its uses as per IS codal recommendations **Brick** : Classification and composition of bricks, qualities of good bricks, tests on bricks.	6 Hrs
Module II **Timber:** Classification of timber, qualities of good timber, common timbers used for building work, Types of plywood, Ply board, properties and applications. Bamboo as building material Glass: Types of glass and its engineering properties for use in construction	6 Hr
Module-III **Metals:** Types and properties of Iron and Steel – Manufacturing process of steel – Advantages of new alloy steels – Properties and advantages of aluminium and application. HYSD and TMT bars Materials **Clay products:** ceramics –Refractories Fibre Textiles – Geosynthetics for Civil Engineering applications, Polymers in Civil Engineering.	7 Hr
Module -IV **Smart Construction Materials:** Introduction, Shape cemory alloys, Magnetostrictive Materials, Piezoelectric materials, Electro rheological and electrochromic materials-applications in civil engineering. **Fibres:** Carbon fibres, CFRP, Polyfibres, Pre-Preg Carbon fibres, reinforced polymers and polyesters	8 Hrs

Module – V	
Miscellaneous Materials: Adhesives, Asbestos, Thermopolis, Fibers, Heat insulating materials, Sound insulating materials, Geosynthetics **Construction and demolition waste:** Waste disposal, categories of waste, properties of C&D waste, waste utilization criteria, Recyclable and non-recyclable C&D waste, BIS codal provisions	6 Hrs

Course Outcomes: On completion of this course, students are able to:

CO	
CO1:	Explain the properties of engineering materials
CO2:	Select suitable various types of engineering materials to be used in construction industry and utilization of construction and demolition waste.
CO3:	Examine the behaviour of various engineering materials in construction industry
CO4	Illustrate the properties of Smart engineering materials and fibres in civil engineering
CO5	Select suitable engineering materials for insulation,

Question paper pattern:
iii)   Two questions are to be set from each module.
iv)Total five questions are to be answered by selecting minimum one question from each module

Text book:

1.Engineering and General Geology ,Parbin Singh, Edition 2013, S.K. Kataria & Sons, ISBN 10: 9350142678
2. Engineering Materials 1, An Introduction to Properties, Applications and Design , D.R.H. Jones , Michael F. Ashby , Butterworth-Heinemann, 5th Edition, 2018, ISBN-10: 0081020511
3. Engineering Materials , Rangawala, 43rd Edition,2007, Publisher: Charotar Publishing House Pvt. Ltd, ISBN-10: 9385039172
4. Basic Civil Engineering, Sateesg Gopi , 2009, Pearson publication, ISBN 9788131729885

Reference books:
1. Mohan rai and M. P. Jai Singh "Advanced Building Materials and Construction" CBRI Publication Roorkee.
2. Parbin Sing "Civil Engineering Materials ", S. K. Kataria and Sons Publications, New Delhi.
3. K. S. Manjunath "Materials of Construction", Sanguine Technical Publishers, Bangalore.

COURSE TITLE: RURAL, URBAN PLANNING AND ARCHITECTRE

Course code	22CV36B	Credit:03
Hours/Week	3 hours (Theory)	SEE:50Marks
Totalhours:42	CIE:50Marks	SEE:3hours

Prerequisite: None

Course objectives:

1. To make the student understand about the past and present architecture of different parts of the world
2. Rural and urban planning and growth and circulation of patterns and effect of increase in urbanization
3. The basic planning required for urban and rural centres with respect to physical and social aspects
4. Student s to visit the different place of architecture monuments to understand the concept
5. To understand different types of architecture and planning

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.
1. The architecture of India has to be understood and few exercises must be given.
2. Student has to visit different cities to understand architecture and planning concepts
3. Online courses to understand the basics
4. YouTube videos
5. Power point presentations

Modules	Teaching Hours
ModuleI Introduction: Aim and importance of Architecture, Architecture as a fine art. Role of an architect and anengineer. Essential principles and qualities of architecture with examples Factors of architecture: Mass, Form, Colour, Solids, and Voids, Uniformity, Balance and Symmetry, Paintingwith examples.	9hours
Module II Architectural influence of the following: Association, Tradition, Climate, Materials, Topography, Religion social customs and aspiration of time. Architectural characteristics of the following architecture with examples. 1. Egyptian, 2. Greek, 3. Roman, 4. Buddhist, 5. Hindu, 6. Jain, 7. Chalukyan, 8. Modern architecture Factors that have influence present day Modern Architecture, Aesthetic difference between the past and present Architecture. Students are advised for a technical tour related Architecture and town planning to gain additional knowledge in this subject	8hours

Module-III	
Human settlements, Rural and urban pattern of growth, Factors that promote growth and development of Rural and urban areas Ancient Town Planning in India: Principles of town planning and circulation pattern with examples	9hours

Module-IV	
Industrialization: Impact on town planning, Urbanization causes, its effect on town and cities, remedial measures both in urban and rural planning Circulation pattern in cities: Urban roads and streets, their functional classification, traffic survey data and its use in town planning	8hours

Module - V	
Contemporary objectives and methods of planning of town: Development plans for cities, objectives and stages involved in their preparation and implementation, space standards for planning.	8hours

Course Outcomes: On completion of this course, students are able to:

CO	
CO1:	Understand importance of architecture in rural and urban planning
CO2:	Understand Influence of architecture
CO3:	Design infrastructure for rural and urban region
CO4	Plan and design rural and urban roads
CO5	To know Scope and Importance of architecture, Architecture education, Important architectural structures

Question paper pattern:
1. Two questions are to be set from each module.
2. Total five questions are to be answered by selecting minimum one question from each module

Books
1. History of Architecture – Fletcher
2. Urban pattern – Galliaon
3. Indian architecture – Vol. I & II – Perey Brown
4. Principle of town and country planning – Lewis Keeble
5. Urbanization and Urban Syatems in India, Ramachandran R, Oxford University Press, New Delhi.
6. Town planning – Rangwala, Charothar Publication

COURSE TITLE: Sustainable Design Concept for Building Services		
Course code	22CV36C	Credit:03
Hours/Week	3 hours (Theory)	SEE:50Marks
Totalhours:42	CIE:50Marks	SEE:3hours

Prerequisite: None

Course objectives:
1. To facilitate learners to understand sustainable building designs and its parameters such as energy and water efficiency, Comfort in buildings, and waste management.
2. To expose the learners to shading systems, thermal and visual comfort.
3. To impart fundamental knowledge on Life cycle assessment and Green ratings and certifications.

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.
   1.Videos to teach, providing activities and assignments.
   2.Power Point presentation during online expert sessions.
   3.Hands-on software exercises through virtual classrooms.

Modules	Teaching Hours
Module I **Introduction to Sustainability and Climatology:** Overview of Sustainability – Global energyscenario, carbon footprint and climate action, Net zero in carbon offsetting, Water neutral, Sustainable construction and resource management. Green buildings - Selection of site –preservation and planning, Influence of climate on buildings, Basics of climatology, Earth – Sun relationship, Solar angles and sun path diagram, Design of shading systems.	9hours
Module II **Comfort in Buildings:** Thermal comfort – Basics of Thermodynamics, Convection/radiation heat transfer, Heat gain through various elements of a building, Thermal comfort models and case studies Acoustics – Building acoustics, measures, defects and prevention of sound transmission Indoor Air Quality – Effects, design consideration and integrated approach for IAQ management Visual comfort – Enhancement strategies for Daylighting and Artificial	8hours
Module-III **Energy, water efficiency and waste management in buildings:** Energy efficiency – Energy efficiency in building envelope and energy efficient HVAC and Lighting as per Energy conservation building code (ECBC) 2017, Energy simulation, Energy management system – Renewable energy and Energy Audit. Water Efficiency – Planning and design of water management system, Rain water harvesting, Water efficient design and fixtures, Treatment andreuse and Water efficient landscape system. Waste management – Types of waste and its treatment methods, Construction and	9hours

demolition waste management, Waste management in residential, commercial buildings, healthcare facilities.		
Module-IV		
Life Cycle Assessment of Buildings and Green project management: Materials – Green product certifications, features of sustainable building materials and sustainable alternatives for structural, envelope and finishing materials. Low carbon cement, Zero emission bricks and lean construction practices. Life cycle assessment and its types – Modelling and Analysis Greenhouse gas emission. Different phases of Green building project management.	8hours	
Module - V		
Sustainable rating systems: Green building rating systems- LEED, BREEAM and others,Indian Green building rating systems – IGBC & GRIHA. IGBC criteria for certification -site selection credits, pre-design credits, detailed design credits, pre-construction credits, construction credits, post construction credits.	8hours	

Course Outcomes: On completion of this course, students are able to:

CO	
CO1:	Comprehend sustainable design, climatology, shading system and analyze heat transfer mechanism in buildings
CO2:	Assess the design considerations and parameters for thermal comfort, visual comfort, indoorair quality and acoustics
CO3:	Develop solutions for energy efficiency, water efficiency and waste management in buildings
CO4	Adopt green project management methodology and evaluate building life cycle assessment
CO5	Implement green practices during construction and operation phase of the buildings forachieving green rating

Question paper pattern:
1. Two questions are to be set from each module.
2. Total five questions are to be answered by selecting minimum one question from each module

Books
1. HarharaIyer G, Green Building Fundamentals, Notion Press
2. Dr. Adv. HarshulSavla, Green Building: Principles & Practices
3. IGBC Green new building rating system - version 3.0 - Abridged reference guide
4. The Sustainable Habitat Handbook (6 Volume Set), GRIHA Version 2019
5. National Building Code – 2016, Volume 1&2, Bureau of Indian Standards
6. Energy Conservation Building Code – 2017 (with amendments up to 2020), Bureau ofEnergy Efficiency

