

Annexure II

Government College of Engineering, Aurangabad
(An Autonomous Institute)
 Teaching and Evaluation Scheme from year 2022-23
Second Year B. Tech. Program in Civil Engineering
Semester III

Course				Teaching Scheme			Continuous Evaluation in terms of Marks					
Sr No	Category	Course Code	Course Name	TH	T	PR	Credits	ISE I	ISEII	ISEIII	ESE	Total (100)
1	BSC	MABS2001	Mathematics III	2	1	-	3	15	15	10	60	100
2	PC	CEPC2001	Solid Mechanics	3	-	-	3	15	15	10	60	100
3	PC	CEPC2002	Survey	3	-	-	3	15	15	10	60	100
4	PC	CEPC2003	Fluid Mechanics	3	-	-	3	15	15	10	60	100
5	ESC	CEES 2001	Engineering Geology	2	-	-	2	15	15	20	-	50
6	ESC	CEES 2002	Programming for Engineering	1	-	-	1	5	10	10	-	25
7	MC	EEMC2010	Environmental Studies	3	-	-	-	15	15	10	60	100
8	PC	CEPC2004	Lab. Solid Mechanics	-	-	2	1	25			25	50
9	PC	CEPC2005	Lab. Survey	-	-	4	2	50			50	100
10	PC	CEPC2006	Lab. Fluid Mechanics	-	-	2	1	25			25	50
11	ESC	CEES 2003	Lab. Programming for Engineering			2	1	25			25	50
12	ESC	CEES2004	Lab-Engineering Geology	-	-	2	1	25			25	50
Total				17	1	12	21	150	160	115	450	875

Approved in XXIVth Academic Council, Dated 23/07/2022

2022-23
 23/07/2022

Government College of Engineering, Aurangabad
(An Autonomous Institute)

Teaching and Evaluation Scheme from year 2022-23
Second Year B. Tech. Program in Civil Engineering
Semester IV

Course				Teaching Scheme			Continuous Evaluation in terms of Marks					
Sr No	Category	Course Code	Course Name	TH	T	PR	Credits	ISE I	ISEII	ISEIII	ESE	Total (100)
1	PC	CEPC2007	Building Planning & Design	3	-	-	3	15	15	10	60	100
2	PC	CEPC2008	Structural Analysis	3	-	-	3	15	15	10	60	100
3	PC	CEPC2009	Environmental Engineering	3	-	-	3	15	15	10	60	100
4	PE	CEPE2001 to CEPE2002	PE-I	3	-	-	3	15	15	10	60	100
5	PC	CEPC2010	Concrete Technology	3	-	-	3	15	15	10	60	100
6	OE	CEOE 1010	Disaster Management	3	-	-	3	15	15	10	60	100
7	PC	CEPC2011	Lab. Building Planning & Design	-	-	4	2	50			50	100
8	PC	CEPC2012	Lab-Structural Analysis			2	1	25			25	50
9	PC	CEPC2013	Lab-Environmental Engineering	-	-	2	1	25			25	50
10	PC	CEPC2014	Lab- Concrete Technology			2	1	25			25	50
Total				18	-	10	23	140	145	80	485	850

Professional Elective I		
Sr. No.	Course Name	Course Code
1	Advanced Survey	CEPE2001
2	Advance Fluid Mechanics & Hydraulic Machinery	CEPE2002


Approved in XXIVth Academic Council, Dated 23/07/2022

MABS2001: Engineering Mathematics-III (For Civil/Mechanical)		
Teaching Scheme	Examination Scheme	
Lectures: 02 hrs/ week	ISE I	15 Marks
Tutorial: 01 hrs/ week	ISE II	15 Marks
Credits: 03	ISE III	10 Marks
	End Semester Examination	60 Marks

Course description:

MABS 2001:Engineering Mathematics-III is a compulsory course to Second Year engineering students of Civil and Mechanical of the institute in the Semester –III and is a continuation of previous year courses viz. MABS1001: Engineering Mathematics-I and MABS1002: Engineering Mathematics-II. This course intends to provide engineering students a coherent and balanced account of major mathematical techniques and tools.

Course Objective:

This course intends to provide an overview of analytical and numerical techniques to solve ordinary and partial differential equations, which we apply to solve many engineering problems.

Course Outcomes:

After completing the course, students will be able to:

CO1	Define linear differential equations (LDE), Cauchy's and Legendre's differential equations, first order partial differential equations, Lagrange's equation
CO2	Summaries the solution of LDE with constant and variable coefficients, solution of homogeneous and non-homogeneous PDE,
CO3	Find approximate solution of ordinary differential equations of first order
CO4	Solve linear differential equations with constant and variable coefficients, first order linear and non linear partial differential equations, second order homogeneous and nonhomogeneous linear partial differential equations.
CO5	Apply knowledge of linear differential equations to civil engineering problems, spring-mass system, apply knowledge of partial differential equations to wave equations and heat equations.





Approved in XXIVth Academic
Council, Dated 23/07/2022

Detailed syllabus:

Unit-I	The approximation for the solution of first order Ordinary Differential Equations: Taylor series method, Euler's method, Euler's modified Method, Runge-Kutta Fourth order Method, Milne's Predictor-Corrector Method.
Unit-II	Linear Differential Equations (LDE): Linear differential equations (LDE) with constant coefficients, method of variation of parameters second order linear differential equations with variable coefficients, Cauchy's and Legendre's differential equations.
Unit-III	Applications of Linear Differential Equations (LDE): Bending of beams, spring-mass system.
Unit-IV	Partial Differential Equations (PDE): First order linear/nonlinear partial differential equation, Lagrange's equation, solution to homogenous and non-homogenous linear partial differential equations of second and higher order by complimentary function and particular integral method.
Unit-V	Applications of Partial Differential Equations: Method of separation of Variables, solutions of one-dimensional wave equation, one-dimensional heat equation, steady state solution of two-dimensional heat equation.

Text and Reference Books

1. E. Kreyszig, *Advanced Engineering Mathematics*, 9th edition, New Delhi, John Willey Eastern Ltd. 2006.
2. B.S. Grewal, *Higher Engineering Mathematics* 44th edition, New Delhi, Khanna publication, 2017.
3. R. R Singh, Mukul Bhatt, *Engineering Mathematics-A Tutorial Approach*, 1st edition, New Delhi, McGraw Hill Education India Publication, 2013.
4. H.K Dass, *Advanced Engineering Mathematics*, 22nd edition, New Delhi, S. Chand and Sons Publication, 2018..
5. G. B. Thomas and R. L. Finney, *Calculus*, 12th edition, Boston, Addison- Wesley, 2010.
6. I.N. Sneddon, *Elements of Partial Differential Equations*, 5th edition, Dover Publications inc network. 2013.
7. W.E. Boyce & R.C. Di-Prima, *Elementary Differential Equations and Boundary Value Problems*, 9th edition, New Delhi, John Willey and Sons Ltd Publication, 2009.



Approved in XXIVth Academic
Council, Dated 23/07/2022

Mapping of Course outcome with Program Outcomes (Civil & Mechanical Engineering)

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

3 - High, 2 - Medium, 1 - Low

Teaching Strategies:



The teaching strategy planned through the lectures, and team based home works. Exercises assigned weekly to stimulate the students to actively use and revise the learned concepts, which also help the students to express their way of solving the problems fluently in written form. Most critical concepts and mistakes emphasized

Assessment: ISE-I, ISE-II, ISE-III (Class Test-1, Class Test-2, TA) & ESE TA: Students will perform one or more of the following activities

1. Surprise Test
2. Assignment using Mathematical tools like Mathematica/ MatLab or similar.
3. Quiz
4. Any other activity suggested by course coordinator

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I (Class Test-1)	ISE II (Class Test-2)	ISE III (TA + Surprise Test)	End Semester Examination	Total
K1	Remember	01	02			03
K2	Understand	14	13	10	44	81
K3	Apply				16	16
K4	Analyze					
K5	Evaluate					
K6	Create					
Total Marks 100		15	15	10	60	100



 Approved in XXXth Academic Council, Dated 23/07/2022

Assessment table:

Assessment Tool	K1	K2	K2	K2	K3	Total
	CO1	CO2	CO3	CO4	CO5	
ISE I (15 Marks)	01		08	06		15
ISE II (15 Marks)	02			08	05	15
ISE III (10 Marks)		04	02		04	10
ESE Assessment (60 Marks)			15	29	16	60
Total Marks 100	03	04	25	43	25	100

 
**Approved in XXIVth Academic
Council, Dated 23/07/2022**


**Approved in XXIVth Academic
Council, Dated 23/07/2022**

Annexure III

CEPC 2001: Solid Mechanics		
Teaching Scheme	Examination Scheme	
Lectures: 03 hrs/ week	ISE I	15 Marks
Tutorials:00	ISE II	15 Marks
Credits:03	ISE III	10 Marks
	End Semester Examination	60 Marks
	Total Marks	100

Pre-requisites: Fundamental knowledge of Physics, Engineering Mechanics (Static) and Engineering Mathematics

Course Description: The mechanics of deformable solids or strength of materials or solid mechanics or mechanics of materials, as it is commonly called, is one of the core subject that need to be studied by all engineering students.

Primary aim of this course is to introduce students to the fundamental concepts and principles applied by engineers - whether civil, mechanical, aeronautical, etc. - in the design of structures of all sorts of sizes and purpose. Students learn the concept of stress and strain, elastic constants, principle stress and strain, torsion, shear force and bending moment. They also learn to calculate the deflection of beams by different methods and the concept of strain energy. Students understand different formulae to calculate critical load on columns. After course completion, students will be able to calculate stress, strain, shear force and bending moment for beams, deflection in beams by different methods and critical load on columns.

The course content have been presented in five units so that the students can develop the logic and get insight to analyze beams, columns & strut, cylinders & spheres and solid circular shafts


Course Outcomes:

After completing the course, students will able:

Course Outcomes	
CO1	To explain the concepts of simple stresses and strains for different materials
CO2	To construct shear force and bending moment for different types of beams
CO3	To interpret the behavior of beam under bending and shear and determine the flexural and shearing stresses.
CO4	To compute the deflections of beams and analyze the behavior of columns
CO5	To interpret the behavior of circular shaft under torsion and determine combined stresses

Detailed Syllabus:

Unit 1	Simple Stresses and Strains: Introduction, Definition and concept and of stress and strain, Lateral strain, Poisson's ratio, volumetric strain, elastic moduli and relation between them Hooke's law, Stress-Strain diagrams for ferrous and non-ferrous materials,
--------	---


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

	factor of safety, Elongation of tapering bars of circular and rectangular cross sections, Elongation due to self weight. Saint Venant's principle, Compound bars, Temperature stresses, Compound section subjected to temperature stresses, state of simple shear, Elastic constants and their relationship. Strain energy for gradual, sudden and impact loading.[8 Hours]
Unit 2	Shear Force and Bending Moment in Beams Introduction to types of beams, supports and loadings. Definition of bending moment and shear force, Sign conventions, relationship between load intensity, bending moment and shear force. Shear force and bending moment diagrams for statically determinate beams subjected to points load, uniformly distributed loads, uniformly varying loads, couple and their combinations. Calculation of maximum BM and SF and the point of contraflexure. [8 Hours]
Unit 3	Stresses in Beams A) Flexural Stresses- Introduction, pure bending theory, Assumptions, derivation of bending equation, modulus of rupture, section modulus, flexural rigidity, Section modulus of rectangular and circular sections (Solid and Hollow), I,T, Angle and Channel sections, Determination of bending stresses, B) Shear Stresses- Concept of Shear Stress, Derivation of formula – Shear stress distribution across various beam sections like rectangular, circular, triangular, I, T angle sections. [8 Hours]
Unit 4	Deflection of Beams A) Slope and deflection- Relationship between moment, slope and deflection, Double integration method, Macaulay's method. Use of these methods to calculate slope and deflection for determinant beams. B) Columns and Struts: Introduction, short and long columns. Euler's theory; Assumptions, Concept of effective length, Derivation for Euler's Buckling load for different end conditions, slenderness ratio, Limitations of Euler's theory, Rankine's theory. [8 Hours]
Unit 5	A) Torsion in Circular Shaft : Introduction, pure torsion, Assumptions, derivation of torsion equation for circular shafts, torsional rigidity and polar modulus, Power transmitted by a shaft, combined bending and torsion. B) Combined Stresses: Combined direct and bending stresses, core/kern of section, middle third rule. State of stress at a point in two dimensional stress system, Principal stresses, and principal planes. Mohr's circle of stresses. Introduction of Theories of failure[8 Hours]

Text Books:

1. Elementary Structural Analysis, Jain,A.K., Nem Chand & Bros, Roorkee
2. Strength of Materials by R. Subramanian, Oxford University Press, New Delhi.
3. Strength of Materials, S. Ramamrutham, Dhanpat Rai Publications.
4. Strength of Materials, B.C. Punmia, Laxmi Publications.
5. A Textbook of Strength of Materials, Prof. R. K Bansal, Laxmi Publications.


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Reference Books:

1. Mechanics of Materials, Popov Nagarjan & Lu, Prentice Hall of India, N. Delhi.
2. Mechanics of Materials by Hibbeler, Pearson.
3. Mechanics of material by Gere, Cengage Learning.
4. Mechanics of Materials by Beer, Jhonston, DEwolf and Mazurek, MCGRAW HILL INDIA
5. Strength of Materials by Pytel and Singer, Harper Collins.
6. Strength of Materials by Ryder, Macmillan.
7. Strength of Materials by Timoshenko and Youngs, East West Press.
8. Introduction to Solid Mechanics by Shames, Pearson.
9. Mechanics of material by Pytel, Cengage Learning.

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

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

3-High 2 - Medium 1 - Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
 ISE II: Shall be based on class test on third and fourth units
 ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	2	2	----	5
K2	Understand	3	3	2	15
K3	Apply	5	5	2	30
K4	Analyze	5	5	----	10
K5	Evaluate	----	----	6	----
K6	Create	----	----	----	----
Total Marks: 100		15	15	10	60

Assessment table:

Assessment Tool	K1	K2	K3	K4	K5
	CO1 to CO5	CO1 to CO5	CO1 to CO5	CO1 to CO5	CO1 to CO5
ISE I (15 Marks)	2	3	5	5	
ISE II (15 Marks)	2	3	5	5	
ISE III (10 Marks)		2	2		6
ESE Assessment (60 Marks)	5	15	30	10	
Total Marks :100	09	23	42	20	6

Approved in XXIVth Academic Council, Dated 23/07/2022

CEPC 2002: SURVEY			
Teaching Scheme		Evaluation Scheme	
Lectures	3Hrs/Week	ISE I	15 Marks
Tutorials	-----	ISE II	15 Marks
Total Credits	3	ISE III	10 Marks
		ESE	60 Marks
		Total	100 Marks

Prerequisites: Basic knowledge of measurements and its units.

Course description: This course introduces the methods and instruments for measurement necessary for plotting maps and plans. Topics range from surveying, leveling, theodolite, plane table surveying and tachometry.

