Government College of Engineering Aurangabad
Chhatrapati Sambhajinagar - 431005

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Curriculum for
Second Year B. Tech. in Civil Engineering
With Multidisciplinary Minor Degree

(NEP Compliant)

(With Effect from Academic Year 2024-25)

Approved in XXVIIITH Academic Council
Dated: 25th Jun 2024

Total Credits for the completion of B. tech. Course with Minor for Direct Second Year admitted students

The total number of credits proposed for the B. tech. with 1 Multidisciplinary minor (Compulsory) degree is **128** as per the structure given below.

Semester		III	IV	V	VI	VII	VIII	Total Credits
Program Core Courses (PCC)	Program Courses	12	11+2*	12	15	-	-	52
Program Elective Course (PEC)	Program Elective	-	-	4	4	12	-	20
Multi-Disciplinary Minor (MD M))	Multidisciplinary Courses	4	3	4	3	-	-	14
Open Elective (OE)other than a particular program	OE	3	3	2	-	-	-	8
Vocational & Skill Enhancement Course (VSEC)	Skill Courses	-	2	-	2	-	-	4
Ability Enhancement Course (AEC-01, AEC-02)	Humanities Social Science and Management (HSSM)	-	2	-	-	-	-	2
Entrepreneurship/Economics/ Management Courses		2	2	-	-	-	-	4
Indian Knowledge System (IKS)		-	-	-	-	-	-	-
Value Education Course (VEC)		2	2	-	-	-	-	4
Research Methodology	Experiential Learning Courses	-	-	-	-	2	-	2
Comm. Engg. Project (CEP)/Field Project(FP)		2	-	-	-	-	-	2
Project		-	-	-	-	-	4	4
Internship/OJT		-	-	-	-	-	12	12
Co-curricular Courses(CC)	Liberal Learning Courses	-	-	-	-	-	-	-
Total Credits(Major)		**25**	**27**	**22**	**24**	**14**	**16**	**128**

Students can opt for any of the following as per the rules and regulations given by institute:

1. B. Tech with one Minor = Total 128 Credits
2. B. Tech with one Minor and Honor in A.I.M.L. = Total 146 Credits
3. B. Tech with one Minor and Honor by Research = Total 146Credits
4. B. Tech with two Minors = Total 142 Credits

Government College of Engineering, Chh. Sambhajinagar (Aurangabad)

(An Autonomous Institute of Government of Maharashtra)

Teaching and Evaluation Scheme with effect from 2024-25 (NEP)

B. Tech. Program in Civil Engineering with Multidisciplinary Minor

Second Year (S.Y.B.Tech.)