COURSE TITLE: ENVIRONMENTAL PROTECTION AND MANAGEMENT		
Course code	22CV36D	Credit:03
Hours/Week	3 hours. (Theory)	SEE: 50 Marks
Total hours: 42	CIE:50Marks	SEE:3hours

Prerequisite:

Course objectives:
To enable the student to acquire the knowledge in the following topics.
1. Environmental management standards, sustainable production and consumption
2. Environmental quality objectives, zero discharge technologies
3. Environmental policy, legal and other requirements objectives and targets of Environmental management systems.
4. Environmental audit , waste audits and waste minimization planning
5. Hazardous waste characters , classification ,treatment and disposal methods

Modules	Teaching Hours
ModuleI Environmental Management Standards: Unique Characteristics of Environmental Problems-Systems approach to Corporate environmental management-Classification of Environmental Impact Reduction Efforts -Business Charter for Sustainable Production and Consumption-Tools, Business strategy drivers and Barriers -Evolution of Environmental Stewardship. Environmental Management Principles-National policies on environment, abatement of pollution and conservation of resources-Charter on Corporate responsibility for Environmental protection.	8hours
Module II Environmental Management Objectives: Environmental quality objectives-Rationale of Environmental standards: Concentration and Mass standards, Effluent and stream standards, Emission and ambient standards, Minimum national standards, environmental performance evaluation: Indicators, benchmarking. Pollution control Vs Pollution Prevention-Opportunities and Barriers-Cleaner production and Clean technology, closing the loops, zero discharge technologies	9hours
Module-III Environmental Management System: EMAS, ISO 14000 - EMS as per ISO 14001– benefits and barriers of EMS – Concept of continual improvement and pollution prevention - environmental policy – initial environmental review – environmental aspect and impact analysis – legal and other requirements- objectives and targets – environmental management programs – structure and responsibility – training awareness and competence- communication – documentation and document control – operational control – monitoring and measurement – management review.	9hours
Module-IV Environmental Audit: Environmental management system audits as per ISO 19011– Roles and qualifications of auditors-Environmental performance indicators and their evaluation-Non conformance-Corrective and preventive actions -compliance audits-waste audits and waste minimization planning-Environmental statement (form V)-Due diligence audit.	8hours

Module – V	
Applications: Applications of EMS, Waste Audits and Pollution Prevention Control: Textile, Sugar, Pulp & Paper, Electroplating, , Tanning industry. Hazardous Wastes-Classification, characteristics Treatment and Disposal Methods, Transboundary movement, disposal.	8hours

Course Outcomes: On completion of this course, students are able to:

CO	
CO1:	Understand the elements of Corporate Environmental Management systems complying to international environmental management system standards.
CO2:	Effluent and emission standards and clean technology
CO3:	legal and other requirements objectives targets of Environmental management systems.
CO4	Develop, Implement, maintain and Audit Environmental Management systems for Organizations
CO5	Pollution Prevention Control: Textile, Sugar, Pulp & Paper, Electroplating, , Tanning industry and Hazardous waste characters , classification ,treatment and disposal methods

Question paper pattern:
1. Two questions are to be set from each module.
2. Total five questions are to be answered by selecting minimum one question from each module

Reference books:
1. Christopher Sheldon and Mark Yoxon, Installing Environmental management Systems-a step by step guide Earthscan Publications Ltd, London, 1999.
2. ISO 14001/14004: Environmental management systems-Requirements and Guidelines-International Organisation for Standardisation, 2004
3. ISO 19011: 2002, Guidelines for quality and/or Environmental Management System auditing, Bureau of Indian Standards, New Delhi, 2002
4. Paul L Bishop Pollution Prevention: Fundamentals and Practice, McGraw- Hill International, Boston, 2000.
5. Environmental Management Systems: An Implementation Guide for Small and Medium-Sized Organizations, Second Edition, NSF International, Ann Arbor, Michigan, January 2001.

UNIVERSAL HUMAN VALUES-I			
Course Code	**22UHV37**	**Credits:1**	**CIE: 50**
Number of Lecture Hours/Week	**2hrs (Tutorial)**		**SEE: 50**
Total Number of Theory Hours	**14 hours**		**SEE Hours: 03**

Course Objectives:

1. To help the students appreciate the essential complementarily between 'VALUES' and 'SKILLS' to ensure sustained happiness and prosperity, which are the core aspirations of all human beings.

2. To facilitate the development of a Holistic perspective among students towards life and profession as well as towards happiness and prosperity based on a correct understanding of the Human reality and the rest of Existence. Such a holistic perspective forms the basis of Universal Human Values and movement towards value-based living in a natural way.

3. To highlight plausible implications of such a Holistic understanding in terms of ethical human conduct, trustful and mutually fulfilling human behaviour and mutually enriching interaction with Nature.

Modules	Teaching Hours
Module I **Introduction To Value Education:** Understanding Value Education, Need Of Value Education, Basic Guidelines For Value Education, The Content Of Value Education, The Process Of Value Education. **Self- Exploration As The Process For Value Education:** Starting To Observe Inside, What Is Self-Exploration? What Is Its Purpose?, Content Of Self-Exploration, Natural Acceptance, What Is The State Today?, What Is The Way Out? What Do We Need To Do?.	**3hrs**
Module II **The Basic Human Aspirations- Continuous Happiness And Prosperity:** Continuous Happiness And Prosperity- Our Basic Aspiration, Exploring Happiness And Prosperity, A Look At The Prevailing Notions Of Happiness And Prosperity, Some Possible Questions/ Confusions. **The Program To Fulfill Basic Aspiration:** Basic Requirements For Fulfillment Of Human Aspirations, What Is Our State Today?, Why Are We In This State?- Living With Wrong Assumptions, What Is The Solution?- The Need For Right Understanding, Our Program: Understand And Live In Harmony At All Levels Of Living, Our State Today?, Our Natural Acceptance For Harmony At All Levels Of Our Living, Human And Animal Consciousness.	**3hrs**

Module III	
Understanding The Harmony At Various Levels: Understanding The Human Being As Co-Existence Of Self(I) And Body, Human Being Is More Than Just The Body, Understanding Myself As Coexistence Of Self And The Body, Understanding The Needs Of The Self And Needs Of The Body, Understanding The Self(I) As A Conscious Entity, The Body As The Material Entity, Exercise On Distinguishing Needs Of The Self(I) And The Body, Exercise On Distinguishing Activities Of The Self(I) And Body, Understanding The Body As An Instrument Of 'I'(I Being The Seer, Doer And Enjoyer). **Harmony In Self(I)- Understanding Myself:** Why Should I Study Myself?, Getting To Know The Activities In I Related?, The Activities In I Are Continuous, What Is The Problem Today?, Effects Of The Problem, What Then Is The Solution?, Result Of Realization And Understanding-Living With Definiteness. **Harmony With The Body- Understanding *Sanyama* And *Svashtya:*** Our Body- A Self-Orgnaised Unit, Harmony Of I With The Body: *Sanyama* And *Svashtya*, What Is Our State Today?, What Is The Way Out?, Understanding And Living With Sanyama, Correct Appraisal Of Our Physical Needs.	**3hrs**
Module IV	
Harmony In The Family- Understanding Values In Human Relationships: Family As The Basic Unit Of Human Interaction, Harmony In The Family, Justice*(Nyaya)*, What Is The State Today?, Values In Human Relationships, Trust(*Visvasa*),Respect(*Sammana*), The Basis For Respect, Assumed Bases For Respect Today, The Problem Due To Differentiation, Difference Between Attention And Respect, What Is The Way Out?, Affection (*Sneha*), Care(*Mamata*), Guidance(*Vatsalya*),Reverence(*Shraddha*),Glory(*Gaurava*),Gratitude(*Kritagyata*),Love(*Prema*), Harmony From Family To World Family: Undivided Society. **Harmony In The Society-From Family Order To World Family Order:** Extending Relationship From Family To Society, Identification Of The Comprehensive Human Goal, Where Are We Today?, Programs Needed To Achieve The Comprehensive Human Goal: Five Dimensions Of Human Endeavour, Education-Right Living (*Siksha-Sanskara*), Health-Self-Regulation (*Svasthya-Sanyama),* Justice-Preservation (Nyaya-Suraksha), Production-Work (*Utpadana-Karya*), Exchange-Stotage (*Vinimaya-Kosa*), What Is Our State Today?, Harmony From Family Order To World Family Order: Universal Human Order.	**3hrs**
Module V **Harmony In Nature-Understanding The Interconnectedness And Mutual Fulfillment:** The	**2hrs**

Four Orders Of Nature, Incconnectedness And Mutual Fulfillment (Parasparta And Paraspara Purakata), Recyclability And Self-Regulation In Nature, Understanding The Four Orders- Things (Vastu), Activity(Kriya), Innateness(Dharana), Natural Characteristic(Svabhava), Basic Activity, Conformance(Anu-Sangita), Human Beings-Our State Today, What Is The Way Out?.

Harmony In Existence-Understanding Existence As Co-Existence: An Introduction To Space (Sunya), Co-Existence Of Units In Space, Limited And Unlimited, Active And No-Activity, Energised And Energy In Equilibrium, Each Unit Recognizes…. Space Is Reflecting Or Transparent, Self-Organised And Self-Organisation Is Available, Existence Is Co-Existence, What Are We Doing Today?, Where Do We Want To Be?