Course Outcomes

As an outcome of completing the course, students will able to:

CO1	Operate levels and theodolite
CO2	Use different types of surveying and levelling equipment
CO3	Design and set out the curve in the field
CO4	To plot map/plan and calculate area and volumes

Detailed Syllabus:

Unit 1	LEVELLING: Definition, study of auto level, laser level, digital level, Types of leveling: simple, differential, fly, check, profile, reciprocal etc. Profile leveling- plotting longitudinal section, cross section, leveling difficulties, volume calculations, Contouring: Definition, characteristics, use, methods of locating and interpolating contour lines
Unit 2	THEODOLITE: Introduction to vernier theodolite, types of theodolite, principal axes, Uses of theodolite: Measurement of horizontal angle, vertical angle, magnetic bearing, prolonging a line, lining in, measuring deflection angles, direct angles, finding out elevations of objects (base accessible or inaccessible) by trigonometrical observations, Theodolite traversing- Computation of consecutive and independent coordinates, adjustment of a closed traverse, Gale's traverse table, omitted measurements, area by coordinates
Unit 3	PLANE TABLE SURVEY: Introduction, accessories, temporary adjustments, advantages and disadvantages, methods, two point and three point problem and their solution Testing and permanent adjustments of Dumpy Level and Transit SETTING OUT WORKS: Setting out buildings, culverts, bridges
Unit 4	TACHEOMETRY: Introduction, instruments, methods, principle of stadia method, determination of tachometric constants, anallatic lens, horizontal and inclined sights with vertical staff, Tachometric contouring MINOR INSTRUMENTS: Study and use of planimeter, abney level, box sextant, Indian pattern clinometers, prismatic compass
Unit 5	CURVES: Introduction, degree and radius of a curve, Types of curve, Simple circular curve- Elements, setting out by linear and angular methods, Compound curves- Elements of compound curve, Transition curve- types, uses, length of transition curve, elements of transition curve

Recommended Books:

1. Prof. T. P. Kanetkar and Prof. S.V.Kulkarni, Surveying and leveling Vol. I & II, Pune Vidyarthi Griha Prakashan, Pune, 23rd Edition, 1985
 2. Dr. A.M.Chandra, Plane surveying, New Age International Publishers New Delhi, Second Edition, 2006
 3. Dr. B.C.Punmia, Surveying Vol I & II, Laxmi Publications (P) Ltd. New Delhi, Sixteenth Edition Reprint 2008
- R. Subramanian, Surveying and Levelling, Oxford University Press, New Delhi, First Edition, 2007

Mapping of Course outcome with Program Outcomes

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

3 - High 2 - Medium 1 - Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
 ISE II: Shall be based on class test on third and fourth units
 ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern (for theory courses)

Assessment Pattern Level No.	Knowledge Level	Test I	Test II	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05			06
K2	Understand	05	05		18
K3	Apply	05	05	05	18
K4	Analyze		05	05	18
K5	Evaluate				
K6	Create				
Total		15	15	10	60

Assessment Table

Assessment Tool	K1	K2	K3	K4
	C01, CO2	CO1, CO2, CO3	C02, CO3,CO4	CO3, CO4
ISE I 15 Marks	05	05	05	
ISE II 15 Marks		05	05	05
ISE III 10 Marks		05	5	
ESE 60 Marks	06	18	18	18


Approved in XXIVth Academic Council, Dated 23/07/2022

Approved in XXIVth Academic Council, Dated 23/07/2022

CEPC2003: FLUID MECHANICS		
Teaching Scheme	Examination Scheme	
Lectures: 03 hrs/ week	ISE I	15 Marks
	ISE II	15 Marks
Credits:3	ISE III	10 Marks
	End Semester Examination	60 Marks

Pre-requisites: Nil

Course Description: Fluid Mechanics is a course that deals with the analysis and quantification of effect of the forces exerted by a fluid on Civil Engineering Structures. In order to design any water retaining structure or a water conveyance system it is necessary to know the fluid properties and its effect on the system. The behavior of fluid flow varies with the properties of fluid, flow characteristics and the surroundings. The fluid behaves differently when it is at rest and in motion. The design criterion is decided on the basis of properties of fluid and classification of flow. In general the fluid flow problems that an engineer deals with include the fluid flow in closed conduits and in open channel, this course covers all the aspects of fluid flow characteristics and design in pipe flow and also open channel flow. This course is very useful for Civil Engineer as he has to design the Water Conveyance Systems, Design capacity of the Conveyance system, Design of Water retaining structures, Flow regulation system, Discharge measurement etc. This course also forms a prerequisite course for the Water Resources Engineering and Water Power Engineering.

Course Outcomes:

After completing the course, students will able to:

Course Outcomes	
CO1	Assess the properties of fluids, effect of fluid at rest and also when in motion
CO2	Understand fluid kinematics and fluid dynamics and measure discharge using discharge measuring devices
CO3	Analyze and design pipe network and model studies
CO4	Analyze uniform flow and hydraulic jump and its applications
CO5	Analyze and select the pumps and turbines as per requirements

Detailed Syllabus

Unit 1	<p>Properties of Fluids: Classification of fluids, Rheological diagram, properties of fluids - Specific weight, specific volume, specific gravity, viscosity, compressibility, surface tension and capillarity.</p> <p>Fluid Statics: Pressure at a point, Pascal's Law, measurements of fluid pressure, hydrostatics pressure on plane and curved surfaces, pressure diagram, concept of buoyancy, metacenter, determination of metacentric height, equilibrium of floating bodies.</p>
Unit 2	<p>Fluid Kinematics: Classification of fluid flows, steady, unsteady, uniform, non-uniform, laminar, turbulent, Reynolds number, vorticity, rotational, irrotational flows, path line, streak line, stream tube. Continuity Equation, flow net</p> <p>Fluid Dynamics: Forces acting on fluid in motion, Euler's equation,</p>

	Bernoulli's Equation, Momentum equation, correction factors. Measurement of Flow: Venturimeter, Pitot tube, orifices, flow over notches and weirs.
Unit 3	<p>Flow through Pipes: Major and minor losses, laws of friction, hydraulic gradient line and total energy line, flow through pipes, equivalent pipes and branching of pipes, three reservoir problems, Turbulent flow through pipes: Pandtl's theory, velocity distribution equation for smooth and rough pipes, Pipe Network Analysis, Introduction to EPANET software</p> <p>Dimensional analysis and similarity: Dimensions of various physical quantities, Raleigh's method, Buckingham's theorem, types of similarities and Distorted and non-distorted models</p>
Unit 4	<p>Flow in open channels: gradually and rapidly varied Flows, velocity distribution in open channels, basic equation of Fluid flow viz. continuity equation, Bernoulli's equation and momentum equation as applied to Channel flow, uniform flow, Chazy's and Manning's equations, Specific energy diagram, specific force Diagram.</p> <p>Non uniform flow: Energy equation for gradually varied flow (GVF), Basic assumptions and Equations, slope profiles with different combinations, Flow measurement appurtenances, Rapidly varied flow, phenomenon of hydraulic jump in rectangular channel section, basic equations, classifications and applications of hydraulic jump, conjugate depths and its computation</p>
Unit 5	<p>Water Power Engineering:</p> <p>Impact of jets: Impulse momentum equation, jet force on stationary and moving vanes</p> <p>Centrifugal pumps: Parts of centrifugal pumps, Types, construction and principle of working, Principle of similarity, efficiencies, priming of pumps, cavitation. Reciprocating pumps: Types, working principle, slip, Air vessel and its function</p> <p>Turbines- Classification and types of turbines, impulse and reaction turbines, components and parts, efficiency and characteristics of turbines based on Performance, draft tube and its function.</p>

Text and Reference Books

1. Hydraulics and Fluid Mechanics – Modi and Seth, Standard Book House, Delhi
2. Fluid Mechanics and Hydraulic Machines – by R.K. Bansal, Laxmi Publications (P) Ltd., New Delhi.
3. V.L.Streeter and E.B. Wylie , Fluid Mechanics and Hydraulic machines, McGraw Hill Publications, New York, 2010
4. D.S.Kumar, Fluid Mechanics and Fluid Power Engineering, S.K.Katariya and Sons, New Delhi, 7thEdition, 2010
5. Fluid Mechanics and Hydraulic Machines – by V.L.Streeter and E.B.Wylie, McGraw Hill Publications, New York.
6. Fluid Mechanics and Hydraulic Machines – by Douglas J.F, Gasiorek J.M., Swaffield J.A. (2003) Pearson Education (Singapore) Pvt. Ltd.
7. Open Channel Flow- by K. Subramnaya, Tata MacGraw Hill Publishing Ltd., New Delhi.


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Mapping of Course Outcome with Program Outcomes

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

3-High 2 - Medium 1 - Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit

ISE II: Shall be based on class test on third and fourth units

ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember				
K2	Understand	10	05		24
K3	Apply	05	05	05	24
K4	Analyze		05	05	12
K5	Evaluate				
K6	Create				
Total Marks	100	15	15	10	60

Assessment table:

Assessment Tool	K2	K2, K3	K3	K4	K3, K4
	CO1	CO2	CO3,CO4	CO4	CO5
ISE I (15 Marks)	8	7			
ISE II (15 Marks)		05	05	05	
ISE III (10 Marks)					10
ESE Assessment (60 Marks)	12	12	12	12	12
Total Marks 100	20	24	17	17	22


Approved in XXIVth Academic Council, Dated 23/07/2022

CEESC 2001: ENGINEERING GEOLOGY			
Teaching Scheme		Evaluation Scheme	
Theory	2 Hrs/Week	ISE I	15 Marks
Tutorial		ISE II	15 Marks
Total Credits	2	ISE III	20 Marks
		End Semester Examination	
		Total	50 Marks

Course Description: This course introduces the elements of engineering geology and earth science. It also mentions importance of principles of geology in various stages of civil engineering project. It also describes occurrence and character of common building materials. It explains structural geology and its importance in civil engineering. It covers natural hazards such as landslide, earthquake and their remedial measures.

Course Outcomes: After successful completion of the course, students will be able to:

CO1	Explain basic principles of engineering geology
CO2	Differentiate between various rock types and their applications in civil engineering
CO3	Identify favorable conditions for construction of buildings, roads, dams and tunnels
CO4	Understand the geological hazards and remedial measures to prevent damage to civil engineering project

Detailed Syllabus:

Unit-1:	Geology definition, scope, important in Civil Engineering, Mineralogy introduction, important rock forming minerals their groups. Classification and mineral composition, important igneous rocks.
Unit-2:	Strike, dip, parts And important types of folds, faults, fractures and joints unconformity, discontend and concordant igneous intrusions, geological work, river rejuvenation, river capture, earthquake, Introduction to Plate tectonics, Principles of stratigraphy, geological time scale, Indian geology, physiographic divisions of India, significance of their structural characters in major civil engineering activities.
Unit-3:	Geological investigations of Civil Engineering sites, significance of stratification strike dip fold faults joints fractures dykes in this study, surface and subsurface surveys, use of pits trenches, exploratory drilling in subsurface exploration, preparation of geological maps and sections, Sub surface water types, water table porosity permeability Zones, perched water table occurrence of subsurface water, geological conditions favorable for natural springs and seepages, depression and contact springs, hot springs and geysers, wells and drill holes
Unit-4:	Building stones, requirement of good building stones and their dependability on geological characters of rocks, common building stones, Building stones of India, Land slide, angle of repose, causes, stability of hill slopes, relation of dip, amount of slope with stability of hill slopes, preventive measures for

	landslides. , fluctuations in water table levels by geo physical electrical resistivity method
Unit-5:	Dams, requirements of good dam and reservoir site, Influence of Geological conditions on types and design of a dam. Dams on sedimentary rocks, folded strata dykes fractures zones, fault zones and on carbonate rocks. Tunnels types, seepage of subsurface water, over break, support during tunneling, lining after tunneling, rate of tunneling, tunnels in soft rocks, in hard rocks in sedimentary rocks, in jointed rocks in folded strata. Tunnels across fracture zones and fault zones, Bridges, types, requirements of good site

References:

1. Gupte R.B. "Text Book of Engineering Geology", P.V.G. Publications, Pune
2. Parbin Singh "A Text Book of Engineering and General Geology", S.K. Kataria & Sons New Delhi
3. M. S. Krishnan , "Geology of India and Burma" CBS Publishers, New Delhi
4. Arthur Holmes, "Physical Geology ", ELBS Publication.
5. M. P. Billings, "Structural Geology", Prentice Hall India Learning Private Limited
6. F G H Blyth and De Frietus , "Engineering Geology" Reed Elsevier India Ltd.
7. Bell F G, "Engineering Geology", Butterworth - Heinemann

Table 1: Mapping of Course outcome with Program Outcomes

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

3-High 2 - Medium 1 - Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
 ISE II: Shall be based on class test on third and fourth units
 ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Table 2: Recommended Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
K1	Remember	05	05		
K2	Understand	05	05	10	
K3	Apply	05	05	10	
K4	Analyze				
K5	Evaluate				
K6	Create				
	Total	15	15	20	


Approved in XXIVth Academic Council, Dated 23/07/2022

Table 3: Assessment table

Assessment Tool	CO1	CO2	CO3	CO4
	K1, K2	K2	K2	K3
ISE I (15 Marks)	10	5		
ISE II (15 Marks)			10	05
ISE III (20 Marks)			10	10
ESE Assessment				



**Approved in XXIVth Academic
Council, Dated 23/07/2022**

Approved in XXIVth Academic
Council, Dated 23/07/2022

CEESE 2002: Programming for Engineers		
Teaching Scheme	Examination Scheme	
Lectures: 01 hrs/ week	ISE I	5 Marks
	ISE II	10 Marks
Credits: 1	ISE III	10 Marks
	End Semester Examination	

Course Outcomes:

After completing the course, students will able to:

Course Outcomes	
CO1	To formulate simple algorithms for arithmetic and logical problems
CO2	To use arrays, pointers and structures to formulate algorithms and programs
CO3	To translate the algorithms to programs

Detailed Syllabus

Unit 1	Introduction to Programming (Flow chart/pseudocode, compilation etc.), Variables (including data types)
Unit 2	Arithmetic expressions and precedence , Conditional Branching and Loops, Writing and evaluation of conditionals and consequent branching Iteration and loops
Unit 3	Arrays, Arrays (1-D, 2-D), Character arrays and Strings, Basic Algorithms, Searching, Basic Sorting Algorithms, Finding roots of equations, idea of time complexity
Unit 4	Function and Recursion, Functions (including using built in libraries), Recursion with example programs such as Quick sort, Ackerman function etc.
Unit-5	Structure and Pointers, Pointers, Structures (including self referential structures e.g., linked list, notional introduction) File handling

Text and Reference Books

1. Byron Gottfried, Schaum's Outline of Programming with C, McGraw-Hill
2. E. Balaguruswamy, Programming in ANSI C, Tata McGraw-Hill
3. Brian W. Kernighan and Dennis M. Ritchie, The C Programming Language, Prentice Hall of India

Mapping of Course Outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	2	2		3		3				1	
CO2	3	3	3	3	3	2	3	2			1			
CO3	3	3	3	3	3		3	2						

3-High 2 - Medium 1 - Low

Approved in XXIVth Academic
Council, Dated 23/07/2022

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
 ISE II: Shall be based on class test on third and fourth units
 ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	5			
K2	Understand		05	05	
K3	Apply		05	05	
K4	Analyze				
K5	Evaluate				
K6	Create				
Total Marks 100		5	10	10	

Assessment table:

Assessment Tool	K1	K2, K3	K3
	CO1	CO2 & CO3	CO2,CO3
ISE I (5 Marks)	5		
ISE II (10 Marks)		5	5
ISE III (10 Marks)		5	5
ESE Assessment			
Total Marks	5	10	10

Approved in XXIVth Academic Council, Dated 23/07/2022

EEMC2010: Environmental Studies			
Teaching Scheme		Examination Scheme	
Lectures	: 3 Hrs/Week	ISE I	: 15 Marks
Tutorial	:	ISE II	: 15 Marks
Total Credits	: 0	ISE III	: 10 Marks
		End -Semester Exam	: 60 Marks

Pre-requisites: Nil

Course objectives:

1. To become aware about the various types of pollution, its sources, effects and control measures
2. To become aware about present environmental issues
3. To become aware of the importance of natural resources and environmental legislation
4. To become aware about environmental biotechnology and bio monitoring
5. To become aware of the biodiversity, conservation methods and factors for the loss of biodiversity

Course Outcomes:

After completion of this course students will be able to-

CO1	Learn about the basics of environment
CO2	Understand the harmful effects of human activities on environment and their solutions
CO3	Understand the use of biotechnology and bio monitoring for the treatment of environment
CO4	Understand the concept of climate change, global warming, acid rain, various disasters and its mitigation measures

Detailed syllabus:

UNIT-I	<p>A) Concepts of Environmental Sciences Environment, Levels of organizations in environment, Structure and functions in an ecosystem; Biosphere, its Origin and distribution of land, in water and in air, Broad nature of chemical composition of plants and animals</p> <p>B) Natural Resources Renewable and Non-renewable Resources, Forests, water, minerals, Food and land (with example of one case study); Energy, Growing energy needs, energy sources (conventional and alternative)</p>
UNIT-II	<p>A) Biodiversity and its conservation Biodiversity at global, national and local levels; India as a mega-diversity nation; Threats to biodiversity (biotic, abiotic stresses), and strategies for conservation</p> <p>B) Environmental Pollution Types of pollution- Air, water (including urban, rural, marine), soil, noise, thermal, nuclear; Pollution prevention; Management of pollution- Rural/Urban/Industrial waste management [with case study of any one</p>

	<p>type, e.g., power (thermal/nuclear), fertilizer, tannin, leather, chemical, sugar], Solid/Liquid waste management, disaster management</p> <p>C) Environmental Biotechnology</p> <p>Biotechnology for environmental protection- Biological indicators, bio-sensors; Remedial measures- Bio-remediation, phyto remediation, biopesticides, bio-fertilizers; Bio-reactors- Design and application</p>
UNIT-III	<p>A) Social Issues and Environment</p> <p>Problems relating to urban environment- Population pressure, water scarcity, industrialization; remedial measures; Climate change-Reasons, effects (global warming, ozone layer depletion, acid rain) with one case study; Legal issues- Environmental legislation (Acts and issues involved), Environmental ethics</p> <p>Environmental Monitoring</p> <p>Monitoring- Identification of environmental problem, tools for monitoring (remote sensing, GIS); Sampling strategies- Air, water, soil sampling techniques</p>
UNIT-IV	<p>Laboratory Work including Practical and Field Work</p> <p>covering, of biogeographical zones and expanse of territorial waters on the map of India; Identification of biological resources (plants, animals, birds) at a specific location; Determination of</p> <p>(i) pH value, (ii) water holding capacity and (iii) electrical conductivity of different types of soils; Determination of energy content of plants by bomb calorimeter; Measurement and classification of noise pollution; Determination of particulate matter from an industrial area by high volume sampler; Determination of physico-chemical parameters (pH, alkalinity, acidity, salinity, COD, BOD) of tap water, well water, rural water supply industrial effluent and sea water & potability issues; Demonstration of Remote Sensing and GIS methods; Industrial visit for environmental biotechnology processes (e.g., any one of the fermentation, tissue culture, pharmaceutical industries)</p>

Text books & Reference books

1. A Text Book of Environmental Studies by Bharucha E, University Press (India) Pvt. Ltd, 2005
2. A Text Book of Environmental Studies by Nadaf F. M., Pawaskar V. R., Intellectual Book Bureau, Bhopal, 2006
3. Fundamentals of Ecology by Odum E. P, Natraj Publishers, Dehradun, 1996
4. Introduction to Environmental Engineering and science by Gilbert M and Wendell P., Pearson Education India, 2015
5. Environmental Science by S.C Santra, New Central Book Agency, 2011
6. Environmental Education by Sharma R. A, 1998

Mapping of Course outcome with program outcomes (Mechanical Engineering):

Course outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PS O2	PSO 3
CO1	3		1												
CO2	3		1												
CO3	3		1												
CO4	3		1												

1- Low 2- Medium 3- High


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
 ISE II: Shall be based on class test on third and fourth units
 ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern:

Assessment Pattern Level no.	Knowledge Level	Test	Teachers Assessment/assignment	End Semester Examination
K1	Remember	10		12
K2	Understand	10		24
K3	Apply	10	10	12
K4	Analyze			12
TOTAL		30	10	60

Assessment Table

Assessment Tool	K1+K3	K1+K3	K1+K3	K1+K3
Unit wise Course outcomes	CO1	CO2	CO3	CO4
Class Test 30 Marks	10	10	10	
Teachers Assessment 10 Marks		05	05	
ESE Assessment 60 Marks	18	18	12	12

Approved in XXIVth Academic Council, Dated 23/07/2022

Approved in XXIVth Academic Council, Dated 23/07/2022

CEPC2004: LAB- SOLID MECHANICS		
Teaching Scheme	Examination Scheme	
Lectures: 02 hrs/ week	ISE I	25 Marks
	ISE II	
Credits:1	ISE III	
	End Semester Examination	25 Marks
	Total Marks	50 Marks

OBJECTIVE:

In this laboratory, students will have the opportunity to apply loads to various materials under different equilibrium conditions. The student will perform tests on materials in tension, compression, torsion, bending, and impact. These conditions and/or constraints are designed to reinforce classroom theory by having the student perform required tests, analyze subsequent data, and present the results in a professionally prepared report. The machines and equipment used to determine experimental data include universal testing machines, torsion equipment, compression testing machine, impact tester, hardness tester, etc. Data will be collected using Dial indicators, extensometers.

Course Outcome (COs):

After completing the course, students will able:

Course Outcomes	
CO1	To conduct the experiments to evaluate the strength and behavior of structural engineering materials under various loading conditions.
CO2	Document and interpret the test results.

Detailed Syllabus: The term work shall consist of at least 10 experiments from the following list

Expt. No	Name of Experiment/Test
1	Tension test on Mild steel and High Yield strength deformed
2	Cold bend test on Mild and HYSD steel bars.
3	Compression test on mild steel and Cast iron
4	Direct shear test (Single, Double) on steel, Copper, brass specimen
5	Punching shear test on thin metallic sheets.
6	Torsion test on circular mild steel bar
7	Izod and Charpy Impact test on metals
8	Bending test on timber beam specimen
9	Compression test on Wood (parallel and perpendicular to grains)
10	Flexural test on concrete beams
11	Hardness test on metals - Brinnell and Rockwell Hardness Number
12	Tension test on structural steel specimens
13	Compression test on helical springs
14	Study of Buckling of column.


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				3	2	3	2					1		2
CO2				3	3	3	2					1		2

3-High 2 - Medium 1 - Low

Assessment:

ISE I shall be based on the assessment of term work and interaction with student till 50% coverage of curriculum.

ISE II shall be based on the assessment of submission work and interaction with student till end of the term.

ESE will be based on oral/practical exam conducted by Course co-coordinator and External Examiner.

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	Total
S1	Remember/Perception				
S2	Understand /Set	3	3		6
S3	Apply/Guided Response	6	6		12
S4	Analyze/Mechanism	3	4		7
S5	Evaluate/Complex Overt Response				
S6	Create /Adaptation				
Total Marks 25		12	13		25

Assessment Table:

Assessment Tool	S2,S3,S4	S2,S3,S4
	CO1,CO2	CO1, CO2
ISE I (12Marks)	6	6
ISE II (13 Marks)	7	6
ISE III -		
ESE Assessment - (25)	12	13
Total Marks 50	25	25


Approved in XXIVth Academic Council, Dated 23/07/2022

CEPC 2005: LAB SURVEY			
Teaching Scheme		Examination Scheme	
Practical	4 Hrs/Week	ISE I	50 Marks
Credits	2	ISE II	
		ISE III	
		ESE	50 Marks
		Total	100 Marks

Course Outcome: On successful completion of this course, students will be able to

CO1	Perform the experiments for linear measurements
CO2	Execute survey for linear and angular measurements
CO3	Set out alignments for roads, railways and set out for foundation of building
CO4	Coordinate the field activities for surveying and levelling works

List of Experiments

Sr. No.	Details
1	Use of dumpy level to determine elevations of points.
2	Differential Levelling to determine elevations of points.
3	Study and use of Theodolite for measurement of angles.
4	Measurement of horizontal and vertical angle using transit theodolite.
5	Measurement of horizontal angle by method of repetition.
6	Radiation and intersection method in plane table survey
7	Computation of horizontal distance and elevations by tachometry for horizontal and inclined sights.
8	Setting out simple circular curve by linear and angular method
9	Setting out a building

List of Projects

Sr. No.	Details
1	Road project
2	Block contouring

Mapping of Course outcome with Program Outcomes

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

3 - High 2 - Medium 1 - Low


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Assessment:

ISE I shall be based on the assessment of term work and interaction with student till 33% coverage of curriculum.

ISE II shall be based on the assessment of submission work and interaction with student till 66% coverage of curriculum.

ISE III shall be based on the assessment of submission work and interaction with student till end of the term.

ESE will be based on oral/practical exam conducted by Course co-coordinator and External Examiner.

Table 2: Recommended Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
S1	Imitation	5			15
S2	Manipulation	10	5		15
S3	Precision		10	20	20
S4	Articulation				
S5	Naturalization				
Total		15	15	20	25

Table 3: Assessment table

Assessment Tool	CO1	CO2	CO3	CO4
	S1, S2& S3	S1, S2& S3	S1, S2& S3	S1, S2& S3
ISE I (15 Marks)	5	5	5	
ISE II (15 Marks)		5	5	5
ISE III (20 Marks)	5	5	5	5
ESE Assessment (50 Marks)	15	15	10	10


Approved in XXIVth Academic
Council, Dated 23/07/2022

CEPC2006: Lab-FLUID MECHANICS		
Teaching Scheme	Examination Scheme	
Lectures: 02 hrs/ week	ISE I	25 Marks
	ISE II	
Credits:1	ISE III	
	End Semester Examination	25 Marks

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

Course Outcomes	
CO1	The student will experience the theoretical concepts through the experimentation
CO2	The students will be able to calibrate the measuring devices and will be able to use the output of those devices for other analysis and design
CO3	The students will be able to calculate the post jump flow characteristics in open channel

Detailed Syllabus: The term work shall consist of at least 7 exercises of following nature. Individual subject teacher shall have freedom of including additional exercises.

1	Measurement of Pressure
2	Determination of Meta-Centric height
3	Demonstration of Experiment on Bernoulli's Equation
4	Calibration and Determination of coefficients of Venturimeter, Orifice
5	Calibration of Notches
6	Demonstration of Flow Net
7	Demonstration of Hydraulic Jump
8	Determination of Minor losses
9	Demonstration of impact of jet
10	Demonstration of Turbines and Pumps

Assessment:

ISE I shall be based on the assessment of term work and interaction with student till 33% coverage of curriculum.

ISE II shall be based on the assessment of submission work and interaction with student till 66% coverage of curriculum.

ISE III shall be based on the assessment of submission work and interaction with student till end of the term.

ESE will be based on oral/practical exam conducted by Course co-coordinator and External Examiner.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3								1	
CO2	3	3	3	3	3	2							1	
CO3	3	3	3	3	3									

3-High 2 - Medium 1 - Low


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
S1	Remember/Perception				
S2	Understand /Set	05	05		
S3	Apply/Guided Response	05	5	5	15
S4	Analyze/Mechanism				10
S5	Evaluate/Complex Overt Response				
S6	Create /Adaptation				
Total Marks 50		10	10	5	25

Assessment table:

Assessment Tool	S2	S3	S4
	CO1	CO2, CO3	CO3
ISE I (10 Marks)	05	05	
ISE II (10 Marks)	05	5	
ISE III - (5 Marks)		5	
ESE Assessment -(25 Marks)		15	10
Total Marks (50 Marks)	10	30	10



Approved in XXIVth Academic
Council, Dated 23/07/2022

CEESE2003: Lab- Programming for Engineers		
Teaching Scheme	Examination Scheme	
Lectures: 02 hrs/ week	ISE I	25 Marks
	ISE II	
Credits:1	ISE III	
	End Semester Examination	25 Marks

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

	Course Outcomes
CO1	Experience the theoretical concepts through programming
CO2	Write decision control statements and loop manipulation
CO3	Write a program to demonstrate the data analysis using statistical methods

Detailed Syllabus: The term work shall consist of writing at least 8 programs of the following. Individual subject teacher shall have freedom of including additional exercises.

1	Simple computational problems using arithmetic expressions
2	Problems involving if-then-else structures
3	Iterative problems e.g., sum of series
4	1D Array manipulation
5	Matrix problems, String operations
6	Simple functions
7	Numerical methods problems
8	Recursive functions
9	Pointers and structures
10	File operations

Assessment:

ISE I shall be based on the assessment of term work and interaction with student till 33% coverage of curriculum.

ISE II shall be based on the assessment of submission work and interaction with student till 66% coverage of curriculum.

ISE III shall be based on the assessment of submission work and interaction with student till end of the term.

ESE will be based on oral/practical exam conducted by Course co-coordinator and External Examiner.

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3									
CO2	3	3	3	3	3	2							2	
CO3	3	3	3	3	3									

3-High 2 - Medium 1 - Low

**Approved in XXIVth Academic
Council, Dated 23/07/2022**

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
S1	Remember/Perception				
S2	Understand /Set	05	05		
S3	Apply/Guided Response	05	5	5	15
S4	Analyze/Mechanism				10
S5	Evaluate/Complex Overt Response				
S6	Create /Adaptation				
Total Marks 50		10	10	5	25

Assessment table:

Assessment Tool	S2	S3	S4
	CO1	CO2, CO3	CO3
ISE I (10 Marks)	05	05	
ISE II (10 Marks)	05	5	
ISE III -(5 Marks)		5	
ESE Assessment - 25		15	10
Total Marks 50	10	30	10


**Approved in XXIVth Academic
Council, Dated 23/07/2022**

CEESC 2004: LAB-ENGINEERING GEOLOGY			
Scheme of Teaching		Scheme of Evaluation	
Practical	2 Hrs/Week	ISE I	25 marks
Total Credits	1	ISE II	
		ISE III	
		Practical Examination/Viva Voce	25 marks
		Total Marks	50 marks

Prerequisite: Not Applicable

Course Description: This course introduces with practical aspects of engineering geology and earth science. It deals with identification and classification of important rock forming minerals and rocks, study of geological maps and geological features. Case study of 'Geophysical Exploration' and field visit is also included in the course.