Semester-III											
			Teaching Scheme			Continuous Evaluation in terms of Marks					
	Course Code	Course Name	TH	T	PR	Credits	ISEI	ISEII	ISEIII	ESE	Total
PCC	CEPCC2001	Surveying	3	0	0	3	15	15	10	60	100
PCC	CEPCC2003	Lab-Surveying	0	0	2	1			25	25	50
PCC	CEPCC2002	Fluid Mechanics	3	0	0	3	15	15	10	60	100
PCC	CEPCC2004	Lab-Fluid Mechanics	0	0	2	1			25	25	50
MD(M)	CEMDM5001	Multidisciplinary Minor	3	0	0	3	15	15	10	60	100
	CEMDM5002	Lab. Multidisciplinary Minor	0	0	2	1			25	25	50
190OE	CEOEC0010	Open Elective-I	3	0	0	3	15	15-	10	60	100
HSSM	CEEEM0010	Engineering Economics	2	0	0	2	10	10		30	50
VEC	CEVEC0010	Environmental Science	2	0	0	2	10	10		30	50
PCC	AMPCC2001	Solid Mechanics	3	0	0	3	15	15	10	60	100
PCC	AMPCC2002	Lab-Solid Mechanics	0	0	2	1			25	25	50
FP/CEP	CECEP1001	Mini Project	0	0	4	2		-	50	50	100
Total			19	0	12	25	95	95	200	510	900
		Multidisciplinary Minor:									
	CEMDM5001	Engineering Geology									
	CEMDM5002	Lab. Engineering Geology									
		Open Elective-I:									
	CEOEC0010:	Rural Technology									
Semester-IV											
	Course Code	Course Name	TH	T	PR	Credits	ISEI	ISEII	ISEIII	ESE	Total
PCC	AMPCC2003	Concrete Technology	3	0	0	2	15	15	10	60	100
PCC	AMPCC2004	Lab-Concrete Technology	0	0	2	1			25	25	50
PCC	CEPCC2005	Building, Planning and Design	3	0	0	3	15	15	10	60	100
PCC	CEPCC2007	Lab- Building, Planning and Design	0	0	2	1			25	25	50
PCC	CEPCC2006	Environmental Engineering	3	0	0	3	15	15	10	60	100
PCC	CEPCC2008	Lab-Environmental Engineering	0	0	2	1			25	25	50
*PCC	CEPCC1001	Engineering Geology	2	0	0	2	10	10	-	30	50
OE	CEOEC1020	Open Elective-II	3	0	0	3	15	15	10	60	100
MD(M)-2	CEMDM5003	Multidisciplinary Minor	3	0	0	3	15	15	10	60	100
HSSM	CEEEM1020	Finance and Accounting	2	0	0	2	10	10		30	50
VSEC	CEVSE2001	Python Programming	0	0	4	2			50		50
AEC-02	INAEC1002	Technical Report Writing	0	0	4	2		0	50	0	50
VEC	CEVEC1010	Universal Human Values-II	2	0	0	2	10	10		30	50
Total			21	0	14	27	105	105	225	465	900
		Multidisciplinary Minor:									
	CEMDM5003	Basics of Surveying									
		Open Elective-II:									
	CEOEC1020	Disaster Management									

***PCC is applicable to only DSY admitted students**

Approved in XXVIIITH Academic Council
Dated: 25th Jun 2024

CEPCC2001 Surveying

Teaching Scheme		Evaluation Scheme	
Theory	03 Hrs/week	ISE I	15
Total Credits	03	ISE II	15
		ISE III	10
		End Semester Examination	60
		Total	100

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, levelling, theodolite, plane table surveying and tacheometry.

Course Objectives:

1. To introduce basic concepts of surveying
2. To study methods and equipments for linear and angular measurements
3. To introduce advanced methods of measurements

Course Outcomes:

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

CO	Course Outcome
CO1	Recall the instruments and methods of surveying
CO2	Explain the instruments and methods of surveying
CO3	Construct the maps or plans and solve the survey problems
CO4	Analyze field data as well as maps or plans and give conclusion

Detailed Syllabus:

Unit 1	**Levelling:** Definition, study of auto level, laser level, digital level, Types of levelling: simple, differential, fly, check, profile, reciprocal etc. Profile levelling- plotting longitudinal section, cross section, levelling difficulties, volume calculations, Contouring: Definition, characteristics, use, methods of locating and interpolating contour lines, Testing and permanent adjustments of Dumpy Level
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, Testing and permanent adjustments of Theodolite
Unit 3	**Plane Table Survey:** Introduction, accessories, temporary adjustments, advantages and disadvantages, methods, two point and three point problem and their solution **Tacheometry:** Introduction, instruments, methods, principle of stadia method, determination of tachometric constants, analytic lens, horizontal and inclined sights with vertical staff, Tacheometric contouring **Minor Instruments:** Study and use of planimeter, Abney level, box sextant, Indian pattern clinometer
Unit 4	**Curves**: Introduction, degree and radius of a curve, Types of curve, Simple circular

	curve- Elements, setting out by linear and angular methods, Introduction to Compound curves- Elements, Transition curve- types, uses, elements of transition curve **Setting Out Works:** Setting out buildings, culverts, bridges and tunnels
Unit 5	**Modern Systems in Surveying and Mapping:** Electronic distance measurement, Digital theodolite, Total station, Global positioning system, Geographic information system