Text Books:

1. The Text Book R.R Gaur, R Sangal, G P Bagaria, A Foundation Course In Human Values And Professional Ethics, Excel Books, New Delhi, 2010, ISBN 978-8-174-46781-2.
2. The teacher's manual R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010

Reference Books:

1. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.
2. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.
3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991
4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA
5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.
6. Subhas Palekar, 2000, How to practce Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.
7. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.
8. E.F. Schumacher, 1973, Small is Beautful: a study of economics as if people mattered, Blond & Briggs, Britain.
9. A.N. Tripathy, 2003, Human Values, New Age International Publishers.

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO	Course Outcome (CO)
	CO1	The students are able to see that verification on the basis of natural acceptance and experiential validation through living is the only way to verify right or wrong, and

22UHV37		referring to any external source like text or instrument or any other person cannot enable them to verify with authenticity; it will only develop assumptions
	CO2	The students are able to see that their practice in living is not in harmony with their natural acceptance most of the time, and all they need to do is to refer to their natural acceptance to remove this disharmony
	CO3	The students are able to see that lack of right understanding leading to lack of relationship is the major cause of problems in their family and not the lack of physical facilities in most of the cases, while they have given higher priority to earning of physical facilities in their life ignoring relationships and not being aware that right understanding is the most important requirement for any human being
	CO4	The students feel confident that they can understand the whole existence; nothing is a mystery in this existence. They are also able to see the interconnectedness in the nature, and point out how different courses of study relate to the different units and levels. Also, they are able to make out how these courses can be made appropriate and holistic.
	CO5	The students are able to grasp the right utilization of their knowledge in their streams of Technology/Engineering/ Management to ensure mutually enriching and recyclable productions systems.
	CO6	The students are able to sincerely evaluate the course and share with their friends. They are also able to suggest measures to make the course more effective and relevant. They are also able to make use of their understanding in the course for a happy and prosperous society.

COURSE TITLE: MICROSOFT EXCEL AND VISUAL BASICS APPLICATION LAB

Course code	22CVAE381	Credit:1
Hours/Week	2 hours. (Practical)	SEE: 50 Marks
Total hours: 28 hours	CIE: Marks: 50	SEE:03 hours

Prerequisite: Basic Computer knowledge

Modules	Teaching Hours
Module I Introduction to Worksheet and MS Excel – Getting Started with Excel – Editing Cells and using Commands and Functions – Excel Functions – Range – Moving and Copying, Inserting and Deleting Rows and Columns – Formatting a Worksheet – Formatting Numbers.	9 hours
Module II Creating Charts – Resizing and Moving the Chart – Changing the Chart Type – Controlling the Appearance of a Chart – Updating, Modifying and Deleting a Chart – Previewing and Printing Charts – Using Date and Time in a Worksheet – Naming Ranges and Using Statistical, Math functions.	9 hours
Module-III Introduction to Visual Basic, Integrated development environment features – Forums – Controls – Events – Methods – Properties - Uses of Property Window – Code Window (Code Behind File) – Variable declaration.	8 hours
Module-IV Scope of Variables – Constant – Array – Loops in Visual Basic: For ... Next, While, Do...While - Select statements: if...end if - if...else if...end if - Select...Case End Case -	8 hours
Module - V Standard Controls: Form - Text Box – Command Button – Label Box – Check Box – Frame Control – Combo Box – List Box – Radio Button - Image Control - Picture Box – Timer.	8 hours

Question paper pattern:
1. Two questions are to be set from each module.
2. Total five questions are to be answered by selecting minimum one question from each module

Textbook:

1. Mastering Visual Basic 6 – BPB Publications, New Delhi.

2. Mohammed Azam, Programming with Visual basic 6.0 – Vikas Publishing House.

3. Test Your Vb.Net Skills: Language Elements Part 1 Paperback – 1 Dec 2000 by Yashavant P. Kanetkar (Author), Asang Dani, BPB Publications, New Delhi.

COURSE TITLE: SMART URBAN INFRASTRUCTURE

Course code	22CVAE382	Credit:1
Hours/Week	2 hours. (Theory)	SEE: 50 Marks
Total hours: 28 hours	CIE: Marks: 50	SEE:03 hours

Prerequisite: None

Course objectives:
1. Knowing about Urban Infrastructure Systems & their Management
2. Knowing about Smart Cities Key Concepts
3. Understand the Transport and Energy Smart Urban Infrastructure and Services
4. Developing Feasibility Studies for Smart City Services
5. Understand the Global Context of Smart Cities

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.
1. You Tube videos and online study material
2. PPT.
3. Assignments and quiz to explore more on smart cities

Modules	Teaching Hours
Module I Introduction to Smart Urban Infrastructures and Smart Cities: Introduction to smart city, Basic concept of developing smart city, Global standards to create smart city. Different conceptual approaches to Smart Cities and discussing the pros and cons of each approach. Smart urban Infrastructure: List of infrastructure facilities, advantages and disadvantages.	9 hours
Module II Smart Urban Energy Systems: Introduction to Smart Energy Systems, Government policy and technology. Energy sector to explore some of the most important managerial considerations in the transition phase and operation of Smart Urban Energy Systems	9 hours
Module-III Smart Transportation Technologies: Introduction to smart transportation system, Mode of transport systems for smart city, data collection to arrive at best transport facility. Significant opportunities and threads for legacy urban transportation systems. Managerial considerations to facilitate the transition phase, and operation of Smart Urban Transportation Systems	8 hours
Module-IV Towards Smart Cities: Important factors in the transition phase of legacy cities to Smart citiesand their managerial implications	8 hours

Module - V	
Towards Smart Cities: Management of Smart Cities calls for different approaches from conventional urban management approaches. The role of city government in the network of actors who play an important role in management of Smart Cities..	8 hours

Course outcome (Course Skill Set)

At the end of the course the student will be able to:
1. Understand the concept of smart city
2. Play the role of a civil engineer in providing smart infrastructure
3. Design efficient energy system for smart city
                    Analyse and design efficient transport system

Question paper pattern:
1. Two questions are to be set from each module.
2. Total five questions are to be answered by selecting minimum one question from each module

Suggested Learning Resources:
Books
1. Infrastructure for Smart Cities, Dr. R P Rathaliya, Shree Hari Publications, 2021
2. Building Smart Cities, ISBN-13 978-1032340128, by Carol L. Stimmel, 2022
3. Smart Cities for Sustainable Development, Ram Kumar Mishra, Ch Lakshmi Kumari, SandeepChachra, P.S. Janaki Krishna, Springer, ISBN-13 978-9811674099, 2022

DIGITAL DRAFTING FOR CIVIL ENGINEERS LAB

Course Code	22CVAE383	Credit:01
Number of Practical Hours/Week	2 Hrs. Practical	SEE: 50 marks
Total Number of Practical Hours: 28	CIE: 50 marks	SEE Hours: 03

Prerequisite: none

Course objectives:

To enable the student to acquire the knowledge in the following topics

1. Understand the concept of AutoCAD and application.

2. Create various types of building plans, Elevations etc.

3. Create centre line diagrams for various types of building plans.

4. Create Line diagram for various services in a building.

Modules	Teaching Hours
Module 1 Introduction to AutoCad, Usage of AutoCAD tool commands like Line, circle, rectangle, polyline, trim, extend, copy, mirror, rotate, erase, offset, move, array, scale, fillet, explode, text, layers, coordinate system, import and exporting of data from various software and its compatibility	**02hours**
Module III Development of plan, elevation and section elevation for 1. One storey residential building 2. Two storeyed residential building	**06 hours**
Module III Centre line diagram for Primary school building, Primary health centre and foundation center line diagram for load bearing and RCC structures in AutoCAD software	**04 hours**
Module IV Line diagram for preparation of water supply, sanitary, electrical layouts and rain water harvesting	**02 hours**

Course Code	CO#	Course Outcomes	Blooms Level
Text Book: AutoCAD User Manual			
Course outcomes: **On completion of the course, the student will have the ability to:**			
22CVAE383	**CO1**	Understand the concept of AutoCAD and application.	
	CO2	Create various types of building plans, Elevations etc.	
	CO3	Create centre line diagrams for various types of building plans.	
	C04	Create Elevations for various types of building plans.	
	CO5	Create Line diagram for various services in a building.	

COURSE TITLE: PERSONALITY DEVELOPMENT FOR CIVIL ENGINEERS

Course code	22CVAE384	Credit: 01
Hours/Week:2 Hrs	2 hours. (Theory)	SEE: 50 Marks
Total hours: 28 hrs.	CIE: 50 Marks	SEE: 03 hours

Prerequisite: None

COURSE OBJECTIVE:

TO ENABLE THE STUDENT TO AQUIRE THE KNOWELDGE IN THE FOLLOWING TOPICS.

Develop skills to embrace change,

Handle setbacks, and thrive in dynamic work environment

Improve both verbal and non-verbal communication abilities,

Build self-confidence, overcome self-doubt,

Able to assert oneself in professional settings.