Course Outcomes:

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

CO1	Recognize the sample of rock and explain brief about mineralogy of rock
CO2	Analyze the geological maps
CO3	Select suitable method for geophysical explorations

Detailed Syllabus:

List of the experiments/assignments/ field visits if any

Sr. No.	Details
1	Identification and classification of important rock forming minerals and rocks
2	Study of solutions to engineering geological problems with the help of these maps
3	Geological map reading, construction of section of geological maps consisting of horizontal, and inclined beds, unconformity, faults, folds, dykes etc
4	Case study of 'Geophysical Exploration' by electrical resistivity method or seismic refraction method from literature
5	One site visit to study geology and its engineering applications

Term Work:

The term work shall consist of information, exercise based on detailed syllabus above. Based on term work and syllabus external examiner will be conducted.

Table 1: Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	3		1	1								1	
CO2	2	2	2		1									
CO3	3	1	1		2									


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

3-High 2 - Medium 1 - Low

Assessment:

ISE I shall be based on the assessment of term work and interaction with student till 33% coverage of curriculum.

ISE II shall be based on the assessment of submission work and interaction with student till 66% coverage of curriculum.

ISE III shall be based on the assessment of submission work and interaction with student till end of the term.

ESE will be based on oral/practical exam conducted by Course co-coordinator and External Examiner.

Table 2: Recommended Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
S1	Imitation	05	05		5
S2	Manipulation	05	05		10
S3	Precision			05	10
S4	Articulation				
S5	Naturalization				
Total		10	10	5	25

Table 3: Assessment table

Assessment Tool	CO1	CO2	CO3
	S1	S2	S3
ISE I (15 Marks)	5	5	
ISE II (15 Marks)		5	5
ISE III (10 Marks)			05
ESE Assessment (60 Marks)	5	10	10


**Approved in XXIVth Academic
Council, Dated 23/07/2022**


Council, Dated 23/07/2022

EPC2007: BUILDING PLANNING & DESIGN		
Teaching Scheme	Examination Scheme	
Lectures: 03 hrs/ week	ISE I	15 Marks
	ISE II	15 Marks
Credits:3	ISE III	10 Marks
	End Semester Examination	60 Marks

Course description: Objective of this course is to provide an insight and inculcate the essentials of Building Planning and Design. Civil engineers plan, design, build, execute and maintain infrastructure projects such as public and private utility buildings, satisfying the societal needs. This course introduces the elements of building planning, design and construction techniques and building finishes. This course forms the foundation of the Civil Engineering, in which students will be able to decide on the requirements of various types of buildings and its components along with the standard dimensions.

Course Outcomes:

After completing the course, students will able to:

	Course Outcomes
CO1	Apply appropriate principles of planning , building byelaws ,understand relative functions and role of different agencies
CO2	Develop perspective drawing
CO3	Prepare the buildings drawings using knowledge of building planning, byelaws and requirements
CO4	Suggest the suitable construction technique / methods for various construction works
CO5	Select suitable building finishes and design various building services.

Detailed Syllabus:

Unit 1	Building Planning: Relative functions and role of owner, Architect, Structural Engineer and Contractor, Principles of Architectural design – form, function, utility, aesthetics. Integrated approach in Built Environment, Principles of planning, Development of perspective drawing
Unit 2	Building Byelaws and Design Principles of Buildings: Terminology and definition, Site selection and its criteria, Classification of buildings, Building rules and byelaws. Submission and approval procedure of building plans from government authorities. RERA
Unit 3	General requirements of buildings: Residential, Hospital, Primary school, High school, College building and Commonly observed industrial buildings.
Unit 4	Construction Techniques: Formwork, Damp proofing, Termite proofing and Fire protections, Shoring, Scaffolding.
Unit 5	Building Finishes: Plastering, Pointing, Coloring, Waterproofing, Plumbing services. Acoustics , Ventilation and Air conditioning.


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Reference Books:

1. Shah M.G., Kale C.M. and Patki S.Y., "Building drawing an Integrated approach to Built environment", Tata McGraw Hill (Fifth edition).
2. Menttt, "Building Design and Constructions", Tata McGraw Hill (Second edition)
3. Punmia B C " Building Construction
4. Schild E, Casselmann H.F., Dahmen G., Pohlenz R. "Environmental Physics in Construction", Granada Publishing, London.
5. National Building Code of India 2005, Bureau of Indian Standard, New Delhi S.P. 7 ISI
6. Jain V.K. "Fire safety in Buildings" new Age International Publisher
7. Barrid, "Building Construction" Tata McGraw Hill, New Delhi
8. Y.S.Sane, "Planning and Designing Buildings", Engineering Book Publishing Co., Pune- 16, Edition 1996

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

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

3-High 2 - Medium 1 - Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
 ISE II: Shall be based on class test on third and fourth units
 ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember				
K2	Understand	15	10	05	36
K3	Apply		5	05	24
K4	Analyze				
K5	Evaluate				
K6	Create				
Total Marks	100	15	15	10	60

Approved in XXIVth Academic Council, Dated 23/07/2022

Assessment table:

Assessment Tool	K1, K2	K1, K2, K3	K1, K2, K3	K1, K2, K3	K1, K2, K3
	CO1	CO2	CO3	CO4	CO5
ISE I (15 Marks)	6	6	3		
ISE II (15 Marks)			3	6	6
ISE III (10 Marks)	2	2	2	2	2
ESE Assessment (60 Marks)	12	12	12	12	12
Total Marks 100	20	20	20	20	20



**Approved in XXIVth Academic
Council, Dated 23/07/2022**

Approved in XXIVth Academic
Council, Dated 23/07/2022

CEPC2008: STRUCTURAL ANALYSIS		
Teaching Scheme	Examination Scheme	
Lectures: 03 hrs/ week	ISE I	15 Marks
	ISE II	15 Marks
Credits:03	ISE III	10 Marks
	End Semester Examination	60 Marks
	Total Marks	100

Prerequisites:

The students should have undergone course of CEES1004: Engineering Mechanics, CEPC2001: Solid Mechanics

Course Description: The course provides fundamental understanding of the behavior of the structures under various supporting and loading conditions. Various methods for the analysis of structures have been thoroughly discussed. It will help the students in designing the structures.

Course Outcomes Expected:

On the successful completion of this course, the student will be able to

CO1	Apply energy principles for the analysis of statically determinate plane structures
CO2	Recognize the importance of influence line diagrams and its applications to statically determinate beams and pin jointed trusses
CO3	Apply energy principles for the analysis of statically indeterminate beams: fixed and continuous beams
CO4	Apply force method for the analysis of statically indeterminate beams, plane frames and trusses
CO5	Apply displacement method for the analysis of statically indeterminate beams and plane frames

Detailed Syllabus:

Unit 1	A) Analysis of statically determinate pin jointed trusses using joint, section and graphical methods B) Strain energy theorems, Reciprocal deflection theorems, moment area theorems and their applications. Unit load method and applications to Deflection of statically determinate beams, trusses and frames. Analysis of three hinged arch
Unit 2	Influence Line Diagrams and Rolling Loads Concept of influence line, Influence line diagram for support reactions, shear force and bending moment at a section of statically determinate beams and forces in the members of statically determinate trusses. Wheel loads, Criteria for maximum shear force and bending moment.
Unit 3	Analysis of Fixed and Continuous Beams Propped cantilever, Fixed and Continuous beams, Clapeyron's theorem of three moments, Yielding of supports, Deflection at a section using unit load method. Shear force, Bending moment at a section and Shear force and bending moment diagrams.
Unit 4	Analysis of Indeterminate Structures: Force Method Force method of analysis, Analysis of continuous beams and plane

	frames with degree of static indeterminacy upto three, Analysis of pin jointed trusses with degree of static indeterminacy up to two. Analysis of two hinged arch.
Unit 5	Analysis of Indeterminate Structures: Displacement Method Slope Deflection Method: Slope deflection equations, Displacement approach, Moment Distribution Method: Carry over and distribution theorems, Application of methods to analysis of beams and frames with degree of kinematic indeterminacy up to three.

Text Books:

1. S. Ramamrutham and N. Narayan, Theory of Structures, Dhanpat Rai, New Delhi
2. H.M. Somayya and S.R. Parekar, Structural Analysis-I, NiraliPrakashan, Pune
3. H.M. Somayya and S.R. Parekar, Structural Analysis-II, NiraliPrakashan, Pune
4. C.S. Reddy, Basic Structural Analysis, Tata McGraw Hill, New Delhi
5. N.C. Sinha and P.K. Gayen, Advanced Theory of Structures, Dhanpat Rai, New Delhi

Reference Books:

1. Timoshenko S.P. and Young D.H., Theory of Structures, Tata McGraw Hill, New Delhi
2. C.H. Norris, J.B. Wilbur and S.Utku, Elementary Structural Analysis, Tata McGraw Hill, New Delhi
3. S.J. Kinney, Indeterminate Structural Analysis, Oxford and IBH
4. C.K. Wang, Indeterminate Structural Analysis, Tata McGraw Hill, New Delhi
5. Weaver, William, Gere, James M., Matrix Analysis Framed Structures, CBS, New Delhi
6. Russell C. Hibbeler, Structural Analysis, Pearson Education, India
7. Devdas Menon, Structural Analysis, Narosa Publications, New Delhi

Mapping of Course outcome with Program Outcomes and PSOs for CEPC 2008

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

3-High 2 - Medium 1 - Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
ISE II: Shall be based on class test on third and fourth units
ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit


**Approved in XXIVth Academic
Council, Dated 23/07/2022**

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE-I	ISE-II	ISE-III	End Semester Examination
K1	Remember	3	3	02	08
K2	Understand	3	3	02	08
K3	Apply	4	4	03	20
K4	Analyze	5	5	03	24
K5	Evaluate	0	0	00	00
K6	Create	0	0	00	00
Total Marks 100		15	15	10	60

Sample assessment table which includes mapping of course outcomes (CO) and assessment tools:

Assessment Tool	K1, K2, K3 and K4	K1, K2, K3 and K4	K1, K2, K3 and K4	K1, K2, K3 and K4	K1, K2, K3 and K4	Total
	CO1	CO2	CO3	CO4	CO5	
ISE-I	06	06	03			15
ISE-II			03	06	06	15
ISE-III	02	02	02	02	02	10
ESE Assessment	12	12	12	12	12	60
Total Marks 100	20	20	20	20	20	100


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

CEPC 2009 : ENVIRONMENTAL ENGINEERING		
Teaching Scheme	Examination Scheme	
Lectures: 03 hrs/ week	ISE I	15 Marks
	ISE II	15 Marks
Credits:3	ISE III	10 Marks
	End Semester Examination	60 Marks

Prerequisites: Nil

Course description: This course on Environmental Engineering aims to impart knowledge about Water and waste water quality, quantity and supply/ collection system. This course also includes identification of suitable method of treatment to be used for the removal of impurities, design of conventional treatment plant and analysis and design of distribution / collection system.

Course Outcomes: After Successful completion of the course, Student will be able to:

Course Outcomes	
CO1	Measure the water quality parameters, estimate water quantity and suggest the distribution system
CO2	Identify suitable method of treatment for the removal of impurities
CO3	Design the various components of water treatment plant
CO4	Analyze the water distribution network

Detailed Syllabus:

Unit 1	Characteristics of water, physical, chemical and biological standards. Water quality standards as per IS 10500-2012, USEPA and WHO. Quantity of water, rate of water consumption for various purposes, factors affecting water requirements, fire demand, Sources of water and their yield, population forecasting. Principles of Water treatment processes, Theory operation and design of aeration system, solids separation, Coagulation and flocculation theory, Zeta potential and its significance, mean velocity gradient, "G" and power consumption, common coagulants, coagulant aids, principle of sedimentation, design of settling tank and clarifloculator, tube settlers.
Unit 2	Filtration: Theory, Mechanism of Filtration, Slow and Rapid gravity filter, under drainage system, operation troubles, back washing of filters, design of filters, filter material, multimedia filters, disinfection, factors affecting disinfection, types of disinfectant, theory and application of chlorine, break point chlorination, bleaching powder estimation, Ozone and ultra violet rays, Disinfection by products, Disposal of sludge and back wash waters of water treatment plant, Softening, Chemical precipitation, ion exchange process, Regeneration process, Design aspects, Reverse osmosis process, Electro Dialysis, Ultra Filtration test and Odor removal, Demineralization of water, Removal of Fluorides, Color, taste and odors, Dissolved Metals, Dissolved gases CO ₂ , O ₂ , Cl ₂ etc. Removal of Iron and Manganese
Unit 3	Sewage Quantity: Collection and conveyance of sewage, source of sewage, variations in sewage flow, Design of circular sanitary sewers. Sewer materials, choice of materials, testing of sewer pipes, sewer appurtenances. Characteristics of sewage: Physical, chemical and biological characteristics, sampling, analysis of sewage for pH, Suspended

Approved in XXIVth Academic
Council, Dated 23/07/2022

	<p>solids, Total Solids, COD, BOD, Chlorides and Sulphates. Process flow diagram for sewage treatment,</p> <p>Stream sanitation: Self purification of natural streams, river classification, as per MoEF, Government of India, and effluent discharge standards as per BIS 2490, Oxygen Sag curve, Streeter Phelps equation and terminology (without derivation and Numerical)</p> <p>Sewage Treatment: Process flow diagram for sewage treatment, Theory and Design of Screen chamber, Grit Chamber and Primary Sedimentation tank as per the manual of CPHEEO.</p>
Unit 4	<p>Theory and design of secondary treatment units: Introduction to unit process and unit operations for secondary treatment. Biological principle, important microorganisms in waste water and their importance in waste water treatment systems, Bacterial growth, general growth pattern, growth in terms of bacterial numbers and bacterial mass.</p> <p>Activated Sludge process: Design of ASP, Sludge volume index, Sludge bulking and control. Types of ASP. Trickling filter: Biological principle, different TF media and their characteristics, design of standard rate and high rate filters using NRC formula, single stage and two stage filters , recirculation, ventilation, operational problems, control measures, Theory of rotating biological contacters.</p> <p>Low cost treatment methods: Oxidation pond: Bacteria Algae symbiosis, design of oxidation pond as per the manual of CPHEEO, advantages and disadvantages of oxidation ponds. Aerated lagoons: Principle, aeration method, advantages and disadvantages of aerated lagoons, Introduction and theory of Phyto remediation technology for waste water treatment. Introduction and theory of root zone cleaning system.</p>
Unit 5	<p>Pipe Materials, corrosion, laying of pipes, distribution system. Planning of water supply projects. Water distribution systems and analysis; Appurtenances of water transport and distribution system. O& M of water treatment plant, industrial water treatment, Survey of water treatment works, water supply system, Data collection and feasibility of project. Design of water supply scheme project for a medium sized township (above 1 lakh population)</p> <p>Theory and design of aerobic treatment units: Septic tanks, suitable conditions and situations, biological principles method of treatment and disposal of septic tank effluents. Design of septic tank along with upflow filters and soak pit.</p> <p>Anaerobic Digester: Principle of anaerobic digestion, stages of digestion, bio-gas production its characteristics and application, factors governing anaerobic digestion, design of an aerobic digesters, such as gravity thickener, sludge drying bed, decanters.</p> <p>Methods of sludge treatment and disposal, Advantages and Disadvantages. Up flow anaerobic sludge blanket (UASB) Reactor-Principle, Advantages and Disadvantages</p>