Recommended Books:

1. Prof. T. P. Kanetkar and Prof. S.V.Kulkarni, Surveying and levelling 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
4. 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	3	2	2	2	2		2		1	1
CO3	3	3	3	2	2	2	2	2	2	2		2	2	1
CO4	3	3	3	2	2	2	2	2	2		1	2	2	1

1: Low 2: Moderate 3: Strong

Teacher's Assessment: Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1) Simulation
2) Application development
3) Power point presentation of case studies
4) Question & answer / Numerical solution
5) Study of Industry processes and its presentation
6) Mini projects
7) Attendance in the class

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	05		2.5	15
K2	Understand	05	05	2.5	15
K3	Apply	05	05	2.5	15
K4	Analyze		05	2.5	15
K5	Evaluate				
K6	Create				
Total		15	15	10	60

Assessment table

Assessment Tool	K1	K2	K3	K4	K5	K6
	CO1	CO1	CO3	CO4		
ISE I 15 Marks	05	05	05			
ISE II 15 Marks		05	05	05		
ISE III 10 Marks	2.5	2.5	2.5	2.5		
ESE Assessment 60 Marks	15	15	15	15		

CEPCC2003 Lab Survey

Teaching Scheme		Evaluation Scheme	
Practical	02 Hrs/week	ISE I-Term Work	25
Credits	01	ESE-Practical Examination	25
		Total	50

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

CO1	Select the instruments for linear and angular measurements
CO2	Demonstrate equipments for linear and angular measurements
CO3	Make use of the instruments for linear and angular measurements
CO4	Take part in survey projects

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 plane table survey.
4	Radiation and intersection method in plane table survey.
5	Study and use of Theodolite for measurement of angles.
6	Measurement of horizontal and vertical angle using transit theodolite.
7	Computation of horizontal distance and elevations by tacheometry for horizontal and inclined sights.
8	Study and use of planimeter, box sextant, Abney level and Indian pattern clinometer

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	2	1			
CO2	2	1		3	3	2			2	1	1			
CO3	3	2	2	3	3	2			2	2	1			

1: Low 2: Moderate 3: Strong

Assessment table

Assessment Tool	S1	S2	S3	S4	S5	S6
	CO1	C01 ,CO2	CO3, CO4	CO3, CO4	-	
Term Work 25 Marks	05	10	10	-	-	
Practical./Viva-voce 25 marks	-	05	10	10	-	

Assessment Pattern

Assessment Pattern Level No.	Skill Level	Term Work	Practical Examination
S1	Imitation	05	
S2	Manipulation	10	05
S3	Precision	10	10
S4	Articulation	-	10
55	Naturalization	-	-
Total		25	25

CEPCC2002 – Fluid Mechanics

Teaching Scheme		Evaluation Scheme	
Theory	03 Hrs/week	ISE I	15
Total Credits	03	ISE II	15
		ISE III	10
		End Semester Examination	60
		Total	100

Pre-requisites: Engineering Physics, Engineering Mathematics and Engineering Mechanics

Course Description: Fluid Mechanics is a course that deals with the analysis and quantification of effect of 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 behaviour of fluid flow varies with the properties of fluid, flow characteristics and 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 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 be able to:

CO	Course Outcomes
CO1	Understand the use of Fluid Properties, effect of fluid at rest and also in motion
CO2	Understand the concept of fluid kinematics with and fluid dynamics and measure discharge using discharge measuring devices
CO3	Analyse and design pipe network and model studies
CO4	Understand the concept of open channel flow, uniform flow, hydraulic jump in open channel flow and its application
CO5	Analyse and select pumps and turbines as per requirements