Modules	Teaching Hours
Module I Define Personality, Determinants of Personality Development, Perception – Definition, Perceptual Process. Factors of Association – Relationship, Personality Traits, Developing Effective Habits, Emotional Intelligence.	3 hours
Module II Motivation, Introspection, Self-Assessment, Self-Appraisal & Self-development, Ego & Super Ego. Self Esteem, Mind Mapping, Competency Mapping Types of Personalities – Introvert, Extrovert & Ambivert person, Effective Communication & Its key aspects.	4 hours
Module-III Assertiveness, Decision-making skills, Conflict: Process & Resolution, Leadership & Qualities of Successful Leader. Interpersonal Relationship, Good manners & Etiquties, Effective Speech, Understanding Body language, projective positive body language.	3 hours
Module -IV Attitude – Concept -Significance -Factors affecting attitudes – Positive attitude–Advantages –Negative attitude-Disadvantages -Ways to develop a positive attitude	2 hours

Module – V	
Stress Management: Introduction, Causes, stress management techniques, Time management: Importance of time management, Techniques of time management, Time management styles.	2 hours

Course Outcomes: On completion of this course, students are able to:

CO	
CO1:	Personality, Determinants of Personality Development, & Factors of Association
CO2:	Motivation, Introspection, Self-Assessment, Self-Appraisal, Mind Mapping, Types of Personalities
CO3:	Decision-making skills, Conflict: Process & Resolution, Leadership & Qualities, Interpersonal Relationship, positive body language
CO4	Attitude – Concept -Significance attitudes – Positive attitude &Negative attitude
CO5	Stress Management, techniques, Importance of time management

Question paper pattern:
v)Two questions are to be set from each module.
vi)Total five questions are to be answered by selecting minimum one question from each module

Text book:
1. Personality Development Course BY SURYA SINHA
PUBLISHER: DIAMOND POCKET BOOKS PVT LTD.

2. Personality Development and Soft Skills BY BARUN K MITRA
OXFORD PUBLICATION.

3. Personality Development. – by Rajiv K. Mishra

Reference books:
1.Practical Personal Development: The Most Popular Personal Development Concepts BY Jim Stephens   RWG Publishing

IV Semester

Course Title **STRUCTURAL ANALYSIS**		
Course Code	22CV41	Credit: 04
Number of Lecture Hours/Week	3 Hours (Theory)	SEE: 50 Marks
Total Number of Lecture :42 Hrs	CIE: 50 Marks	SEE: 03 Hours
Prerequisite: Engineering Mechanics, Strength of material		

Course objectives:

To enable the student to acquire the knowledge in the following topics

1. Determine the degree of freedom and degree of redundancy of structures and analyse the trusses

2. Analysis beams, frames& trusses for displacements using strain energy methods.

3. Analysis arches, cables and analysis of beams by slope deflection method

4. Analysis of beams and frames by moment distribution method

5. Analysis of beams and frames by Kani's method.

Modules	Teaching Hours
Module I **Structural systems:** Forms of structures. Determinate and indeterminate structures. Static and Kinematic Indeterminacy of structures. principle of superposition. linear and non-linear structures. **Plane trusses:** Introduction, analysis of trusses by method of joints and by method of sections.	8 hours
Module-II **Strain energy:** Strain energy and complimentary strain energy. Strain energy due to axial load, bending and shear, theorem of minimum potential energy, Law of conservation of energy, Clarke -Maxwell`s theorem of reciprocal deflection & Castigliano's theorems. Numerical examples on beams & frames. **Arches and cables:** Analysis of three hinged parabolic arches and circular arches. (Support at same levels and different levels). Analysis of cables under point loads and UDL, length of cables (support at same levels only) Numerical problems	8 hours

Module -III	
Slope & deflection method: Analysis of continuous beams with & without sinking of supports by Slope deflection method Analysis of rigid Frames by Slope deflection method (Sway and Non-Sway).	8 hours
Module IV	
Moment distribution method: Analysis of continuous beams with & without sinking of supports Analysis of rigid frames (sway& Non sway) by moment distribution method	9 hours
Module -V	
Rotation contribution method (Kani.s method): Analysis of continuous beams by Kani's method. Analysis of rigid frames by Kani's method (Non sway frames only)	9 hours

Question paper pattern:

Two questions to be set from each module by inter-mixing the syllabus of respective module. Students have to answer any five full questions by selecting minimum one question from each module.

Text books:

1. Reddy C S, Basic Structural Analysis, Tata McGraw Hill, New Delhi.

2. Muthu K U. etal, Basic Structural Analysis, 2nd edition, IK International Pvt. Ltd., NewDelhi,2015.

3. Bhavikatti, Structural Analysis, Vikas Publishing House Pvt. Ltd, New Delhi,2002.

4. S Ramamrutham R Narayan .Dhanpath Rai Publishing company(P) Ltd New Delhi

Reference Books:

1. Hibbeler R C, Structural Analysis, Prentice Hall, 9th edition,2014.

2. Devadas Menon, Structural Analysis, Narosa Publishing House, New Delhi,2008.

3. Prakash Rao D S, Structural Analysis, University Press Pvt. Ltd,2007.

On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)
22CV41	**CO1**	Describe different types of structural systems and analyze plane trusses
	CO2	Analyze the beams, trusses and frames using energy principles and Analyze the arches and cables
	CO3	Analyze frames and beams by slope deflection method
	CO4	Analyze beams & frames by moment distribution method
	CO5	Analyze beams & frames by Kani's method. Analyze beams subjected to rolling loads

FLUID MECHANICS

Course Code	22CV42	CREDIT:04
Lecture Hours/Week	3hrs(Theory) + 2 hrs (Practical)	SEE: 50 Marks
Total Lecture Hours: 70	CIE: 50 Marks (40 M Thry + 10M Prct.)	SEE:03Hours + 02 Hrs

Prerequisite: Engineering Mathematics, Engineering Mechanics.

Course objectives:
To enable the student to acquire the knowledge in the following topics
1. Distinction between solid, fluid, liquid and gas. Classify the fluids and measurements of pressure by various types of manometers. Flow measurements through notches.

2. Hydrostatic forces on vertical, inclined and curved surfaces. Dynamics of fluid flow, Flow measurement over weirs

3. Types of flows in pipes and head loss in pipe due to friction and bends. Impact of Jets. Flow through pipes and flumes

4. Measurement of flow through orifice, notches and weirs. Pumps. Flow through Orifices and Mouth pieces.

5. Analyse Open Channel flow, Dimensions & Model studies. Pumps, Turbines.

Modules	Teaching Hours
Module I **Scope and importance of the subject.** Definition of fluid, distinction between a solid and a fluid, distinction between a liquid and a gas, Fluid continuum. Fluid properties and classification of Fluids: Mass density, specific volume, specific weight, relative density, viscosity, Newton's Law, compressibility, surface tension and capillarity and their units (SI systems) Pressure at a point in a static fluid – Pascal's law – Hydrostatic Pressure law, Atmospheric pressure, Absolute, gauge, and vacuum pressure, Simple U-tube manometer, U-tube Differential manometers, inverted U-tube monometer. Calibration of rectangular notch, triangular notch, Cipolletti notch.	14 hours
Module II **Hydrostatics:** Hydrostatics Forces on vertical & inclined plane surfaces, Hydrostatic forces on curved surfaces and center of pressure, pressure diagrams. Applications of total pressure and center of pressure on Dams, Roller gates, Tainter gates, sector gates, Sluice gates and pressure diagrams. Calibration of broad crested weir, ogee weir, plug sluice **Dynamics of Fluid Flow**: Euler's equation of motion in one dimension – Integration of Euler's equation, Bernoulli's equation, Limitations and modifications of Bernoulli's equation – Applications of Bernoulli's equation, Pitot tubes, Venturi meter,	14 hours

Module III	
Flow Through pipes: Types of flows in pipes, Reynolds's experiments – Reynold's number Laminar & turbulent flows, fluid friction in pipes - Head loss due to friction (Darcy Weisbach equation) Friction factors for commercial pipes, Minor losses in pipes, pipes in series,equivalent pipe and pipes in parallel, Introduction to Impulse – momentum equation and its application on pipe bend. Water hammer analysis and Surge tanks Definition of pump, difference between pump & turbine, classification, Description & general principle of working, priming & methods. Work done & efficiencies of a centrifugal pump. Determination of constants of Parshall flume, minor losses through pipes, hydraulic coefficient of small circular orifice.	14 hours
Module IV	
Flow measurements: Flow through a small orifice. Hydraulic coefficients and experimental methods of determination. Flow through large rectangular orifices, submerged orifices. Flow through mouth pieces, external cylindrical mouth piece, hydraulic co-efficient, flow through internal or re-entrant Borda's mouth piece. Classification of Notches & weirs, Flow over rectangular Notch, Triangular Notch or weir Trapezoidal Notch, stepped Notch, Velocity of approach, Francis formula Flow, Cipolletti weir or Notch, Broad crested, ogee weir, submerged weir, effect on discharge over a rectangular weir due to end contraction and velocity approach, error in the measurement of head. Determination of friction loss through pipes, hydraulic coefficients of external cylindrical mouth piece. coefficient of discharge of venturi meter.	14 hours
Module V	
Open channel flow: Introduction to open channels, classification, difference between pipe flow & open channel flow, types of flow, geometric properties of open channels, Uniform flow in open channels, Chezy's and Manning's formulae, Problems on uniform flow, Most economical section of open channel flow, Derivation of conditions for most economical rectangular, triangular and trapezoidal sections. Problems on most economical sections. Most economical circular channels derivations and problems, **Dimensional analysis & model similitude**: Introduction to Dimensional Analysis unit & dimensions, Table of Dimensions, Dimensional Homogeneity, Methods of Analysis, Rayleigh's & Buckingham's method. Problems on Rayleigh's & Buckingham's methods, Model Studies, Introduction, Similitude, Dimensionless parameters. Types of models. Froude's models theory & problems. Reynolds models, Problems, Scale effects. Study of performance of centrifugal pump, Francis turbine, Pelton wheel turbine.	14 hours
Question paper pattern:	

Two questions to be set from each Module by intermixing (in total 10). Students have to answer any five full questions by selecting one question from each module. In each module 10% weightage shall be given to questions related to Laboratory experiments.