Text and Reference Books:

1. G.M.Fair, J.C. Geyer, D.A.Okan, Elements of Water Supply and and Waste Water Disposal, John Wiley and Sons Inc. 1971..
2. M.J.Hammer, Water and Waste Water Technology, John Wiley and


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

- Sons, New York, 1986
3. CPHEEO: Manual on Water supply and Treatment, Ministry of Urban Development 1991.
 4. B.C.Punmia, Ashok Jain, Arun Jain, " Water Supply Engineering"
 5. A.G.Bhole, Design of Water treatment plants, Indian Water Works Association.
 6. S.K.Garg, Water Supply Engineering, Khanna Publishers New Delhi
 7. Rajgopalan, Environmental Studies, Oxford University Press
 8. Metcalf and Eddy, Waste Water treatment and Disposal, TMH Publication
 9. B.C.Punmia, Ashok Jain, " Waste Water Engineering", Arihant Publication
 10. B.S.N. Raju, " Water Supply and Waste Water Engineering", TMH Publication
 11. S.K.Garg, " Sewage Disposal and Air Pollution Engineering, Khanna Publications, New Delhi
 12. Manual on Sewerage and Sewage treatment, Public Health Department, Government of India.
 13. Indian Standard Code – IS 3025 (All Parts), IS 10500-2012

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO1	PO12	PSO1	PSO2
CO1		3	1		2				2		1		1	
CO2		2	2		2		1	2						
CO3		3	3		2		3	1	1					
CO4		2			2	2	2	1	1	2	1			

3-High 2 – Medium 1 – Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
 ISE II: Shall be based on class test on third and fourth units
 ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	5			15
K2	Understand	5	5	5	15
K3	Apply	5	5	5	15
K4	Analyze		5		15
K5	Evaluate				
K6	Create				
Total Marks	100	15	15	10	60


Approved in XXIVth Academic Council, Dated 23/07/2022

Assessment table:

Assessment Tool	K1,K2,K3,K4	K1,K2,K3,K4	K1,K2,K3,K4	K1,K2,K3,K4
	CO1	CO2	CO3	CO4
ISE I (15 Marks)	5	5	5	
ISE II (15 Marks)		5	5	5
ISE III (10 Marks)			5	5
ESE Assessment (60 Marks)	15	15	15	15
Total Marks 100	20	25	30	25



**Approved In XXIVth Academic
Council, Dated 23/07/2022**

CEPE 2001: ADVANCED SURVEY			
Teaching Scheme		Evaluation Scheme	
Lectures	3Hrs/Week	ISE I	15 Marks
Tutorials	-----	ISE II	15 Marks
Total Credits	3	ISE III	10 Marks
		ESE	60 Marks
		Total	100 Marks

Prerequisites: CEPC2002

Course description: Advanced topics in surveying computations and procedures, including traverse error analysis, mapping, this course introduces the advanced methods and instruments for measurement necessary for plotting maps and plans.

Course Outcomes:

On completion of the course, the students will be able to:

CO1	Apply advanced surveying techniques in different fields of Civil Engineering
CO2	Select the advanced surveying technique which is best suited for a work
CO3	To compute and apply corrections to field measurements
CO4	Apply total station and EDM in distance measurement and traversing

Detailed Syllabus:

Unit 1	PHOTOGRAMMETRY Introduction, types, types of photograph, Terrestrial photogrammetry, photo theodolite, principle of terrestrial photogrammetry, Aerial photogrammetry: technical terms, scale, ground coordinates, relief displacement, flying height, computation of length and height from photograph, flight planning, ground control, radial line method of plotting, Stereoscopic vision, fusion, stereoscope, parallax in aerial stereoscopic views, difference in elevation by stereoscopic parallax, Photographic interpretation, applications of photogrammetry, Introduction to remote sensing
Unit 2	GEODETIC SURVEYING: Triangulation, triangulation figures, classification of triangulation systems, selection of stations, intervisibility and heights of stations, towers and signals, phase of a signal, eccentricity of signals, Measurement of angle, instruments used, methods of observations, satellite station and reduction to center, Base line measurement, field work, correction to measurement, reduction to MSL, extension of base
Unit 3	Triangulation Adjustment Kinds of errors, Laws of weights, Determination of most probable values (MPV) of conditioned and independent quantities, Method of least squares, Indirect observations, Probable error and its determination, Distribution of error to the field measurements, Normal equation, Method of correlates. Station and figure adjustment of geodetic quadrilateral without central

Approved in XXIVth Academic
Council, Dated 23/07/2022

	station.
Unit 4	Introduction to Satellite Based Positioning System SBPS systems - GPS, Glonass, Galileo, Gagan, Compass, etc and their features, Segments of SBPS (Space, Control and User), their importance and role in SBPS, Positioning with SBPS - Absolute & Differential Methods, Use of SBPS in Surveying, SBPS Co-ordinates & heights, Factors governing accuracy in SBPS positioning, Different types of errors in SBPS Positioning.
Unit 5	Electromagnetic distance measurement (EDM) Principle of EDM Carrier waves - Types of EDM instruments - Distomat - Total Station - Principle - procedure & surveying using Total Station - precise leveling - micro-optic theodolite.

Recommended Books:

1. Surveying: Vol. II. And III by Dr. B. C. Punmia: Laxmi Publication - New Delhi.
2. Surveying and Levelling Vol. II by T. P. Kanetkar and S. V. Kulkarni Pune Vidyarthi
3. Publication.
4. GPS Sattelite Surveying—Alfred Leick—Wiley
5. Remote sensing and Geographical Information System, By A. M. Chandra and S. K. Ghosh,
6. Narosa Publishing House.
7. Remote Sensing & GIS,2/E—Bhatta-- Oxford University Press
8. Principles of Geographical Information System—Burrough-- Oxford University Press
9. Surveying—M.D.Saikia—PHI Learning Pvt .Ltd.Delhi
10. Advanced Surveying -Total Station, GIS and Remote Sensing by SatheeshGopi,
11. R.Sathikumar and N. Madhu , Pearson publication
12. Surveying Vol. 2 by S. K. Duggal, McGraw Hill Publication
13. Remote sensing & image interpretation, Lillesand& Kiefer, John wiley Pub. Dr. B.C.Punmia, Surveying Vol I & II, Laxmi Publications (P) Ltd. New Delhi, Sixteenth Edition Reprint 2008
14. R. Subramanian, Surveying and Levelling, Oxford University Press, New Delhi, First Edition, 2007

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO 1	PSO2
CO1	3			2	3		2	2			2			
CO2	3	2		2		2	3	2	3		2		2	
CO3	2		3		2					2		2	3	
CO4		3		3	2	2	2	2	2		1			

3-High 2 - Medium 1 - Low


 Approved In XXIVth Academic
 Council, Dated 23/07/2022

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
 ISE II: Shall be based on class test on third and fourth units
 ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern (for theory courses)

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
K1	Remember	05			06
K2	Understand	05	05	03	18
K3	Apply	05	05	05	18
K4	Analyze		05	02	18
K5	Evaluate				
K6	Create				
Total		15	15	10	60

Assessment table

Assessment Tool	K1	K2	K3	K4
	C01,C02	CO1, CO2, CO3	CO3,CO4	CO4
ISE I 15 Marks	05	05	05	
ISE II 15 Marks		05	05	05
ISE III 10 Marks		03	05	02
ESE Assessment 60 Marks	06	18	18	18


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Approved in XXIVth Academic
 Council, Dated 23/07/2022

CEPE 2002: ADVANCED FLUID MECHANICS & HYDRAULIC MACHINES		
Teaching Scheme	Examination Scheme	
Lectures: 03 hrs/ week	ISE I	15 Marks
	ISE II	15 Marks
Credits:3	ISE III	10 Marks
	End Semester Examination	60 Marks

Pre-requisite: CEPC2003: Fluid Mechanics

Course Outcomes:

After completing the course, students will able to:

Course Outcomes	
CO1	Determine discharge using notches and weirs, and understand the hydraulic jump in open channel flow
CO2	Determine velocity and Shear stress distribution for laminar flow between parallel plates.
CO3	Calculate force exerted by free jet on stationary and moving vanes
CO4	Estimate performance characteristics of Centrifugal pump
CO5	Design Impulse and Reaction turbine and predict their performance characteristics

Detailed Syllabus

Unit 1	Flow Over Notches and Weirs Classification of notches and weirs, flow over sharp crested rectangular weir/notch, Francis formula, ventilation of weirs, flow over triangular weir/notch, flow over trapezoidal weir/notch, Cipolletti weir, effect on discharge due to error in measurement of head, broad crested weir, submerged weir, proportionate weir. Hydraulic Jump: Assumptions in the theory of hydraulic jump, application of momentum equation to hydraulic jump in rectangular channel: Conjugate depths and relations between conjugate depths. Energy dissipation in hydraulic jump, classification of hydraulic jump and its applications
Unit 2	Laminar Flow and Hydraulics for High Rise Buildings Laminar flow between parallel plates: plates at rest, one plate moving and other at rest (Couette flow), laminar flow through porous media. Introduction of high-rise building, importance and significance of plumbing design, list of components in high rise plumbing, provisions for pressure, velocity and discharge as per uniform plumbing code-India (UPC-I), water supply fixture unit (WSFU) and peak water demand of plumbing fixtures, drainage fixture unit (DFU), maximum loads for horizontal fixture branches and building drains or sewers.
Unit 3	Impact of Free Jets Impulse momentum equation, force exerted by jet on stationary and moving flat plate (normal & inclined to the jet), flat plates mounted on periphery of a wheel, force exerted by jet on symmetrical stationary curved vane at center, on unsymmetrical stationary curved vane tangentially at one of the tips. Force exerted by jet on symmetrical


Approved In XXIVth Academic
Council, Dated 23/07/2022

	moving curved vane at the center, symmetrical curved vanes mounted on periphery of a wheel, force exerted by jet on unsymmetrical moving curved vane tangentially at one of the tips, torque exerted on a wheel with radial curved vanes
Unit 4	<p>Centrifugal Pumps</p> <p>Component parts, working, types of centrifugal pumps, work done by impeller, head of pump, losses and efficiencies, minimum starting speed, loss of head due to increased or reduced flow, diameters of impeller and pipes, pumps in series and parallel, suction lift, net positive suction head, cavitation in centrifugal pump, introduction to submersible pumps. Performance centrifugal pump: characteristic curves, specific speed, model testing.</p> <p>Reciprocating pumps: Types, working principle, slip, Air vessel and its function</p>
Unit-5	<p>Hydraulic Turbines</p> <p>Elements of hydroelectric power plants, heads and efficiencies and classification of turbines, Pelton wheel turbine: component parts and its working, work done and efficiencies, working proportions, design, and multiple jet Pelton wheel (introduction). Francis turbine :component parts and its working, work done and efficiencies, working proportions, design, draft tube theory, cavitation's in hydraulic turbines, governing of turbines. Performance of turbine, prediction of performance in terms of unit quantities and specific quantities, specific speed, characteristic curves, model testing of turbines, selection of turbines</p>

Text and Reference Books

1. Hydraulics and Fluid Mechanics – Modi and Seth, Standard Book House, Delhi
2. Fluid Mechanics and Hydraulic Machines – by R.K. Bansal, Laxmi Publications (P) Ltd., New Delhi.
3. V.L.Streeter and E.B. Wylie , Fluid Mechanics and Hydraulic machines, McGraw Hill Publications, New York, 2010
4. D.S.Kumar, Fluid Mechanics and Fluid Power Engineering, S.K.Katariya and Sons, New Delhi, 7thEdition, 2010
5. Fluid Mechanics and Hydraulic Machines – by V.L.Streeter and E.B.Wylie, McGraw Hill Publications, New York.
6. Fluid Mechanics and Hydraulic Machines – by Douglas J.F, Gasiorek J.M., Swaffield J.A. (2003) Pearson Education (Singapore) Pvt. Ltd.
7. Open Channel Flow- by K. Subramnaya, Tata MacGraw Hill Publishing Ltd., New Delhi.


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Mapping of Course Outcome with Program Outcomes

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

3-High 2 – Medium 1 – Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit

ISE II: Shall be based on class test on third and fourth units

ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember				
K2	Understand	10	05		24
K3	Apply	05	05	05	24
K4	Analyze		05	05	12
K5	Evaluate				
K6	Create				
Total Marks 100		15	15	10	60

Assessment table:

Assessment Tool	K2	K2, K3	K3	K4	K3, K4
	CO1	CO2	CO3,CO4	CO4	CO5
ISE I (15 Marks)	8	7			
ISE II (15 Marks)		05	05	05	
ISE III (10 Marks)					10
ESE Assessment (60 Marks)	12	12	12	12	12
Total Marks 100	20	24	17	17	22


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

CEPC2010: CONCRETE TECHNOLOGY		
Teaching Scheme	Examination Scheme	
Lectures: 03 hrs/ week	ISE I	15 Marks
	ISE II	15 Marks
Credits:03	ISE III	10 Marks
	End Semester Examination	60 Marks
	Total Marks	100

Prerequisites: Nil

Course Description: The course provides and understanding the concept of concrete and to learn the techniques of incorporating to produce the concerts and various methods for the design of concrete have been thoroughly discussed. It will help the students in designing the structures.

Course Outcomes Expected:

On the successful completion of this course, the student will be able to

CO1:	Select and evaluate the properties of ingredients required for making concrete
CO2:	Assess the properties of concrete in fresh and hardened state
CO3:	Design the concrete mixes for required properties
CO4:	Use special type of concrete for a particular application

Detailed Syllabus:

Unit 1	<p>Cement and Cementitious Materials: Cement: Types, Production, Chemical composition, Setting time, hydration of cement, physical and chemical properties and standard Specifications Cementitious Materials: Types, Chemical composition, properties and their role behavior of concrete.</p>
Unit 2	<p>Fine Aggregate: Natural and manufactured sand, particle size distribution, fineness modulus, grading curves, specific gravity, moisture content, bulking of sand, water absorption, bulk density and standard specifications. Coarse Aggregate: Types, particle size distribution, fineness modulus, grading curves, moisture content, specific gravity, absorption, bulk density, flakiness index, elongation index, crushing value, impact value, abrasion and attrition and standard specifications Water: Properties of water for making concrete and standard specifications</p>
Unit 3	<p>Production of Concrete: Batching, Mixing, Transporting, Placing, Compaction, Curing, Properties of Fresh Concrete: Cohesiveness, Segregation, Bleeding, Setting Time. Placing conditions, Workability and methods of its Measurements. Plasticizer and superplasticizer Properties in the Hardened Concrete: Compressive strength, Tensile strength , Flexural Strength, Modulus of elasticity, Poisson's Ratio, Permeability and durability, Standard tests of their measurement. Destructive and non-destructive testing methods.</p>

Approved in XXIVth Academic Council, Dated 23/07/2022



Approved in XXIVth Academic Council, Dated 23/07/2022

Unit 4	Concrete Mix Proportioning: Nominal and design mix concrete, Principles of mix designs, Data for Concrete mix proportioning, Indian Standard method of concrete mix proportioning of Ordinary and Standard grades of concrete
Unit 5	Special Concrete: Light weight concrete, High density concrete, Fiber reinforced concrete, Self compacting concrete, Air entrained concrete etc.: Materials, production and properties in the fresh and hardened state.