Detailed Syllabus

Unit 1	**Properties of Fluids**: Scope and application, classification of fluids, Rheological diagram, properties of fluids – Specific weight, specific volume, specific gravity, viscosity, compressibility, surface tension and capillarity. **Fluid Statics** : Pressure at a point, Pascal's Law, measurements of fluid pressure, pressure measurement devices, hydrostatics pressure on plane and curved surfaces, pressure diagram, concept of buoyancy, metacentre, determination of metacentric height, equilibrium of floating bodies.
Unit 2	**Fluid Kinematics:** Classification of fluid flows, steady, unsteady, uniform, non-uniform, laminar, turbulent, Reynolds number, rotational, irrotational flows, path

	line, streak line, stream line, stream tube. Continuity Equation in two dimension, flow net. **Fluid Dynamics:** Forces acting on fluid in motion, Euler's equation, Bernoulli's Equation, Measurement of Flow: Venturi meter, Pitot tube, orifices, flow over notches and weirs.
Unit 3	**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, Siphons, Dupits Equation, three reservoir problems under steady state, Pipe Network Analysis, Introduction to EPANET software. **Dimensional analysis and similarity:** Dimensions of various physical quantities, Rayleigh's method, Buckingham's theorem, types of similarities, distorted and non-distorted models.
Unit 4	**Flow in open channels:** Types of flow in channel, Geometrical properties of channel, 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- Chezy's and Manning's equations, specific energy diagram, specific force **Non uniform flow:** Energy equation for gradually varied flow (GVF), Basic assumptions and Equations, 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.
Unit 5	**Water Power Engineering:** **Centrifugal pumps:** Parts of centrifugal pumps, Types, construction and principle of working, Principle of similarity, efficiencies, priming of pumps, cavitations. **Reciprocating pumps:** Types, working principle, slip, Air vessel and its function **Turbines:** Classification and types of turbines, impulse and reaction turbines, components and parts, efficiency and characteristics of turbines based on Performance, specific speed, selection criteria for turbines.

Recommended 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. A Textbook of Fluid Mechanics and Hydraulic Machines by Er. R.K.Rajput, S.Chand& Company Ltd.
4. Fluid Mechanics and Fluid Power Engineering by D.S.Kumar, 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.

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

1: Low 2: Moderate 3: Strong

Assessment:

ISEI: Shall be based on Unit-I and Unit-II

ISEII: Shall be based on Unit-III and Unit-IV

ISE-III: Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1. Simulation
2. Application development
3. Power point presentation of case studies
4. Question & answer / Numerical solution
5. Study of Industry processes and its presentation
6. Mini projects
7. Attendance in the class

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISEI	ISEII	ISEIII	End. Semester Examination
K1	Remember				
K2	Understand	10	05		24
K3	Apply	05	05	05	24
K4	Analyze		05	05	12
KS	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
ISEI (15Marks)	8	7			
ISEII (15Marks)		5	5	5	
ISEIII (10Marks)					10
ESE Assessment (60Marks)	12	12	12	12	12
Total Marks 100	20	24	17	17	22

CEPCC2004 Lab. Fluid Mechanics

Teaching Scheme		Evaluation Scheme	
Practical	02 Hrs/week	ISE I -Term Work	25
Credits	01	ESE - Practical Examination	25
		Total	50

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

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

Detailed Syllabus: The term work shall consist of at least 8experiments of following. However, individual course teacher has a freedom to choose and include additional experiment related to the curriculum.