Text books:

P N Modi and S M Seth, "Hydraulics and Fluid Mechanics, including Hydraulic Machines", 20th edition, 2015, Standard Book House, New Delhi

R.K. Bansal, "A Text book of Fluid Mechanics and Hydraulic Machines", Laxmi Publications, New Delhi

S K SOM and G Biswas, "Introduction to Fluid Mechanics and Fluid Machines", Tata McGraw Hill, New Delhi

Reference Books:

1. Victor L Streeter, Benjamin Wylie E and Keith W Bedford, "Fluid Mechanics", Tata McGraw Hill Publishing Co Ltd., New Delhi, 2008(Ed).

K Subramanya, "Fluid Mechanics and Hydraulic Machines", Tata McGraw Hill Publishing Co. Ltd.

3. K Subramanya, "Fluid Mechanics and Hydraulic Machines-problems and solutions", Tata McGraw Hill Publishing Co. Ltd.

J. F. Douglas, J. M. Gasoriek, John Swaffield, Lynne Jack, "Fluid Mechanics", Pearson, Fifth Edition.

Mohd. Kaleem Khan, "Fluid Mechanics and Machinery", Oxford University Press.

E books and online course materials:
www.civilenggebooks.com

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)	Blooms Level
22CV42	**CO1**	Identify basic properties of Fluids, measurement of fluid pressure	C2
	CO2	Analyze fluid pressure forces and design sluice gates, roller gates etc. Apply Bernoulli' s equation & its application on fluid flow problems	C4
	CO3	Analyze fluid flow through pipes, impact of jets on fluid machines.	C3
	CO4	Apply fluid flow phenomenon in flow measurement through orifices, mouth piece, notches and weirs	C2
	CO5	Identify basic principles of flow through open channels and organize the design parameters based on model studies.	C3

BUILDING CONSTRUCTION AND GEOLOGY

Course code	22CV43.	Credit: 04
Hours/Week	hours. (3+1) (Theory/Practical)	SEE: 50 Marks
Total hours: 42Hrs	CIE: 50 Marks	SEE: 3 hours

Prerequisite:

Course objectives:
 To enable the student to acquire the knowledge in the following topics.

1. Preparing job layout, Properties of bricks and bonds in brickwork
2. Types of stone masonry, materials and methods of damp proofing courses.
3. Types of stairs and design of doglegged stair.
4. Roof, insulating materials and types of plastering.
5. Types of doors, windows, flooring and paints

Modules	Teaching Hours
Module I **Construction of substructure and super structure**: Job Layout; site clearance, preparing job layout, layout for load bearing and framed structure by center line method and face line method, precautions	3 Hrs
Foundation: Introduction, Requirements of good foundation, types of foundation	6 Hrs
Brick Masonry: Brick Masonry: Definition of terms used in masonry, bonds in brick work, English bond, Flemish bond, Reinforced brick work.	
Module II **Stone Masonry**: Rubble Masonry, Coursed and Un-coursed rubble masonry, Ashlar masonry, Shoring, Under Pinning and Scaffolding.	6 Hr
Damp Proof Course: Materials used for damp proof course, D.P.C Treatment in building methods of treatment to foundations, treatment to floors, walls and slabs, Concrete paver blocks.	3Hrs
Module-III **Stairs**: Types (classifications) and technical terms in stairs, requirements of a good stair, geometric design of R.C.C dog legged and open well stairs (Plan and Sectional elevation of stairs).	4Hs
Types of flooring: (Materials and method of laying), Granolithic, Mosaic Ceramic, Marble, Polished Granite types and applications, Industrial flooring	5 Hr

Module -IV	
Doors: Types, Paneled doors, glazed doors, flush doors. Windows: Types, Paneled Window, glazed Window.	4 Hrs
Plastering: Purpose of plastering, materials of plastering, lime mortar, cement mortar, masonry mortar, methods of plastering, Stucco plastering, Lath plastering	5 Hrs
Painting: Purpose of painting, types of paints, application of paints to new and old surfaces, distemper, plastic emulsion, enamel, polishing of wood surface.	
Module – V	
Roofs& Miscellaneous Materials: Sloped roof (R.C.C and tile roof), Requirements of good roofs.	4 Hrs
Green Buildings: Concepts and requirements. Energy conservation in buildings. Rating of buildings, Site selection, design concepts, materials and different certifications programs (IGBC AND LEED) Safety in construction Necessity and types of Personal protective equipment.	2 Hrs
Safety in construction Necessity and types of Personal protective equipment.	

GEOLOGY LAB

1. Physical properties of minerals: Identification of	2 Hrs
I. ROCK FORMING MINERALS - Quartz group, Feldspar group, Garnet group, Mica group & Talc, Chlorite, Olivine, Asbestos, Calcite, Gypsum, etc	2 Hrs
II. ORE FORMING MINERALS- Magnetite, Hematite, Pyrite, Pyralusite, Graphite, Chromite, etc	2 Hrs
2. Engineering Properties of Rocks: Identification of	2 Hrs
I. IGNEOUS ROCKS- Types of Granites, Dolerite, Granite Porphyry, Basalt, Pumice etc	2 Hrs
II. SEDIMENTARY ROCKS- Sandstone, Lime stone, Shale, Laterite, Breccia etc	1 Hrs
III. METAMORPHIC ROCKS- Gneiss, Slate, Schist, Marble, Quartzite etc	2 Hrs
	1 Hrs

3.. Dip and Strike problems. Determination of Apparent dip and True dip.

5. Calculation of Vertical, True thickness and width of the outcrops.

6. Three-point borehole problems.

7. Interpretation and drawing of sections for geological maps showing tilted beds, faults,

   unconformities etc.

8. Interpretation and drawing the GEOLOGICAL SECTION MAPS.

9. Field work– To identify Minerals, Rocks, Geomorphology and Structural features with related to the Civil Engineering projects.

Course Outcomes: On completion of this course, students are able to:

CO	
CO1:	Explain the ingredients of brick, different tests on brick and brick masonry.
CO2:	Compare different types of stone masonry and explain different types of DPC.
CO3:	Design the R.C.C dog legged stair case and explain roofing materials, miscellaneous materials.
CO4	Explain doors, windows, floors, and paints.
CO5	Expalin about Roofs & Miscellaneous materials and green buildings

Question paper pattern:
vii)   Two questions are to be set from each module.
viii)   Total five questions are to be answered by selecting minimum one question from each module

Text book:

1. B.C. PUNMIA "Building Construction", Lakshmi Publications, New Delhi.
2. SUSHIL KUMAR "Building Construction", Standard Publication and Distributors, New Delhi.
3. S.C. RANGWALA" Building Construction", Charter Publishing House, Anand, India.
4. Sushil Kumar "Engineering Materials", Standard Publication and Distributors, New Delhi.
5. S. C. Rangwala" Engineering Materials", Charter Publishing House, Anand, India.
6. P. G. Verghese" A Text Book of Building Materials", prentice-Hall of India Pvt Ltd, Publication.
7. R. K. rajpal" Engineering Materials", S.Chand and Company, New Delhi.

Reference books:
1. Mohan rai and M. P. Jai Singh "Advanced Building Materials and Construction" CBRI Publication Roorkee.
2. Parbin Sing "Civil Engineering Materials ", S. K. Kataria and Sons Publications, New Delhi.
3. K. S. Manjunath "Materials of Construction", Sanguine Technical Publishers, Bangalore.

CONCRETE TECHNOLOGY LAB

Subject code	22CVL44	Credit: 01
Hours/Week	2 hours. (Practical)	SEE: 50 Marks
Total hours: 28	CIE: 50 Marks	SEE: 3 hours

Prerequisite: Concrete Technology

Course objectives:

To enable students to acquire the knowledge in the following topics:

Modules	Teaching Hours
I Testing of cement	
Cement:	
Normal Consistency,	1 Hours
Setting time (Initial and Final)	1 Hours
Soundness by autoclave method,	1 Hours
Compression strength test	2 Hours
Fineness of cement.	1 Hours
Specific gravity of cement	1 Hours
II Testing of aggregate	
Water absorption and moisture content of aggregate.	1 Hours
Specific gravity and bulk density of coarse and fine aggregates	2 Hours
Fineness modulus of fine and coarse aggregate (sieve analysis).	1 Hours
Flakiness index and elongation index of coarse aggregate.	2 Hours
Impact value and crushing value of aggregate.	1 Hours
Tests on Concrete	
Workability tests- Slump cone test.	2 Hours
Compression factor test.	2 Hours
Vee Bee consistometer test.	2 Hours
strength tests Concrete:	

Compression Strength	2 Hours
Split tensile tests	2 Hours
Permeability of concrete	2 Hours
NDT Tests (Rebound Hammer Test and Ultra-pulse velocity Test) only Demonstration.	2 Hours

Course Outcomes: On completion of this course, students are able to:

CO	Course Outcomes	BL
CO1:	Demonstrate the concepts of CT theory course through series of experiments.	C2
CO2:	Sharetheresponsibilitiesinsmallteamsof4-5membersforconductingtheexperiments	C3
CO3:	Perform the experiments and determination of specific gravity, Setting time of cement, soundness and Tests on Hardened concrete.	C4
CO4	Analyze the data and interpret the results.	C3
CO5	Prepare a well-organized laboratory report.	C3

Question paper pattern:

Any one of the above experiments is to be conducted in the examination by the student.