Text Books:

1. A. M. Neville, Properties of Concrete, 4th edition, 2006, ELBS with Longman, UK
2. M. L. Gambhir, Concrete Technology, 3rd edition, 2006, Tata McGraw Hill, New Delhi
3. M. S. Shetty, Concrete Technology, 2008, S. Chand & Co., New Delhi
4. S. K. Duggal, Building Material Oxford & IHB Publishing Co. Ltd. New Delhi 2000.
5. B.C. Punmia Building Construction.

Mapping of Course outcome with Program Outcomes and PSOs for CEPC 2008

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

3-High 2 - Medium 1 - Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
 ISE II: Shall be based on class test on third and fourth units
 ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE-I	ISE-II	ISE-III	End Semester Examination (Marks)
K1	Remember	2	2	02	10
K2	Understand	4	4	02	20
K3	Apply	4	4	03	30
K4	Analyze	5	5	03	00
K5	Evaluate	0	0	00	00
K6	Create	0	0	00	00
Total Marks 100		15	15	10	60


Approved in XXIVth Academic Council, Dated 23/07/2022

Sample assessment table which includes mapping of course outcomes (CO) and assessment tools:

Assessment Tool	K1, K2, K3	K1, K2, K3	K1, K2, K3	K1, K2, K3	Total (Marks)
	CO1	CO2	CO3	CO4	
ISE-I	15				15
ISE-II		07	08		15
ISE-III	02	02	02	04	10
ESE Assessment	15	15	15	15	60
Total Marks 100	32	24	25	19	100

**Approved in XXIVth Academic
Council, Dated 23/07/2022**

Approved in XXIVth Academic
Council, Dated 23/07/2022

CEOE 1010: DISASTER MANAGEMENT		
Teaching Scheme	Examination Scheme	
Lectures: 03 hrs/ week	ISE I	15 Marks
	ISE II	15 Marks
Credits:3	ISE III	10 Marks
	End Semester Examination	60 Marks
	Total	100

Prerequisites: Not Required

Course description:

Objective of this course is to provide an insight and inculcate the essentials of Disaster Management for alarming about disaster to overcome for safety of people .Students of all branches of Engineering should know the significance of the Disaster Management in satisfying the societal needs. Disaster management includes various types of Disasters such as Earthquake, Cyclone, Tsunami, Fire, Flood, Landslides, Avalanches, Lightening, and Thundering. The role of Government, NGOs, Public about the Disaster Management


Course Outcomes:

After completing the course, students will able to:

Course Outcomes	
CO1	Explain terms related with Disaster Management
CO2	Illustrate various Disaster Management Techniques
CO3	Study and uses of equipments in Disaster Management
CO4	Demonstrate construction equipments and terms related with earthquake
CO5	Sketch and plan for Disaster management Activities

Detailed Syllabus:

Unit 1	Introduction and Types of Disasters – Natural and Manmade Disasters Definition , concept of Disasters ,Types of Disasters –Earthquakes and its types , Cyclone ,Floods, Tsunami, Lightening ,Thundering , Biological, Chemical ,Nuclear , Bob blasts , Pesticides , Industrial Waste
Unit 2	Disaster Risk Reduction Strategies Disaster risk reduction strategies ,disaster cycle –its analysis ,phases mitigation and preparedness, Early warning Systems, Preparedness, Policies for disaster preparedness program, Roles and responsibilities of different organizations ,DRR master planning for future, Capacity building
Unit 3	Disaster and its Policies Hazard and vulnerability profile of India , Disaster management about Indian scenario Components of Disaster relief – Water ,Flood ,Sanitation, shelter ,Health ,Waste management ,Institutional management –Mitigation and Preparedness , Disaster management act 2005, , policies and guidelines
Unit 4	Disaster Management Framework Effect to mitigate natural disasters at National and Global level, National and


Approved in XXIVth Academic
Council, Dated 23/07/2022

	International strategies for Disaster reduction and its framework ,Role of Media, NGOs, ,Central Government ,State Government , District and Local Administration, Armed forces , Police Department
Unit 5	Predisaster and Post disaster Planning structures Predisaster and post disaster planning , Failures of Framed and load bearing structures , sources of weaknesses in structures ,retrofitting techniques of structures, Earthquake resisting building structures , base isolation techniques. Case studies of Kutch Earthquake (2001) and Latur Earthquake (1993)

Text and Reference Books

1. A.K.Jain ,Disaster Management Pubkisher-Pragun Publishing , ISBN 10 8189920820
2. Nitish Kumar , Disaster Management 2013- 1850, Neeraj Publication MPA
3. Pramod K. Mishra , The Kutch Eathquake 2001, National Institute of Disaster Management ,New Delhi
4. Disaster Management in India SAGE Publications India Pvt Ltd ISBN10 9353883032
5. Disaster Management in India : Challenges and Strategies Publishers – Prowess Publishing ISBN 10 1545720150
6. Disaster Management By SULPHEY M M eBook ISBN 9789354438011
7. Disaster Management : Global Challenges and Local Solutions by Rajib Shaw Publisher – Universities Press(India) Pvt Ltd

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

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

3-High 2 - Medium 1 - Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
ISE II: Shall be based on class test on third and fourth units
ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
K1	Remember				
K2	Understand	15	10	05	36
K3	Apply		5	05	24
K4	Analyze				

Approved in XXIVth Academic Council, Dated 23/07/2022

K5	Evaluate				
K6	Create				
Total Marks 100		15	15	10	60

Assessment table:

Assessment Tool	K1	K2	K3	K4	K4
	CO1	CO2	CO3	CO4	CO5
ISE I (15 Marks)	6	6	3		
ISE II (15 Marks)			3	6	6
ISE III (10 Marks)	2	2	2	2	2
ESE Assessment (60 Marks)	12	12	12	12	12
Total Marks 100	20	20	20	20	20

Approved in XXIVth Academic
Council, Dated 23/07/2022

CEPC2011: LAB- BUILDING PLANNING & DESIGN		
Teaching Scheme	Examination Scheme	
Lectures: 04 hrs/ week	ISE I	50 Marks
	ISE II	
Credits:2	ISE III	
	End Semester Examination	50 Marks

Course description: Objective of this course is to provide an insight and inculcate the essentials of Building Planning and Design. Civil engineers plan, design, build, execute and maintain infrastructure projects such as public and private utility buildings, satisfying the societal needs. This course introduces the elements of building planning, design. This course forms the foundation of the Civil Engineering, in which students will be able to decide on the requirements of various types of buildings and its components along with the standard dimensions.

Before preparing drawings students are expected to visit different sites and study different aspects and peculiarities of structures.

Course Outcomes:

After completing the course, students will able to:

Course Outcomes	
CO1	Identify the various components of buildings and draw the drawings as per measurements
CO2	Develop perspective view
CO3	Plan, and Draw line plan as per standard norms and requirements
CO4	Apply the knowledge of building planning and design the buildings as per clients requirement
CO5	Suggest different alternatives for grouping of units in a building together

Detailed Syllabus: The term work shall consist of exercises of following nature. Individual subject teacher shall have freedom of including additional exercises.

Sr No	Details
1	Measured Drawing of Residential Building (Including Site Visit)
2	Drawing of Perspective view of Residential Building
3	Line Plan of any one Public Building such as 1. High school/ Engineering College / Arts, commerce, Science College 2. Hospital of at least 100 beds 3. Any medium scale manufacturing industry 4. Commercial complex/ multiplex theaters/ shopping mall
4	Planning and Design of Public Building (Drawing)-Drawing of one public building, using conventional or drafting software- Any one public building from above exercise 5 may be considered for detailed drawing purpose.

Approved in XXIVth Academic
Council, Dated 23/07/2022

Approved in XXIVth Academic
Council, Dated 23/07/2022

Text and Reference books

1. M.G. Shah, C.M.Kale, S.Y. Patki, "Building Drawing with an Integrated Approach to Built Environment", Tata McGraw Hill Education Private Limited, New Delhi, Third Reprint 2012.
2. National Building Code of India, S.P. 7 ISI
3. Y.S.Sane, "Planning and Designing Buildings", Engineering Book Publishing Co., Pune- 16, Edition 1996

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

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

3-High 2 - Medium 1 - Low

Assessment:

ISE I shall be based on the assessment of term work and interaction with student till 33% coverage of curriculum.

ISE II shall be based on the assessment of submission work and interaction with student till 66% coverage of curriculum.

ISE III shall be based on the assessment of submission work and interaction with student till end of the term.

ESE will be based on oral/practical exam conducted by Course co-coordinator and External Examiner.

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
S1	Remember/Perception	5	5		10
S2	Understand /Set	10	10	5	20
S3	Apply/Guided Response	5	5	5	20
S4	Analyze/Mechanism				
S5	Evaluate/Complex Overt Response				
S6	Create /Adaptation				
Total Marks 50		20	20	10	50

Assessment table:

Assessment Tool	S1,S2,S3	S1,S2,S3	S1,S2,S3	S1,S2,S3	S1,S2,S3
	CO1	CO2	CO3	CO4	CO5
ISE I (20 Marks)	5	5	5	5	
ISE II (20 Marks)		5	5	5	5
ISE III (10 Marks)				5	5
ESE Assessment 50 Marks	10	10	10	10	10
Total Marks 100 Marks	15	20	20	25	20


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

CEPC 2012: LAB-STRUCTURAL ANALYSIS		
Teaching Scheme	Examination Scheme	
Lectures: 02 hrs/ week	ISE I	10 Marks
	ISE II	10 Marks
Credits:1	ISE III	5 Marks
	End Semester Examination	25 Marks

Prerequisites: Lab Solid Mechanics

Course Description: Objective of this course is to provide an insight about the behavior of the structure under the load.

Course Outcomes Expected:

On the successful completion of this course, the student will be able to

COs	Course Outcomes
CO1	Measure flexural rigidity and deflection of beam under given loading
CO2	Verify moment area and reciprocal deflection theorems for the beams
CO3	Observe the behavior of arches and long columns with different support conditions
CO4	Observe the behavior of statically determinate and indeterminate plane trusses under external loads

Detailed Syllabus: The term work shall consist of the following

1	To determine Flexural Rigidity of a given beam
2	To determine deflection of beam at a section under given loading
3	To verify Moment Area Theorems regarding slope and deflection of the beams
4	To verify Maxwell's theorem of reciprocal deflection
5	To determine horizontal thrust in a three hinged arch under given load and draw influence line diagrams for horizontal thrust and bending moment at a section.
6	To determine horizontal thrust in a two hinged arch under given load and draw influence line diagrams for horizontal thrust and bending moment at a section.
7	To study the behavior of long columns with different support conditions and determine Euler's buckling load
8	To study the behavior of statically determinate and determinate pin jointed plane truss under external load

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

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

3-High 2 - Medium 1 - Low


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Assessment:

ISE I shall be based on the assessment of term work and interaction with student till 33% coverage of curriculum.

ISE II shall be based on the assessment of submission work and interaction with student till 66% coverage of curriculum.

ISE III shall be based on the assessment of submission work and interaction with student till end of the term.

ESE will be based on oral/practical exam conducted by Course co-coordinator and External Examiner.

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
S1	Remember/Perception				6
S2	Understand /Set				6
S3	Apply/Guided Response	5	5		6
S4	Analyze/Mechanism	5	5	5	7
S5	Evaluate/Complex Overt Response				
S6	Create /Adaption				
Total Marks 25		10	10	5	25

Assessment Table:

Assessment Tool	S1	S2	S3	S4
	CO1	CO2	CO3	CO4
ISE I (10 Marks)	5	5		
ISE II (10 Marks)			5	5
ISE III (5 Marks)				5
ESE (25 Marks)	6	6	6	7
Total Marks 50 Marks	12	12	12	14

Approved in XXIVth Academic
Council, Dated 23/07/2022

CEPC 2013: LAB - ENVIRONMENTAL ENGINEERING		
Teaching Scheme	Examination Scheme	
Practical's: 2 hrs./ week	ISE I	25 Marks
	ISE II	
	ISE III	
	ESE	25 Marks
Credits: 1	Total Marks	50 Marks

Prerequisites: No

Course description: This course introduces about characteristics of water and sewage, function of various units of water and sewage treatment plant, identification of suitable method of treatment to be used for removal of impurities, design of conventional water and waste water treatment plant and analysis of water and waste water distribution/ Collection system.

Course Outcomes: After Successful completion of the course, Student will be able to:

Course Outcomes	
CO1	Perform the experiments to determine the characteristics of water and sewage
CO2	Specify the function of each unit of water and sewage treatment plant
CO3	Design the various components of water and sewage treatment plant
CO4	Specify standards for design of water and sewage treatment plant.

Detailed Syllabus:

01.	Detailed design report of water and sewage treatment plant for given population of town
02.	<p>List of Experiments (Any Eight):</p> <ol style="list-style-type: none"> 1. Determination of Hardness 2. Determination of Turbidity 3. Determination of Alum dose by jar test 4. Determination of Chlorine dose and chlorine demand 5. Determination of fluoride by U-V Spectrophotometer 6. Determination of trace metal concentration by AAS 7. Determination of BOD 8. Determination of COD 9. Determination of different types of solids 10. Determination of SVI
03.	<p>Term Work:</p> <p>The Term Work shall consist of laboratory experiments as mentioned below and detailed design report of water and Sewage treatment plant for given population of town</p>
04.	<p>Practical Examination/ Viva voce Examination:</p> <p>The panel of Examiners shall evaluate the understanding / knowledge of the student by performing experiments and/ or by viva voce.</p>

Approved in XXIVth Academic
Council, Dated 23/07/2022

Approved in XXIVth Academic
Council, Dated 23/07/2022

Text and Reference Books:

1. IS 3015 Part 1 to 50: 1987 Methods of Sampling and test (Physical and Chemical) for Water and wastewater
2. Standard methods for the examination of Water 22nd Edition APHA
3. IS 10500: 2012

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

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

3-High 2 - Medium 1 - Low

Assessment:

ISE I shall be based on the assessment of term work and interaction with student till 33% coverage of curriculum.

ISE II shall be based on the assessment of submission work and interaction with student till 66% coverage of curriculum.

ISE III shall be based on the assessment of submission work and interaction with student till end of the term.


ESE will be based on oral/practical exam conducted by Course co-coordinator and External Examiner.

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	ESE
S1	Remember/Perception	5			10
S2	Understand /Set	5	5		10
S3	Apply/Guided Response		05	5	5
S4	Analyze/Mechanism				
S5	Evaluate/Complex Overt Response				
S6	Create /Adaptation				
Total Marks 50		10	10	5	25

Assessment table:

Assessment Tool	S1, S2,S3	S1, S2,S3	S1, S2,S3	S1, S2,S3
	CO1	CO2	CO3	CO4
ISE I (10 Marks)	5	5		
ISE II (10 Marks)			5	5
ISE III (5 Marks)				5
ESE Assessment (25 Marks)	5	5	10	5
Total Marks (50 Marks)	10	10	15	15


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

CEPC2014: LAB-CONCRETE TECHNOLOGY		
Teaching Scheme	Examination Scheme	
Lectures: 02 hrs/ week	ISE I	25 Marks
	ISE II	
Credits:1	ISE III	
	End Semester Examination	25 Marks

Prerequisites:

Course Description: Objective of this course is to provide an insight about the behavior of the concrete.