Sr. No.	Name of Experiment
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 Venturi meter, Orifice
5	Calibration of Notches
6	Demonstration of Flow Net
7	Demonstration of Hydraulic Jump
8	Determination of Minor losses
9	Demonstration of impact jet
10	Demonstration of Turbines and Pumps

Assessment:
ISEI shall be based on the assessment of submission work and interaction with student during the practicals and submission 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 Outcome

Course Outcome	PO1	PO2	PO3	PO4	PO 5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	3	3	3	3	3									
CO2	3	3	3	3	3	2								1
CO3	3	3	3	3	3									

1: Low 2: Moderate 3: Strong

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISEI	ISEII	ISEIII	End. Semester Examination
S1	Remember/Perception				
S2	Understand/Set	5	5		
S3	Apply/Guided Response	5	5	5	15
S4	Analyze/Mechanism				10
SS	Evaluate/Complex Overt Response				
S6	Create / Adaptation				
Total Marks 50		10	10	5	25

Assessment Table: (Content to change)

Assessment Tool	S2	S3	S4
	CO1	CO2,CO3	CO3
ISEI(10Marks)	10	15	
ESE Assessment-(25Marks)		15	10
Total Marks (50Marks)	10	30	10

CEMDM5001: (MD M) Engineering Geology

Teaching Scheme		Evaluation Scheme	
Theory	03 Hrs/week	ISE I	15
Total Credits	03	ISE II	15
		ISE III	10
		End Semester Examination	60
		Total	100

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

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

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

Detailed Syllabus:

Unit 1	Geology definition, scope, importance in Civil Engineering, Mineralogy introduction, important rock forming minerals groups. Classification and mineral composition, important igneous rocks
Unit 2	Strike, dip, parts and important types of folds, faults, fractures and joints, unconformity, discordant and concordant igneous intrusions, geological works, 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 in Civil Engineering sites, significance of stratification strike dip fold faults joints fractures, dykes in the study, surface and subsurface surveys, use of pit trenches, exploratory drilling in the subsurface exploration, preparation of the geological maps and sections, Sub surface water types, water table, porosity, permeability zones, perched water table, occurrence of subsurface water, geological conditions favorable for the natural springs and seepages, depression and contact springs, hot springs and geysers and drill holes

Unit 4	Building stones, requirement of good building stones and their dependability on the geological characters of rocks, common building stones, Building stones of India, Landslides, 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. Tunnel types, seepage of subsurface water, over break, support during tunnelling, lining after tunnelling, rate of tunnelling, 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

Recommended Books:

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 FG, "Engineering Geology "Butterworth-Heinemann

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

1: Low 2: Moderate 3: Strong

Assessment: ISE I: Shall be on the basis of Class Tests on Unit I & Unit II

ISE II: Shall be based on class test on Unit III & IV

ISE-III: Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1. Simulation
2. Application development
3. Power point presentation of case studies
4. Question & answer / Numerical solution
5. Study of Industry processes and its presentation
6. Mini projects
7. Attendance in the class

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	5	5		10
K2	Understand	10	10	2	38
K3	Apply			8	12
K4	Analyze				
K5	Evaluate				
K6	Create				
Total Marks 100		15	15	10	60

Assessment table:

Assessment Tool	K1	K2	K3
	CO1, CO2 & CO3	CO1, CO2 & CO3	CO1, CO2 & CO3
ISE I (15 Marks)	00	15	00
ISE II (15 Marks)	00	15	00
ISE III (10 Marks)	00	00	10
ESE Assessment (60 Marks)	00	30	30
Total Marks 100		60	40

CEMDM5002: Lab. Engineering Geology

Teaching Scheme		Evaluation Scheme	
Practical	02 Hrs/week	ISE I -Term Work	25
Credits	01	ESE - Practical Examination	25
		Total	50

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:

CO	Course Outcome
CO1	Recognize the sample of rock and explain brief about mineralogy of rock
CO2	Toposheet Reading and graph making
CO3	Select suitable method for geophysical explorations
CO4	Analyze the geological maps Engineering problems using graph and drill hole mapping
CO5	Create models and study the present models

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	Model preparation related to groundwater
6	Toposheet Reading
7	Graph making for engineering drill hole problems
8	One site visit to study geology and its engineering applications

Term Work:

The term work shall consist of information, experiments/ exercise based on the detailed syllabus above. An external viva will be conducted based on the term work performed during the term