Reference books:

1. M. L. Gambir, "Concrete Manual", Danpat Rai and sons, New Delhi

2. Shetty M.S, "Concrete Technology", S. Chand &Co. Ltd, New Delhi.

3. Mehta P.K, "Properties of Concrete", Tata McGraw Hill Publications, New Delhi

4. Relevant codes.

Nptel Link: https://youtu.be/cx5gPKp9QEc

<table>
<tr><td colspan="4">COURSE TITLE
BUILDING INFORMATION MODELLING IN ARCHITECTURE, ENGINEERING AND CONSTRUCTION</td></tr>
<tr><td>Coursecode</td><td>22CV45A</td><td colspan="2">Credit:01</td></tr>
<tr><td>Hours/Week</td><td>2 hours.
(Theory/Practical)</td><td colspan="2">SEE:50 Marks</td></tr>
<tr><td>Total hours: 28</td><td>CIE:50 Marks</td><td colspan="2">SEE:03 hours</td></tr>
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Prerequisite:

Course objectives:
To enable the student to acquire the knowledge in the following topics.
1. Develop building and infrastructure vocabulary to be able to describe a building, its components, and its systems, including the architectural, MEP (mechanical, electrical, plumbing), and structural components.
2. Describe evolution and development of BIM from it origination to today. Be able to compare, including advantages and disadvantages of BIM vs. 2D and 3D CAD.
3. Explain the challenges and roadblocks still facing the use of BIM.
4. Demonstrate proficiency of commonly used BIM software (Autodesk Revit), including project document development and professional presentation of a BIM model.
5. Understand applications of BIM, such as cost estimation, architectural renderings, interference checking, and modeling of energy consumption

Modules	Teaching Hours
Module I Introduction to/Review of Buildings & Systems ☐ Building components and systems (architectural, MEP, structural) ☐ Building vocabulary ☐ Building drawings, specifications ☐ Building design process and roles of owners, managers, designers, engineers and contractors/subcontractors	3 hours
Module II Introduction to BIM and BIM Concepts ☐ What is BIM? ☐ How can BIM be a part of the building design process? ☐ BIM vs. 3D CAD ☐ Evolution and development of BIM & object-based parametric modeling ☐ BIM platforms	3 hours
Module-III Autodesk Revit ☐ Mass and concept modeling ☐ Detailed modeling ☐ Creating, importing and modifying families of objects and elements ☐ Architecture, MEP and Structural applications ☐ Creating plans, sections, details, schedules, cover page	3 hours
Module-IV Future of BIM	3 hours

Module - V Miscellaneous Applications of BIM ☐ Cost Estimating ☐ Energy Modeling ☐ Conflicts/Interference checking	2 hours

Course Title: CONSTRUCTION EQUIPMENT, PLANTS AND MACHINERY		
Course Code	22CV45B	CIE: 50
Number of Lecture Hours/Week	3HRS. (THEORY)	SEE: 50
Total Number of Lecture Hours	42	SEE Hours: 03

Prerequisite: **None**

Course objectives:
This course enables students to
- Various type of equipments used in constructions advantage & limitations of these equipment.
- Manufacturing of natural aggregate & recycled aggregate through mechanization.
- Mechanization in rebar fabrication, concrete production, placement, types of form work & scaffolding and materials used.
- Construction of bridge/flyover by segmented construction and box pushing technology for tunneling &pile driving equipment.
- Construction methods of drilling blasting, tunneling &various equipments used in this construction.

MODULES	TEACHING HOURS
MODULE I Introduction to mechanization: Definition, advantages and limitations of mechanization, Indian scenario and Global scenario. Mechanization through construction equipment: Equipment cost, Machine power, production cycle-Dozers, scrapers, Excavators, finishing equipment, Trucks and Hauling equipment, Hoisting equipment, Draglines and Clamshells.	**10Hrs.**
MODULE II Mechanization in aggregate manufacturing: Natural aggregates and recycled aggregates	**8Hrs.**
MODULE III Mechanization in rebar fabrication Mechanization in concrete production and placement Mechanization through construction: Formwork and scaffolding types, materials and design principals.	**8Hrs.**
MODULE IV Mechanization through construction methods/technologies: Segmental construction of bridges/flyovers, box pushing technology for tunneling, trench-less technology. Pile driving equipment: Pile hammers, selecting a pile hammer, loss of energy due to impact, energy losses due to causes other than impact.	8Hrs.

MODULE V	
Mechanization through construction methods of drilling, Blasting and Tunneling Equipment: Definition of terms, bits, Jackhammers, Drifters, wagon drills, chisel drills, piston drills, blast hole drills,shot drills, diamond drills, tunneling equipment, selecting the drilling method equipment, selecting drilling pattern. Selecting andEnvironmental issues in mechanization.	8Hrs.

Question paper pattern:
i) **Two** questions are to be set from each module.
ii) Total five questions are to be answered by selecting minimum one question from each module

Text books:
1)construction equipments by , S.C.Sharma , Dr.S.Seetharaman

REFERENCES:
1. "Construction Equipment and its Planning and Applications", Mahesh Varma, Metropolitan Book Co.(P) Ltd.,New Delhi. India.
2. "Construction Machinery and Equipment in India". (A compilation of articles Published in Civil Engineering and
3. "Construction Review" Published by Civil Engineering and Construction Review,New Delhi, 1991.
4. Sharma S.C. "Construction Equipment and Management", Khanna Publishers, Delhi, 1988
5. Peurifoy R L, "Construction Planning, Equipment and Methods", Mc Graw Hill
6. James F Russell, "Construction Equipment", Prentice Hall
7. "Current Literature"

E books and online course materials: www.civilenggbooks.com

Course outcomes:
On completion of the course, the student will have the ability to:

Course Title	**CONCRETE TECHNOLOGY**	
Course Code	22CV45C	Credit: 01
Number of Lecture/weeks	2 Hrs (Theory)	SEE:50 Marks
Total Number of LectureHours: 28	CIE:50 Marks	SEE: 03 Hours

Prerequisite: none

Course objectives:

To enable the student to acquire the knowledge in the following topics

1. Hydration of cement and physical properties of cement and types of cement.
2. Physical properties of course and fine aggregate.
3. Design of concrete mix.
4. Fresh and hardened state property of concrete.
5. Testing of concrete.

Modules	**Teaching Hours**
Module I **Cement:** Manufacture of cement (OPC) by dry and wet process (Flow charts only). chemical composition and their importance, bogue's compounds, hydration of cement, heat of hydration. Tests on cement- Fineness by sieve test and Blaine's air permeability test, normal consistency, setting time, soundness, compressive strength of cement specific gravity of cement.	5 hours
Module-II **Aggregate:** Coarse aggregate, importance of size, shape, texture, grading of aggregates, sieve analysis Flakiness and Elongation, Specific Gravity, Moisture Content, Crushing, Impact, Abrasion tests.Fine Aggregate, Bulking of fine aggregate, Bulk Density, Ten percent Fineness Value, Sieve Analysis Specific Gravity. Deleterious Material and Introduction of M sand and recycled aggregates.	5 hours
Module -III **Fresh Concrete:** Workability-factors affecting, measurement of Workability-Slump, Compaction Factor, Vee-bee Consistometer, Flowtests. Segregation and Bleeding, Mixing, Placing and Compaction. Curing methods, Accelerated curing. **Admixtures**-plasticizer, superplasticizer, accelerators, retarders and airentraining agents.	6 hours

Mineral admixtures-fly ash and silica fume	
Module IV **Hardened Concrete:** Factors affecting strength- w/c, degree of compaction, age, aggregate/cement ratio, aggregate properties, maturity concept. Elasticity, factors affecting modulus of elasticity, relation between modulus of elasticity and Poisson's ratio, Introduction to RMC. **Testing:** Destructive testing-compressive strength, flexural strength, splittensile strength NDT by Schmidt rebound hammer test and ultra-Pulse velocity . Relation between tensile strength and compressive strength	6 hours
Module V **Shrinkage**- types of shrinkage, factors affecting shrinkage. Creep- factorsaffecting creep, effect of creep. Durability-importance, permeability, sulphate attack, chloride attack, carbonation, freezing and thawing. **Concrete Mix Design**: Factors to be considered in Mix Design, Mix Design by BIS method.	6 hours
Question paper pattern: Two questions to be set from each Module by intermixing (in total 10). Studentshave to answer any five full questions by selecting one question from each module.	
Textbooks**:** 1. Neville A.M. "Properties of Concrete"-4th Ed., Longman. 2. M.S. Shetty, Concrete Technology - Theory and Practice Published by S.Chand and Company, New Delhi. 3. Kumar Mehta. P and Paulo J.M. Monteiro "Concrete-Microstructure, Propertyand Materials", 4th Edition, McGraw Hill Education, 2014 4. A.R. Santha Kumar, "Concrete Technology", Oxford University Press, NewDelhi (New Edition).	
Reference Books: 1. M L Gambir, "Concrete Technology", McGraw Hill Education,2014. 2. N. V. Nayak, A. K. Jain Handbook on Advanced Concrete Technology, ISBN:978-81-8487-186-9 3. Job Thomas, "Concrete Technology", CENGAGE Learning,2015. 4. IS 4926 (2003): Code of Practice Ready-Mixed Concrete [CED 2: Cement andConcrete] Criteria for RMC Production Control, Basic Level Certification for Production Control of Ready Mixed Concrete BMTPC.	
E books and online course materials: www.civilenggebooks.com	

Course outcomes:

On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22CV45C	**CO1**	Explain manufacturing of cement and the significance of physical properties of cement.
	CO2	Describe and identify the requirements of good quality fine aggregate and coarse Aggregate.
	CO3	Design a concrete mix and explain the fresh state property requirements of concrete
	CO4	Evaluate the influence of different parameters on the properties of hardened concrete
	CO5	Analyze the quality of hardened concrete using the results of types of test

Course Title: **HYDROLOGY**		
Course Code	22CV45D	Credits: 03 CIE: 50
Number of Lecture Hours/Week	3 hrs	SEE: 50
Total Number of Lecture Hours	42 Hrs	SEE Hours: 03

Prerequisite: The students should have knowledge of Engg. Mechanics & water resources engineering

Course objectives: The students will be able to acquire knowledge in the following topics
1. Hydrological cycle & Measurement rainfall over a catchment.
2. Engineering Analysis of Rainfall data.
3. Rainfall-Runoff relationship & Analysis of stream flow data.
4. Hydrograph theory & Application to predict floods.
5. Ground water hydrology & Estimation of yield of well.