Course Outcomes Expected:

On the successful completion of this course, the student will be able to

COs	Course Outcomes
CO1	Evaluate the properties of ingredients of concrete
CO2	Evaluate the properties of concrete in fresh and hardened state
CO3	Design and prepare concrete of required properties

Detailed Syllabus: The term work shall consist of following experiments

1	CEMENT TEST 1. Fineness by Air permeability Test 2. Standard consistency 3. Initial and Final Setting time 4. Soundness 5. Compressive strength
2	FINE AGGREGATE (Minimum 2) 1. Sieve analysis 2. Water absorption, moisture content and specific gravity 3. Bulking of sand 4. Deleterious Material Test
3	COARSE AGGREGATE (Minimum 2) 1. Sieve analysis 2. Water absorption, moisture content and specific gravity 3. Flakiness and Elongation Index of aggregates 4. Impact and Crushing Value
4	TEST ON FRESH CONCRETE (Minimum 2) 1. Workability of concrete by slump test 2. Workability of concrete by compaction factor test 3. Workability of concrete by Vee-Bee consist meter test 4. Workability of concrete by flow test
5	TEST ON HARDEN CONCRETE (Minimum 2) 1. Compression Test 2. Split Tension Test 3. Rebound hammer test. 4. Ultrasonic pulse velocity test.


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

6	Concrete mix proportioning using natural and manufactured sand as per IS 10262- 2009
7	Visit to construction site.

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1				3	2	3	2					1		2
CO2				3	3	3	2					1		2
CO3			3	3	3	3	2					1		2

3-High 2 - Medium 1 - Low

Assessment:

ISE I shall be based on the assessment of term work and interaction with student till Mid Term.

ISE II shall be based on the assessment of submission work and interaction with student till end of the term.

ESE will be based on oral/practical exam conducted by Course co-coordinator and External Examiner.

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	Total
S1	Remember/Perception				
S2	Understand /Set	3	5		8
S3	Apply/Guided Response	5	6		11
S4	Analyze/Mechanism	2	4		6
S5	Evaluate/Complex Overt Response				
S6	Create /Adapation				
Total Marks 25		10	15		25

Assessment Table:

Assessment Tool	S1, S2, S3	S1, S2, S3	S1, S2, S3
	CO1	CO1, CO2	CO2, CO3
ISE I (10Marks)	5	5	
ISE II (15 Marks)			15
ISE III -			
ESE Assessment - (25 Marks)	7	8	10
Total Marks (50 Marks)	12	13	25


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Annexure IV

CEHS 0020: FINANCE AND ACCOUNTING

Teaching Scheme		Evaluation Scheme	
Theory	3 hrs / Week	Class Test 1	15 Marks
Total Credits	03	Class Test 2	15 Marks
		Teachers Assessment	10 Marks
		End Semester Exam	60 Marks
		Total	100 Marks

Pre - Requisite: Not required

Course Description: This course is to understand fundamentals of Accounting, Finance, Taxation for individual and Company / firm. To learn accounting methods and importance of Finance to incorporate decisions for capital budgeting and monitoring. Course content is divided in six units to understand aspects of accounts and finance to Engineers.

Course Outcomes: After Successful completion of course, the student will be able to

Course Outcomes	
CO1	Understand basic concepts of Accounting, Finance and Taxation.
CO2	Understand accounting methods and Tax structure.
CO3	Implement Accounting and Finance for individual and business planning.
CO4	Asses Techno Economic Viability of project

Detailed Syllabus

Unit 1	Introduction to Accounting and Book Keeping : Definition, Steps for accounting, Objectives of accounting, Importance of accounting (to Owner, Management, Creditors, Employees, investors, Government etc.) Functions and Advantages of accounting, Limitations of accounting, Types of accounts (Personal, impersonal), Rules of accounting, Terminology. Definition, Objectives, Methods of book keeping. Single Entry System, Double entry System, and Debit, Credit .Journal entries, Recording and analysis of entries. Illustration of journal entries, Ledger, Invoice, E-way bills.
Unit 2	Cost Accounting and Final accounting : Cost accounting meaning, Elements of cost (material, labor, Expenses) Direct cost, Indirect cost, variable costs, Fixed cost, Break even analysis, Break even Charts advantages and types. Trading Account, Manufacturing account. Profit and loss account, preparation, purpose and principles of P & L account. Balance Sheet, meaning, Classification of Assets and Liability. Tangible assets.

Approved in XXIVth Academic
Council, Dated 23/07/2022

Unit 3	Taxation. Tax definition, applicability of tax to Individual, Proprietor partnership firm, Private limited company, Listed company. Tax registrations PAN,TAN,TIN Types of Taxes, Direct Tax, Indirect tax. Tax benefits, tax exemptions. Tax payment and collection system. TDS, TCS, Filing of tax returns, Tax Audit introduction.
Unit 4	Finance Definition, importance of finance, rate of interest, types of ROI , calculation of ROI formulas, Ratios, Types of Finance, Banking Finance, Non-banking finance, Govt. finance, Subsidy. Capital budgeting, Financial management. Role of valuer for finance.
Unit 5	Techno-Economic Viability Study (TEV) Objectives and importance of TEV, Company profile, Economic aspects, Market analysis (existing and future), Technical assessment of project, Financial viability, Risk assessment, Environmental aspects, Feasibility analysis. Contents of TEVR report. Role and opportunity for Engineer in TEV profession.

Recommended Books:

1. Financial Accounting by- P.C. Tulsian, Pearson Education (Singapore), Published by Dorling Kindersley Delhi.
2. Cost Accounting Principles and practice by: S.P.Jain, K.L.Narang, Agarwal, Kalyani Publishers.
3. Financial Accounting by – S.P.Jain, K.L.Narang, Kalyani Publishers.
4. Entrepreneurship Development by - S.Anilkumar , S.C. Poornima, K.Jayshree, New Age International (P) Limited Publishers, Delhi

Mapping of Course Outcome with Program Outcomes

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

1: Low

2: Moderate

3: Strong

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
ISE II: Shall be based on class test on third and fourth units
ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	05	05		24
K2	Understand	05	05	05	24
K3	Apply	05	05	05	12


 Approved In XXIVth Academic
 Council, Dated 23/07/2022

K4	Analyze				
K5	Evaluate				
K6	Create				
Total Marks 100		15	15	10	60

Assessment table:

Assessment Tool	K1	K2	K3
	CO1, CO2, CO3& CO4	CO1, CO2, CO3& CO4	CO1, CO2, CO3& CO4
ISE I (15 Marks)	05	05	05
ISE II (15 Marks)	05	05	05
ISE III (10 Marks)		05	05
ESE Assessment (60 Marks)	24	24	12
Total Marks 100	34	39	27


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Approved in XXIVth Academic
 Council, Dated 23/07/2022

CEHS 1030: Constitution of India and Professional Ethics		
Teaching Scheme	Examination Scheme	
Lectures: 03 hrs/ week	ISE I	15 Marks
Credits:3	ISE II	15 Marks
	ISE III	10 Marks
	End Semester Examination	60 Marks

Prerequisite: Basic Knowledge of Civics


Course Description: Our constitution is not a mere pedantic legal text; it contains human values, cherished principles and spiritual norms. It upholds the dignity of human being. The Constitution of India is the supreme law of India. It lays down the framework defining fundamental political principles, establishes the structure, procedures, powers and duties of government institutions and sets out fundamental rights, directive principles and the duties of citizens. This course introduces the salient features of constitution, fundamental rights and directive principles, judiciary system, electoral process and importance of acts.

Course Outcome: On successful completion of this course, students will be able to-

Course Outcomes	
CO1	Recognize the importance of constitution of India and fundamental rights
CO2	Describe the role of Union Executives, Judiciary system & Electoral Process
CO3	Justify the professional ethics, moral standards and Intellectual Property Rights
CO4	Recognize the importance of Intellectual Property Rights

Detailed Syllabus

Unit 1	Introduction to the Constitution of India, The making of the constitution and Salient features of the constitution. Preamble to the Indian Constitution, Fundamental rights, Directive Principles & Fundamental Duties of the Indian citizen
Unit 2	Union Executives-President, Prime Minister, Parliament, Supreme Court of India; State Executives-Governor, Chief Minister, State Legislature, High Court of State and Judiciary system
Unit 3	Electoral Process in India, Amendment procedures, Important Amendments, Powers a function of Municipalities, Panchayats and Co-Operative Societies
Unit 4	Different Intellectual Property Rights, International aspect of intellectual property, Principles behind The Patents Act, Patents: What is patent, Inventions not patentable, Applications for patents, Publication and Examination of application, Grant of patent and rights conferred thereby, Copyright act and its implementation.
Unit-5	Scope and aims of engineering ethics, Responsibility of Engineers, Impediments to Responsibility, Risks, Safety and liability of Engineers, Code of conduct of different engineering organizations


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Text and Reference Books

1. Constitution of India (Full Text)/ India Portal-<http://india.gov.in>
2. The Constitution of India, Bare Act with short comments-Published by Professional Book Publishers, Delhi
3. Intellectual Property Laws, Bare Act with Short Comments-Published by Professional Book Publishers, Delhi
4. C.S.V. Murthy, 'Business Ethics' - Himalaya publishing House

Mapping of Course Outcome with Program Outcomes

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

1: Low**2: Moderate****3: Strong**

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit

ISE II: Shall be based on class test on third and fourth units

ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember				
K2	Understand	10	05		24
K3	Apply	05	05	05	24
K4	Analyze		05	05	12
K5	Evaluate				
K6	Create				
Total Marks 100		15	15	10	60

Assessment table:

Assessment Tool	K2	K2, K3	K3	K4	K3, K4
	CO1	CO2	CO3, CO4	CO3, CO4	CO4
ISE I (15 Marks)	8	7			
ISE II (15 Marks)		05	05	05	
ISE III (10 Marks)					10
ESE Assessment (60 Marks)	12	12	12	12	12
Total Marks 100	20	24	17	17	22

Approved in XXIVth Academic Council, Dated 23/07/2022

CEHS 0040: Operations Research		
Teaching Scheme	Examination Scheme	
Lectures: 03 hrs/ week	ISE I	15 Marks
Credits:3	ISE II	15 Marks
	ISE III	10 Marks
	End Semester Examination	60 Marks

Prerequisites: NO

Course description: Operations Research (OR) is a discipline that helps to make better decisions in complex scenarios by the application of a set of advanced analytical methods. It couples theories, results and theorems of mathematics, statistics and probability with its own theories and algorithms for problem solving. Applications of OR techniques are spread over various fields of engineering and management.

Course Outcomes: After Successful completion of the course, Student will be able to:

Course Outcomes	
CO1	understand, formulate and solve the linear programming problems
CO2	Write a dual and solve
CO3	Solve the transportation and Assignment problem
CO4	Solve the network problem so as to get maximum flow or shortest route

Detailed Syllabus:

Unit 1	Introduction and application of Optimization techniques in Engineering, Systems, Characteristics of systems, System Classification, Objective function, constraints, Linear Programming: Terminology and formulation, Graphical solution
Unit 2	Linear Programming Problem: Simplex Algorithm for LPP solution, Artificial Variable Method, Method of Big M, Two phase method for solution of LPP
Unit 3	Duality and Post Optimal Analysis, Transportation model and its Variants, Assignment Model and its solution
Unit 4	Network Analysis, Maximum Flow Problem, Shortest Route Problem
Unit 5	Introduction to Non Linear Programming, Problem formulation, Local and Global Optimum

Text and Reference Books:

1. "Operations Research", Premkumar Gupta and D. S. Hira, S. Chand and Company Pvt. Ltd., New Delhi.
2. "Operations Research, An Introduction", Hamdy A. Taha, Prentice Hall of India Private Limited, New Delhi.
3. "Operations Research Theory and Applications", J K Sharma, MacMillan India Ltd.
4. "Principles of Operations Research", Wagner H M, Prentice-Hall of India, New Delhi.
5. "Engineering Optimization, Theory and Practice", Rao S. S., New Age International Publishers

Approved in XXIVth Academic
Council, Dated 23/07/2022

Mapping of Course outcome with Program Outcomes and Program Specific Outcomes

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

1 – Low 2 – Medium 3 – High

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit

ISE II: Shall be based on class test on third and fourth units

ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern (for theory courses)

Assessment Pattern Level No.	Knowledge Level	Test I	Test II	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	05	05		15
K2	Understand	05	05		15
K3	Apply	05	05	05	15
K4	Analyze			05	15
K5	Evaluate				
K6	Create				
Total		15	15	10	60

Assessment Table

Assessment Tool	K1	K2	K3	K4
	C01, CO2, CO3, CO4	C01, CO2, CO3, CO4	C01, CO2, CO3, CO4	C01, CO2, CO3, CO4
ISE I 15 Marks	05	05	05	
ISE II 15 Marks		05	05	05
ISE III 10 Marks		05	5	
ESE 60 Marks	15	15	15	15
Total	20	30	30	20


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

CEOE 0020-Watershed Management

Teaching Scheme		Evaluation Scheme	
Theory	3Hrs/Week	ISE I	15 Marks
Tutorial		ISE II	15 Marks
Total Credits	3	ISE III	10 Marks
		ESE	60 Marks
		Total	100 Marks

Prerequisite:

Course Description: This course introduces the watershed and different techniques which are used for its sustainable development. The course provides experience in solving the difficulties in watershed management, use of modern techniques, role of various sectors, etc. You will also learn necessity of watershed management.

Course Outcomes: After Successful completion of the course, Student will be able to:

Course Outcomes	
CO1	Plan watershed management activities
CO2	Estimate soil erosion
CO3	Design sustainable water resources management

Detailed Syllabus

Unit-1:	Introduction and Basic Concepts Concepts of watershed, introduction to watershed management, its necessity and objectives, different stake holders and their relative importance, characteristics of watershed, hydrology and hydrogeology, socio-economic characteristics, watershed policies and decision making
Unit-2:	Watershed Modeling Standard modeling approaches and classification, system concepts for watershed modeling, different hydrologic processes accounted in modeling, modeling on rainfall runoff process, subsurface flows and groundwater flows, planning of watershed management activities, preparation of action plans, administrative requirements.
Unit-3:	Flood and Erosion Control Storm water management, design of drainage system, flood frequency analysis, flood routing through channels and reservoir, flood control and reservoir operation, case studies of flood damages. Types of erosion, Soil erosion, estimation of soil erosion, universal soil loss equation, effects of erosion on land fertility and land capability, control measures to erosion, reclamation of saline and alkaline soils.
Unit-4:	Drought and Rainwater Harvesting Drought assessment and classification, drought analysis technique, drought mitigation planning, Rainwater harvesting, catchment harvesting, harvesting structures
Unit-5:	Integrated Watershed Management Introduction to integrated approach, conjunctive use of water resources, Role of ecosystem, cropping pattern, sustainable agriculture, bio- mass management, dry land agriculture, social forestry, management of Forest, wild land and grass land. Role of GIS in watershed modeling, its need and necessity, data development, and its application.