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

1: Low 2: Moderate 3: Strong

CEOE0010 – Open Elective-I Rural Technology

Teaching Scheme		Evaluation Scheme	
Theory	03 Hrs/week	ISE I	15
Total Credits	03	ISE II	15
		ISE III	10
		End Semester Examination	60
		Total	100

Prerequisites :- Basic knowledge of Rural Technology and challenges faced**.**

Course Description: Rural Technology explores the application of engineering principles and technological innovations to address challenges and enhance living standards in rural communities. The course covers a wide range of topics including renewable energy, agriculture technology, water management, infrastructure development, and appropriate technology solutions.

Course Outcomes

After successful completion of the course the students shall be able to

CO	Course Outcome
CO1	Understand the concept and necessity of rural development
CO2	Use of modern techniques in crop production
CO3	Learn the solutions for water scarcity and rural infrastructure
CO4	Learn the choice for Renewable Energy at available resources

Detailed Syllabus:

Unit1	**Introduction to Rural Technology** • Overview of rural communities and their characteristics (Panchayat Raj System, its specific objectives, Functions, Sources of incomes of Village Panchayat. • Importance of technology in rural development • Challenges faced by rural populations • Role of engineers in rural technology development • Need for rural industries, objectives and scope, Relation between agriculture and industry
Unit2	**Renewable Energy in Rural Areas** • Introduction to renewable energy sources (solar, wind, biomass, etc.) • Applications of renewable energy in rural electrification • Components, Advantages, Challenges, Design and implementation of off-grid and micro-grid systems • Case studies of successful renewable energy projects in rural settings

Unit3	**Agriculture Technology** • Different modern agricultural techniques and their impact on rural communities • Smart Irrigation System • Vermi Technology • Genetic Engineering and Bio technology • Precision agriculture and its benefits for small-scale farmers • Mechanization and automation in farming practices • Innovations in crop storage, processing, and value addition
Unit4	**Water Management and Sanitation** • Challenges related to water access and sanitation in rural areas • Technologies for efficient water harvesting and management • Design of low-cost sanitation solutions • Community-based approaches to water conservation and hygiene promotion
Unit5	**Infrastructure and Connectivity** • Importance of infrastructure for rural development • Design considerations for rural roads, bridges, and transportation systems • ICT solutions for improving connectivity in remote areas • Case studies of innovative infrastructure projects in rural communities

Recommended Books:

1. "Rural Technology: A Transformative Tool for Development" by Anil Kumar, Springer, 2018.
2. "Renewable Energy Technologies for Rural Development" by R.K. Pandey, CRC Press, 2019.
3. "Agricultural Technology Adoption: Issues for Consideration" edited by Roger Day and M.G. Cook, CABI, 2020.
4. "Water, Sanitation, Hygiene and Energy in Rural Areas: Challenges and Innovations" edited by P. Bhattacharya et al., Elsevier, 2021.
5. "Infrastructure Development in Rural Areas: Strategies and Case Studies" edited by N.K. Suryadevara et al., IGI Global, 2019.

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

1: Low 2: Moderate 3: Strong

Assessment: ISE I: Shall be on the basis of Class Tests on First and Second unit
ISE II: Shall be based on class test on third and fourth units

ISE-III: Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1. Simulation
2. Application development
3. Power point presentation of case studies
4. Question & answer / Numerical solution
5. Study of Industry processes and its presentation
6. Mini projects
7. Attendance in the class

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember	5	5		12
K2	Understand	5	5	2	36
K3	Apply	5	5	8	12
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)	5	5	5
ISE II (15 Marks)	5	5	5
ISE III (10 Marks)	00	2	8
ESE Assessment (60 Marks)	20	20	20
Total Marks 100	30	32	38

CEEEM0010: (HSSM)- Engineering Economics

Teaching Scheme		Evaluation Scheme	
Theory	02 Hrs/week	ISE I	10
Total Credits	02	ISE II	10
		ISE III	-
		End Semester Examination	30
		Total	50

Pre-requisites: Basic concepts of Economics and Mathematics

Course Description: Engineering Economics introduces students to the fundamental principles of economic analysis as applied to engineering projects and decision-making. The course covers topics such as time value of money, cost estimation, investment analysis, and risk assessment, providing students with the tools necessary to make informed decisions in engineering projects.