Modules	Teaching Hours
Module I **INTRODUCTION:** Introduction and practical application of Hydrology and water Resources. Hydrologic cycle (Hortion's Qualitative Representation) . Concept of Catchment and Water budget equation.	4 hours
PRECIPITATION: Definition and forms of precipitation Types of precipitation – seasons in India Measurement of precipitation – Non recording and recording type rain gauges. Computation of average depth of precipitation over an area. Statistical method. Estimation of mission precipitation record.	4 hours
ModuleII **ANALYSIS OF RAINFALL DATA**: Mass curve and consistency of rainfall data Rain gauge networks – optimum number of rain gauges, Hyetograph, Average & Maximum intensity curves, Depth area durationcurves. Problems on dependable rain, frequency analysis.	8 hours
Module III **RUNOFF & STREAM FLOW MEASUREMENT:** Components. Factors affecting runoff. Basin yield. Rainfall – Runoff relationship using simple regression analysis. Computation of maximum flood discharge by rational formula, Empirical equations, frequency analysis. Stream flow measurement, Stage of a river, area-velocity method. Slope area method, Dilution method, Units of stream flow, flow duration curve, flow mass curve.	9 hours

Module IV **HYDROGRAPH THEORY:** Components of hydrograph. Separation of base flow. Unit hydrograph theory. Derivation and application of unit hydrograph. Computation of unit hydrographs ordinates of different durations . S-Curve and its use. Computation of Run off Hydrograph using unit hydrograph. Unit hydrograph for complex storms.		9 hours
Module V **GROUND WATER HYDROLOGY AND WELL HYDRAULICS:** Scope and importance of ground water hydrology. Occurrence of ground water. Definitions: Aquifers, aquitard, aquifuge, aquiclude, perched aquifer. Aquifer parameters. Darcy's law and its validity. Steady radial flow into a well in confined and unconfined aquifers. Safe yield, yield of an open well Pumping test and recuperation test. problems		8 hours

Question paper pattern:
Two questions is to be set from each module by intermixing the topic in the same module. Total five questions to be answered by selecting minimum one question from each module.

Text books:
1. Subramanya K. Engineering Hydrology, Tata McGraw Hill, New Delhi.
2. R.K. Sharma and Sharma – Hydrology and Water Resource Engineering
3. Linsley, Kohler and Paulhus: Applied Hydrology, McGraw Hill, New Delhi
4. Jayarami Reddy P: A textbook of Hydrology, Lakshmi Publications, New Delhi

Reference Books:
1. Mutreja. K.M. Engineering Hydrology
2. H.M. Raghunath: Hydrology, Wiley Eastern Publications
3. Ven Tee Chow Handbook of applied hydrology
4. Garg. S.K: Hydrology and Water resources engineering, Khanna Publications
5. nic@karnic.in
6. Water resources systems and management B.L.Gupta & Amit Gupta Standard Publishers distributers Dheeli

E books and online course materials:
www.civilenggebooks.com

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO #	Course Outcome (CO)
22CV45D	**CO1**	Students will be in a position to analyze the rainfall dataand apply the principles to the real problems.
	CO2	Students in a position to understand runoff computationsand apply the principles.

	CO3	Students acquire the knowledge of hydrographs and itscomponents also students can apply the principles of various hydrographs to solve field problems.
	CO4	Students gain knowledge in ground water source andapply the principles to different problems.
	CO5	Students will acquire the skills to interpret the hydrological data pertaining to surface and ground water.

UNIVERSAL HUMAN VALUES-II

Course Code	22UHV47	Credits:1	CIE: 50
Number of Lecture Hours/Week	2hrs (Tutorial)		SEE: 50
Total Number of Theory Hours	14 hours		SEE Hours: 03

Course Objectives:

1. To facilitate the students to understand harmony at all the levels of human living, and live accordingly.
2. To facilitate the students in applying the understanding of harmony in existence in their profession and lead an ethical life.

Modules	Teaching Hours
Module I **Implications Of The Right Understanding: Providing The Basis For Universal Human Values And Ethical Human Conduct**- Value In Different Dimensions Of Humanliving, Universal Values Naturally Emerging From The Right Understanding, Defintiveness Of Ethical Human Conduct, Identification Of *Svatva* Leading To *Svatantrata And Svarajya*, Development Of Human Consciousness, Implications Of Value-Based Living.	**3hrs**
Module II **Basis For The Holistic Alternative Towards Universal Human Order**: Identification Of Comprehensive Human Goal, Vision For The Holistic Alternative, Basis For Humanistic Education And Humanistic Constitution, Universal Human Order And Its Implications.	**3hrs**
Module III **Professional Ethics In The Light Of Right Understanding:** Profession-In The Light Of Comprehensive Human God, Ensuring Competence In Professional Ethics, Issues In Professional Ethics-The Current Scenario, Inherent Contradictions And Dilemmas And Their Resolutions.	**3hrs**
Module IV **Vision For Holistic Technologies, Production Systems And Management Models**: The Holistic Criteria For Evaluation, A Critical Appraisal Of The Prevailing Systems, Learning From The Systems In Nature And Traditional Practices, Holistic Technologies And Systems- Typical Case Studies.	**3hrs**
Module V **Journey Towards the Holistic Alternative- The Road Ahead:** Appreciating The Need For Self-Exploration, Facilitating The Understanding Of Harmony At Various Levels, Steps For Evaluation At The Individual Level, Steps For Transition At The Level Of Family, Society And	**2hrs**

Profession, Promoting Mass Awareness And Moving Towards Humanistic Education, Evolving Holistic Models Of Living, Amending Policies, Programs And Social Systems In Tune With Comprehensive Human Goal, Is The Transition Too Difficult?, Concluding Remarks.

Text Books:

1. The Text Book R.R Gaur, R Sangal, G P Bagaria, A Foundation Course In Human Values And Professional Ethics, Excel Books, New Delhi, 2010, ISBN 978-8-174-46781-2.

2. The teacher's manual R.R Gaur, R Sangal, G P Bagaria, A foundation course in Human Values and professional Ethics – Teachers Manual, Excel books, New Delhi, 2010

Reference Books:

1. B L Bajpai, 2004, Indian Ethos and Modern Management, New Royal Book Co., Lucknow. Reprinted 2008.

2. PL Dhar, RR Gaur, 1990, Science and Humanism, Commonwealth Purblishers.

3. Sussan George, 1976, How the Other Half Dies, Penguin Press. Reprinted 1986, 1991

4. Ivan Illich, 1974, Energy & Equity, The Trinity Press, Worcester, and HarperCollins, USA

5. Donella H. Meadows, Dennis L. Meadows, Jorgen Randers, William W. Behrens III, 1972, limits to Growth, Club of Rome's Report, Universe Books.

6. Subhas Palekar, 2000, How to practce Natural Farming, Pracheen(Vaidik) Krishi Tantra Shodh, Amravati.

7. A Nagraj, 1998, Jeevan Vidya ek Parichay, Divya Path Sansthan, Amarkantak.

8. E.F. Schumacher, 1973, Small is Beautful: a study of economics as if people mattered, Blond & Briggs, Britain.

9. A.N. Tripathy, 2003, Human Values, New Age International Publishers.

Course outcomes: On completion of the course, the student will have the ability to:

Course Code	CO	Course Outcome (CO)
	CO1	The students are able to visualize the co-relation between lack of human values and the prevailing problems.
	CO2	They are also able to visualize tangible steps and a roadmap for moving in the cherished direction.
22UHV47	CO3	The students are able to visualize an appropriate utilization of the knowledge in their respective streams to ensure mutually enriching and sustainable systems.

	CO4	The students are able to sincerely evaluate the course and the transformation achieved in this process.
	CO5	They are also able to make use of this understanding for moving towards happy and prosperous life including an ethical conduct of their profession.

Finance for professionals		
COURSE CODE:	22CVAE481	Credit: 01
Hours/ week	(theory /practical): 14 / 0	SEE MARKS:50
TOTAL HOURS:14	CIE MARKS:50	SEE HOURS:
PREREQUISITE:		

COURSE OBJECTIVES:
TO ENABLE THE STUDENT TO AQUIRE THE KNOWELDGE IN THE FOLLOWING TOPICS.
1.How to manage finance and risk analysis
2.firm values and Cash Flow comparative Analysis.
3. Financial Statement Analysis
4. Foreign Exchange Markets, Financing Foreign Operations
5. Documents in International Trade, Financial Management in Sick Units

MODULE-I
Introduction: Evolution of Financial Management, Goals, Forms of Business.
Risk and Required Return: Risk and return relationship, Business risk, financial risk, and risk in expected rate of return, Capital asset pricing model. Capital Budgeting: Risk analysis in Capital Budgeting, HOURS: 03

MODULE-II
Capital Structure and Firm Value: Assumption, Definition and approaches, Capital Structure decisions – EBIT, EPS analysis, ROI, REI analysis and Cash Flow comparative Analysis. Working Capital Management: Factors influencing working capital requirement, HOURS: 03

MODULE-III
 Securities and Portfolio Analysis: Derivatives, Futures Trading, Financial Statement Analysis: Ratio analysis, time series analysis, Du pont analysis, funds flow analysis.
HOURS: 02

MODULE-IV
International Financial Management: World Monitoring system, Foreign Exchange Markets, International Parity Relationships, International Capital budgeting, Financing Foreign Operations,
HOURS: 03

MODULE-V
Raising Foreign Currency Finance, Financing Exports, Documents in International Trade. Financial Management in Sick Units: Definition of sickness, Causes of sickness, Symptoms of sickness, Prediction of sickness. HOURS: 03

Course Outcomes:
CO1: Financial Management, Risk and return relationship,& Risk analysis
CO2: Firm Value,Capital Structure decisions Factors influencing working capital requirement,
CO3: Futures Trading, Financial Statement Analysis:
CO4: International Financial Management, Financing Foreign Operations,
CO5: International Trade., Financial Management in Sick Units

Text Books:
 1.Financial Management Theory and practice – Prasanna Chandra
 2.Financial accounting – B.S. Raman – United publication – VoI II
 Reference Books:
 1. Financial Management Text & Problems – Khan & Jain – TMH – ISBN 007-460208-X.
2.   Financial management – IM Pandey – Vikas Pub. House – ISBN 0- 7069-5435-1.