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

References:

1. Murthy JVS, "Watershed management", New Age International Publishers, New Delhi.
2. Murthy VVN, "Land and water management" Kalyani Publishers, New Delhi.
3. Mujumdar D. K. "Irrigation water management" PHI Learning Pvt Ltd, Delhi
4. Suresh R.-Water shade Hydrology, Standard Publisher New Delhi
5. Das Ghanshyam "Hydrplogy and Soil Conservation Engineering, Prentice Hall India
6. SinghRajveer, Water shade Planning and Management, Yash Publishing House

Mapping of Course outcome with Program Outcomes

Course Outcome	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2			2	3		2	2	2		2		1	
CO2	2	2		3		2		2						
CO3	2	3	3		2	2				2		2	2	

3 - High 2 - Medium 1 - Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/Surprise Task

ISE II: Shall be based on class test on third and fourth units

ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Surprise Task

Assessment Pattern (for theory course)

Assessment Pattern Level No.	Knowledge Level	Test I	Test II	Teachers Assessment/ Assignment	End Semester Examination
K1	Remember	5			06
K2	Understand	5	5		18
K3	Apply	5	5	5	18
K4	Analyze		5	5	18
K5	Evaluate				
K6	Create				
Total		15	15	10	60

Assessment Table

Assessment Tool	K1	K2	K3	K4
	C01	CO1, C02,	C02, CO3	CO 2, CO3
ISE I 15 Marks	5	5	5	
ISE II 15 Marks		5	5	5
ISE III 10 Marks		5	5	
ESE 60 Marks	06	18	18	18
Total	11	33	33	23


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

CEOE 1030: APPLIED FINITE ELEMENT ANALYSIS		
Teaching Scheme	Examination Scheme	
Lectures: 03 hrs/ week	ISE I	15 Marks
	ISE II	15 Marks
Credits:3	ISE III	10 Marks
	End Semester Examination	60 Marks

Pre-requisites: Nil


Course Description: The course is aimed at imparting the students' preliminary knowledge of Finite Element Method. This course is very useful for Civil Engineer as well as Mechanical Engineering student

Course Outcomes:

After completing the course, students will able to:

Course Outcomes	
CO1	Explain general procedure of Finite Element analysis.
CO2	Solve Ordinary differential equations and assemble Global Stiffness Matrix.
CO3	Illustrate simple Engineering problems using Finite Element Analysis.
CO4	Use basic mathematical methods for finite elements analysis of structures.
CO5	Compare the of Finite Element Software's.

Unit-1	Introduction to Finite Element Analysis, Introduction to Finite Element Method, General Procedure of Finite Element Analysis, History of the Finite element Method, Need of studying Finite Element Analysis.
Unit-2	Global Stiffness Matrix, 1-Dimensional Bar Element, Truss Structures, Nodal Equilibrium Equations, Element Transformation, Assembly of Global Stiffness Matrix, Boundary conditions, Element Strain and Stress.
Unit-3	Beam Elementary Theory, Flexure Elements Elementary Beam Theory, Beam Element, Element's Shapes, Nodes, Nodal Unknowns and Coordinate Systems.
Unit-4	Variation Method of Formulation, Method of Weighted Residuals, Galerkin Method, Interpolation Functions, Triangular Elements, Rectangular Elements, 3-Dimensional Elements.
Unit-5	Introduction to Standard Packages of FEM, Introduction to Standard FEM software's ANSYS and MATLAB and its application.


 Approved In XXIVth Academic
 Council, Dated 23/07/2022

REFERENCE BOOKS:

1. T.R. Chandrupatla and A. D. Belegundu, "Introduction to Finite Elements in Engineering", Prentice Hall Publication, Latest Edition.
2. D. V. Hutton, "Fundamentals of Finite Element Analysis", McGraw Hill Publication, 10/e, Pearson Publication, Latest Edition.
3. P. Seshu, "Textbook of Finite Element Analysis", Tata McGraw Hill Publishing Company Limited, Latest Edition.
4. D.L. Logan, "A First Course in the Finite Element Method", Cengage Publications, Latest Edition.
5. Reddy J. N., "An introduction to the finite element method", Tata McGraw Hill, India, Latest Edition.
6. Desai Y. M., Eldho T. I. and Shah A. H., "Finite Element Method with application in Engineering, Pearson, Delhi, Latest Edition.
7. Olegierd C. Zienkiewicz, R. L. Taylor, "The Finite Element Method: Basic Formulation and Linear Problem-Volume-I" McGraw-hill College, Latest Edition

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 – Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit

ISE II: Shall be based on class test on third and fourth units

ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember			05	10
K2	Understand	08	08	05	15
K3	Apply	07	07		20
K4	Analyze				15
K5	Evaluate				
K6	Create				
Total Marks 100		15	15	10	60


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Assessment table

Assessment Tool	K1,K2	K2,K3	K2,K3	K2,K3	K2
	CO1	CO2	CO3	CO4	CO5
ISE I (15 Marks)	03	03	03	04	02
ISE II(15 Maeks)	03	03	03	04	02
ISE III (10 Marks)		04	04	02	
ESE Assessment (60 Marks)	05	20	15	15	05
Total	11	30	25	25	9


Approved in XXIVth Academic
Council, Dated 23/07/2022

CEOE0040: INFRASTRUCTURE MANAGEMENT			
Teaching Scheme		Evaluation Scheme	
Theory	3 hr/week	Class Test	20
Tutorial		Teacher's Assessment	20
Total credits	3	End Semester Exam	60
		Total	100

Course Outcomes: Students will be able to

Course Outcomes	
CO1	Have a technical knowledge of deterioration, maintenance, and repair techniques.
CO2	Function as a professional engineer within the context of the lifecycle management of infrastructure assets.
CO3	Have the understanding of economic constraints to develop a management plan for critical infrastructure structures and systems for the needs of society.

Unit-1	Basic Concepts Related to Infrastructure, Infrastructure scenario in India, transportation infrastructure, Urban infrastructure in India, rural infrastructure in India, introduction to special economic zone, infrastructure finance .
Unit-2	Construction Management Scheduling, contract management, quality and safety management, economics of construction, financing of infrastructure projects. Maintenance of Infrastructure Assets Impact of failure, risk analysis, monitoring, performance, resilience, service life, repair, condition assessment, no-destructive testing and evaluation.
Unit-3	Planning and Creation of Infrastructure Assets Environment impact assessment, life cycle cost and analysis, sustainable design and construction, service life of structure, quality control and assurance.
Unit-4	Private Involvement in Infrastructure Overview of infrastructure privatization, benefits of infrastructure privatization, problems of infrastructure privatization, case studies on privatization of infrastructure projects in India.
Unit-5	Risks in Infrastructure Planning and Implementation Economic and demand risks, political risks, socio-environmental risks, legal and contractual issues in infrastructure, challenges in construction and maintenance of infrastructure.


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Approved in XXIVth Academic
 Council, Dated 23/07/2022

REFERENCE BOOKS:

1. B. Sengupta, "Construction Management and Planning", Tata McGraw Hill Publication.
2. Srinath L.S., "PERT and CPM: Principles and Applications", 3rd Edition, Affiliated East West Press, Delhi.
3. N.S.Grigg, "Infrastructure Engineering and Management", John Wiley and Sons.
4. W.R. Hudson, R. Hass, W. Uddin, "Infrastructure Management", McGraw-Hill Inc.

Mapping of Course outcome with Program Outcomes

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

1 – High 2 – Medium 3 – Low

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit

ISE II: Shall be based on class test on third and fourth units

ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember			05	10
K2	Understand	08	08	05	15
K3	Apply	07	07		20
K4	Analyze				15
K5	Evaluate				
K6	Create				
Total Marks 100		15	15	10	60

Assessment table

Assessment Tool	K1,K2	K2,K3	K2,K3	K2,K3	K2
	CO1, CO2, CO3	CO1, CO2, CO3	CO1, CO2, CO3	CO1, CO2, CO3	CO1, CO2, CO3
ISE I (15 Marks)	03	03	03	04	02
ISE II(15 Marks)	03	03	03	04	02
ISE III (10 Marks)		04	04	02	
ESE Assessment (60 Marks)	05	20	15	15	05
Total	11	30	25	25	9

Approved In XXIVth Academic Council, Dated 23/07/2022

CEOE 1050: CIVIL ENGINEERING STRUCTURES		
Teaching Scheme	Examination Scheme	
Lectures: 3 hrs/ week	ISE I	15 Marks
	ISE II	15 Marks
Credits: 3	ISE III	10 Marks
	End Semester Examination	60 Marks
	Total Marks	100

Pre-requisites: Fundamental knowledge of Physics, Engineering Mechanics (Static) and Engineering Mathematics

Course Description: Civil engineering structures are built wherever the natural terrain needs to be altered to enable the completion of infrastructure projects. More demanding structural requirements, widely varying terrain and dynamic urban development make civil engineering structures of various kinds necessary.

Primary aim of this course is to introduce students to the fundamental concepts and principles applied by engineers - whether civil, mechanical, aeronautical, etc. - in the design of structures of all sorts of sizes and purpose.

Unit 1	Civil Engineering Structures: An Overview <ul style="list-style-type: none"> • Introduction • Classification of Structures • Structural Elements
Unit 2	Principle of Mechanics: <ul style="list-style-type: none"> • Mechanical Properties of Material • Simple and Compound Stresses • Internal Stress resultants • Analysis of beams and Trusses • Determination of Internal forces and joint deformation
Unit 3	Concept of Design of Structural Elements <ul style="list-style-type: none"> • Loads on Structures • RCC Structures • Prestressed Concrete Structures • Steel Structures • Wood/ Timber Structures • Masonry Structures • Cable supported structures
Unit 4	Codes of practice for design of structures <ul style="list-style-type: none"> • Introduction to codes of practice to evaluate loads on building structures IS 875 (Part I to Part V), IS 1893 (Part I) • Introduction to codes of practice for earthquake resistant design requirement for building structures IS 13920, IS 4326. • Introduction to code of practice for design of building structures i.e. IS


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

	456, IS 800, IS 1343, IS 1905, IS 1597.
Unit 5	Forms of Construction of Building Structures <ul style="list-style-type: none"> • Load bearing structures • Framed Structures • Prefabricated Structures • 3D Printed building

Students learn the concept of stress and strain, elastic constants, principle stress and strain, torsion, shear force and bending moment. They also learn to calculate the deflection of beams by different methods and the concept of strain energy. Students understand different formulae to calculate critical load on columns. After course completion, students will be able to calculate stress, strain, shear force and bending moment for beams, deflection in beams by different methods and critical load on columns.

The course content have been presented in five units so that the students can develop the logic and get insight to analyze beams, columns & strut ,cylinders & spheres and solid circular shafts

Course Outcomes:

After completing the course, students will able to:

Course Outcomes	
CO1	Know the forms of structures.
CO2	Understand the fundamental principles of structures including: response of structural elements to forces, stresses and stress resultants.
CO3	Understand different forms of design including external loads and environment agencies affecting the structures.
CO4	Understand the basis for design of building structures.
CO5	Understand structural form of building structures

Detailed Syllabus:

Text Books:

1. Ramamrutham.S., Design of Reinforced Concrete Structures, Dhanpat Rai Publishing Company, 2007.
2. Varghese.P.C., Advanced Reinforced Concrete Design, PHI, Eastern Economy Editions, Second Edition, 2005.
3. Subramanian, N., Design of Steel Structures, Oxford University Press, 2008.
4. Ramachandra and VirendraGehlot, Design of steel structures -Vol. 2, Scientific Publishers, 2012.
5. Bechthold, Martin.,Schodek, Daniel L.. Structures: Pearson, 2014.
6. Design of Steel Structures. P.Dayaratnam, Publisher : S. Chand, Edition 2011-1

Reference Books:

1. Henn W. Buildings for Industry, Vol.I and II, London Hill Books, 1995

2. Handbook on Functional Requirements of Industrial buildings, SP32-1986, Bureau of Indian Standards, 1990.
3. Handbook of Industrial Lighting, Stanley L.Lyons, Butterworths, London.1981
4. Koncz, J., Manual of Precast Construction Vol. I and II, Bauverlay GMBH, 1971.
5. Handbook on Precast Construction, An Indian Concrete Institute Publication, 2016
6. Allen, Edward.,Zalewski, Waclaw. Form and Forces: Designing Efficient, Expressive Structures. Germany: Wiley, 2012.

Various Indian Standards :

1. IS 456:2000, Indian Standard Code of Practice for Plain and Reinforced Cement Concrete, 4th revision, Bureau of Indian Standards, New Delhi.
2. IS 800:2007, General Construction In Steel - Code of Practice, 3rd revision, Bureau of Indian Standards, New Delhi.
3. IS 1343:2012, Prestressed Concrete - Code of Practice,2nd revision, Bureau of Indian Standards, New Delhi.
4. IS 1905:1987, Code of Practice for Structural use of Unreinforced Masonry, 3rd revision, Bureau of Indian Standards, New Delhi.
5. IS 1597- Part-1 and Part-2:1992, Construction of Stone Masonry - Code of Practice - Part 1 : Rubble Stone Masonry&Code of practice for construction of stone masonry: Part 2 Ashlar masonry, 1st revision, Bureau of Indian Standards, New Delhi.
6. IS 875 Part-1 to Part-5, Code of Practice For Design Loads (Other Than Earthquake)For Buildings And Structures Part 1 Dead Loads - Unit Weights of Building Material And Stored Materials(1987), Code of Practice for Design Loads (Other Than Earthquake) For Buildings And Structures: Part 2 Imposed Loads (1987), Design Loads (Other than Earthquake) for Buildings and Structures - Code of Practice Part 3 Wind Loads,3rd revision (2015), Code of Practice for Design Loads other than earthquake for Buildings and Structures Part 4 Snow Loads(1987), Code of Practice For Design Loads (Other Than Earthquake) For Buildings And Structures Part 5 Special Loads And Combinations(1987), Bureau of Indian Standards, New Delhi.
7. IS 1893- Part-1:2016, Criteria for Earthquake Resistant Design of Structures - Part 1 : General Provisions and Buildings, Bureau of Indian Standards, New Delhi
8. IS 13920:2016, Ductile Design and Detailing of Reinforced Concrete Structures Subjected to Seismic Forces - Code of Practice (First Revision), Bureau of Indian Standards, New Delhi.
9. IS 4326:2013, Earthquake resistant design and construction of buildings - Code of practice, Bureau of Indian Standards, New Delhi.

Mapping of Course outcome with Program Outcomes and PSOs

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

1 – Low 2 – Medium 3 – High


 Approved in XXIVth Academic
 Council, Dated 23/07/2022

Assessment: ISE I: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on First and Second unit
ISE II: Shall be based on class test on third and fourth units
ISE III: Shall be on the basis of Class Tests/ Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Fifth unit

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	05	05	02	20
K2	Understand	10	10	08	40
K3	Apply				
K4	Analyze				
K5	Evaluate				
K6	Create				
Total Marks: 100		15	15	10	60

Assessment table:

Assessment Tool	K1, K2,	K1, K2,	K1, K2,	K1, K2,	K1, K2,	Total
	CO1	CO2	CO3	CO4	CO5	
ISE-I	06	06	03			15
ISE-II			03	06	06	15
ISE-III	02	02	02	02	02	10
ESE Assessment	12	12	12	12	12	60
Total Marks 100	20	20	20	20	20	100


 Approved in XXIVth Academic
 Council, Dated 23/07/2022