Course Outcomes

After successful completion of the course the students shall be able to

CO	Course Outcome
1	Understand basic economic principles of decision-making in engineering.
2	Define and analyze various engineering economic criteria.
3	Apply the time value of money for economic decision making of engineering projects
4	Perform cost-benefit analysis and make economically sound engineering decisions

Detailed Syllabus:

Unit1	**Introduction to Engineering Economics** • Basic economic principles and concepts • Overview of engineering economics and its importance in decision-making • Definition of economics, nature of the economic problem • Micro and macroeconomics: features and scope • Relation between Science, Engineering Technology, and Economics • Nature and characteristics of the Indian economy, privatization, globalization • Elementary concept of WTO & TRIPS agreement, Monetary Policy & Fiscal Policy • Market types: perfect competition, monopoly, oligopoly, monopolistic competition • Concepts and measurement of utility, law of diminishing marginal utility, economies of scale
Unit2	**Cost Analysis and Estimation** • Demand analysis: individual and market demand, law of demand, elasticity of demand • Supply analysis: law of supply, role of demand & supply in price

	determination • Various concepts of cost: fixed cost, variable cost, average cost, marginal cost, opportunity cost • Cost concepts in engineering projects: fixed costs, variable costs, direct costs, indirect costs, sunk costs • Methods of cost estimation: historical data, analogy, parametric estimation
Unit3	**Investment Analysis** • Time value of money: simple and compound interest, time value equivalence, compound interest factors • Cash flow diagrams, calculation of time-value equivalences, present worth comparisons • Future worth comparison, payback period comparison • Equivalent annual worth comparison, comparison of assets with equal, unequal, and infinite lives • Rate of return, internal rate of return, comparison of IRR with other methods • Depreciation, computing depreciation charges, break-even analysis

Recommended Books:

1. Ahuja H.L"MicroEcomomic Theory" S. Chand Publication, New Delhi
2. Dewett K.K "Modern Ecomomic Theory" S. Chand Publication, New Delhi
3. Jain T.R, Grover M.L, Ohri V.K Khanna O.P,"Economics for engineers" V.K .Publication ,New Delhi
4. Jhingan M.L"MicroEcomomic Theory" S.Chand Publication ,New Delhi
5. Chopra P.N "Principle of Economics" Kalyani Publishers, Delhi
6. Mishra S.K "Modern Micro Economics" Pragati Publication Mumbai

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

1: Low 2: Moderate 3: Strong

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	End Semester Examination
K1	Remember	2		4
K2	Understand	2	2	7
K3	Apply	2	3	8
K4	Analyze	4	5	11
K5	Evaluate			
K6	Create			
Total Marks 50		10	10	30

Assessment Table

Assessment Tool	K1	K2	K3	K4
	CO1, CO2, CO3, CO4	CO1, CO2, CO3, CO4	CO1, CO2, CO3, CO4	CO1, CO2, CO3, CO4
ISE I (10 Marks)	4	4	2	-
ISE II (10 Marks)	2	2	3	3
ESE Assessment (30 Marks)	6	6	8	10
Total Marks 50	12	12	13	13

CEVEC0010: Environmental Science

Teaching Scheme		Evaluation Scheme	
Theory	02 Hrs/week	ISE I	10
Total Credits	02	ISE II	10
		ISE III	-
		End Semester Examination	30
		Total	50