TOTAL STATIONAPPLICATION IN CIVIL ENGINEERING

Course Code	22CVAE482	CREDIT:2
Number of Lecture Hours/Week	2hrs(Practical)	SEE:50Marks
Total Number of LectureHours:28	CIE:50Marks	SEE:03Hours

Prerequisite: Basic Surveying, AutoCAD

Course objectives:
To enable the student to acquire the knowledge in the following topics

Experiments	Teaching Hours
1. Setting up, levelling up, centering and creation of file in Total Station.	02Hours
2. Taking out basic measurements RDM, REM & SHV using Total Station	02Hours
3. Determination of Area measurement using Total Station	02Hours
4. Establishment of new station using free stationing technique	02Hours
5. Traversing using total station to prepare topographic map of Area.	04Hours
6.Contour surveying using Total station.	04Hours
7. Plotting of topographic details within contours.	04Hours
8. Downloading total station data and map completion.	04Hours
9. Stake-out application using Total Station	04Hours
10.Determination of area of a polygon and capacity of contour using digital Planimeter.	

Question paper pattern:
Conduct any one experiment by picking up student and he has to prepare writeup and conduct experiment.

Reference Books:
1. S.K. Duggal, "Surveying Vol.1", Tata McGraw Hill Publishing Co. Ltd. New Delhi.2009.

2. A. Bannister, S. Raymond, R. Baker, "Surveying", Pearson, 7th ed., New Delhi

Course outcomes:
On completion of the course, the student will have the ability to:

Course Code	CO#	Course Outcome(CO)	Blooms Level
21CVAE46B	**CO1**	Understand the concepts of Surveying theory course through series of experiments.	C2

	CO2	Sharetheresponsibilitiesinsmallteamsof4-5members for conducting the experiments.	C3
	CO3	Perform the various experiments on total station survey	C3
	CO4	Analyze the data and interpret the results.	C3
	CO5	Prepare a well-organized laboratory report.	C3

COURSE TITLE: ELECTRONIC WASTE MANAGEMENT- ISSUES AND CHALLENGES		
Course code	22CVAE483	Credit:01
Hours/Week	0/2hours.(Theory/Practical)	SEE:50Marks
Total hours: 14	CIE:50Marks	SEE:2hours

Prerequisite: Environmental studies, waste management, impact analysis

Course objectives:
To enable the student to acquire the knowledge in the following topics.
1. Understand the environmental impacts of e-waste.
2. Apply concepts of e-waste management hierarchy
3. Distinguish the role of various national and internal act and laws applicable for e-waste management and handling
4. Analyze the e – waste management measures proposed under national and global legislations.
5. The international legislations on e-waste control

Modules	Teaching Hours
ModuleI Introduction. E- waste; composition and generation. Global context in e- waste; E-waste pollutants, E waste hazardous properties, Effects of pollutant (E- waste) on human health and surrounding environment, domestic e-waste disposal, Basic principles of E waste management, Component of E waste management	3hours
Module II E-waste hazardous on Global trade Essential factors in global waste trade economy, Waste trading as a quint essential part of electronic recycling, . Important hazardous e-waste in India; India,. recycling of e-waste in metro cities of india	3hours
Module-III E-waste control measures Need for stringent health safeguards and environmental protection laws in India, , Reduction of waste at source. Restrictions of Hazardous Substances (RoHS) Directive	3hours
Module-IV E-waste (Management and Handling) Rules, 2011; and E-Waste (Management) Rules, 2016 - Salient Features and its likely implication. Government assistance for TSDFs.	2hours
Module - V The international legislation: The Basel Convention; The Bamako Convention. The Rotterdam Convention. Waste Electrical and Electronic Equipment (WEEE) Directive in the European Union,	3hours

CourseOutcomes: Oncompletion ofthiscourse,students areableto:

CO	
CO1:	Understand the environmental impacts of e-waste
CO2:	Apply concepts of e-waste management hierarchy
CO3:	Distinguish the role of various national and internal act and laws applicable for e-waste management and handling
CO4	Analyze the e – waste management measures proposed under national and global legislations.

CO5	To know the international legislation on e-waste control

Question paper pattern:

ix)   Two questions aretobesetfrom eachmodule.

x) Totalfivequestionsaretobeansweredbyselectingminimumonequestionfromeachmo
dule

Textbook:

1. Johri R., E-waste: implications, regulations, and management in India and current global best practices, TERI Press, New Delhi 2. Hester R.E., and Harrison R.M, Electronic Waste Management. Science, 2009

Reference books:

1. Fowler B, Electronic Waste – 1 st Edition (Toxicology and Public Health Issues), 2017Elsevier E-Resources 1. https://news.mit.edu/2013/ewaste-mi

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COMPONENTS OF SMART CITY

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Subject code	22CVAE484	Credit: 03
Hours/Week	3 hours. (Theory)	SEE: 50 Marks
Total hours: 42	CIE: 50 Marks	SEE: 3 hours

Prerequisite:

Course objectives:
To enable the student to acquire the knowledge in the following topics.
1. To Understand the necessity of infrastructural development for smart cities.
2. To Identify components of infrastructure and Prepare infrastructure plan for smart city.
3. To Understand smart transport system for smart cities and its application
4. To Study of water resources systems for smart city and its application.
5. To Understand National and Global policies to implement for smart city development.

Modules	Teaching Hours
Module I **Fundamental of smart city & Infrastructure:** Introduction of Smart City, Concept of smart city, Objective for smart cities, History of Smart city world and India. Need to develop smart city, Challenges of managing infrastructure in India and world, various types of Infrastructure systems, Infrastructures need assessment.	09 hours
Module II **Planning and development of Smart city Infrastructure:** Energy and ecology, solar energy for smart city, Housing, sustainable green building, safety, security, disaster management, economy, cyber security, Project management.	09 hours
Module-III **Intelligent transport systems** Smart vehicles and fuels, GIS- uses- applications -components- use cases, GPS uses-applications -components- use cases, Navigation system, traffic safety management, mobility services, E-ticketing Definition-airline ticket-checking in with e tickets - limitations.	08 Hours
Module -IV **Management of water resources and related infrastructure** Storage and conveyance system of water, sustainable water and sanitation, sewerage system, flood management, conservation system. Monitoring aging infrastructure -public health water quality and environmental protection -extreme weather and climatic conditions .mobile operator capabilities for smart water management.	08 Hours
Module - V **Infrastructure Management system & Policy for Smart city** Integrated infrastructure management systems for smart city- solving urban infrastructure problems using smart city technologies, Infrastructure management - IoT-based monitoring for smart community. Policy for Smart city- Introduction- vision-objective-coverage-strategy-administrative structure-financing- Convergence with Other Government Schemes- Countries Supporting India's Smart Cities Mission- Budget Allocation.	08 hours

Course Outcomes: On completion of this course, students are able to:

CO		BL
CO1:	Understand the necessity of infrastructural development for smart cities.	C3

CO2:	Identify components of infrastructure and Prepare infrastructure plan for smart city.	C4
CO3:	Understand smart transport system for smart cities and its application	C4
CO4	Study of water resources systems for smart city and its application.	C4
CO5	Understand National and Global policies to implement for smart city development.	C4

Question paper pattern:

xi) Two questions are to be set from each module.

xii) Total five questions are to be answered by selecting minimum one question fromeach module

Text book:

1. Smart City on Future Life - Scientific Planning and Construction by Xianyi Li
2. The Age of Intelligent Cities: Smart Environments and Innovation-for-all Strategies (Regions and Cities) by Nicos Komninos
3. Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia by Anthony Townsend
4. Grig N.S., Infrastructure engineering and management, Wiley-Interseience, 1988
5. Hudson W.R., Haas R., Uddin W., Infrastructure Management, McGraw-Hill, 1997
6. Giffinger, Rudolf; Christian Fertner; Hans Kramar; Robert Kalasek; Nataša Pichler-Milanovic; Evert Meijers (2007). "Smart cities – Ranking of European medium-sized cities". Smart Cities. Vienna: Centre of Regional Science
7. Mission statement &guidelines on Smart City Scheme". Government of India - Ministry of Urban Development http://smartcities.gov.in/upload/uploadfiles/files/Smart City Guidelines(1).pdf

Reference books:

1. Smart city government of India. http://smartcities.gov.in
2. Reconceptualising Smart Cities: A Reference Framework for India https://www.niti.gov.in/writereaddata/files/document_publication/CSTEP%20Report%20Smart%20 Cities%20Framework.pdf
3. Draft Concept Note on Smart City Scheme". Government of India - Ministry of Urban Development -martcitiesoftomorrow.com/wp-content/uploads/2014/09/CONCEPT_NOTE_ 3.12.2014__REVISED_AND_LATEST_.pdf