Pre-requisites: Nil

Course Outcomes

After successful completion of the course the students shall be able to

CO	Course Outcome
CO1	Learn about the basics of environment
CO2	Understand the harmful effects of human activities on environment and their solutions
CO3	Understand the biodiversity, conservation methods and factors for the loss of biodiversity
CO4	Understand the concept of climate change, global warming, acid rains, various disasters and it's mitigation measures

Detailed syllabus:

Unit 1	**A)Understanding Environment** - Environment: concept and importance - Components of environment: Physical, Biological and Social - Ecosystem Concept, Structure and Function - Producers, Consumers and Decomposers - Food chain, Food web and Ecological pyramids - Energy flew in an Ecosystem. - Ecosystem services Ecological, economic, social, aesthetic and informational **B) Natural Resources** - Land resources: global land use patterns, concept land degradation and desertification - Forest resources: Use and consequences of over-exploitation - Water resources: Use and consequences of over-utilization, concept of water harvesting and watershed management, water conflicts Energy resources Renewable and non-renewable energy sources, growing energy needs and alternate energy sources
Unit 2	**A) Biodiversity and its conservation** - Biodiversity definition, levels (genetic, species and ecosystem) and values - Threats to biodiversity :habitat loss, poaching of wildlife, biological invasions - Concept of endemism and hot spots of biodiversity - Conservation of biodiversity: In-situ and Ex-situ concepts **B) Environmental Pollution** -Causes, effects and control measures of Air, water, soil, noise, thermal, nuclear;

	-Solid waste management -Liquid waste management
Unit 3	**Environmental issues, policies and practices** - Global environmental issues: Increase in greenhouse gases, climate change, Acid rain and stratospheric ozone layer depletion - Salient features of Environment Protection Act, 1986 - Environmental education: Formal and Informal education - Environmental Movements (Chipko Movement, Silent valley) and Environmental ethics

Recommended 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. Fundamental 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:

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

1: Low 2: Moderate 3: Strong

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	End Semester Examination
K1	Remember	5		10
K2	Understand	5	5	10
K3	Apply		5	10
K4	Analyze			
K5	Evaluate			
K6	Create			
Total Marks 50		10	10	30

Assessment Table

Assessment Tool	K1	K2	K3
	CO1, CO2, CO3, CO4	CO1, CO2, CO3, CO4	CO1, CO2, CO3, CO4
ISE I (10 Marks)	00	10	00
ISE II (10 Marks)	00	10	00
ESE Assessment (30 Marks)	00	15	15
Total Marks 50		35	15

AMPCC2001: Solid Mechanics

Teaching Scheme		Evaluation Scheme	
Theory	3Hrs/Week	ISE I	15 Marks
Tutorial	-	ISE II	15 Marks
Total Credits	3	Teacher Assessment**(ISE-II)**	10 Marks
		End Semester Examination	60 Marks
		Total	**100 Marks**

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. The course builds on the fundamental concepts of engineering mechanics course. 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. The course content have been presented in five units so that the students can develop the logic and get insight to analyze beams, trusses and solid circular shafts under various actions.

Course Outcomes :

After successful completion of the course the students will be able .

CO	Course Outcomes
1	To understand the basic concepts of the stresses and strains for different materials and to understand concept of internal forces such as compression, tension, and principal stresses
2	To know the development of internal forces and resistance mechanism of statically determinate beam and understand the importance of shear force and bending moment diagrams
3	To analyze and understand di3fferent internal forces and stresses induced due to bending and shear and torsion
4	To understand the basic concept of analysis of structural elements such as columns , struts, beams and frames

Detailed Syllabus:

Unit No.	Description
Unit 1	**a)Simple Stresses and Strains** Concept of normal stress and shear stress, Concept of normal strain and shear strain, Stress and strain diagram, Hooke's law, Generalised Hook's Law Elastic constants, Volumetric stress and strain, Stresses and strains in uniform and varying sections under axial loading, Saint Venant's principle, Stresses and strains in compound bars under axial loading, Concept of residual stresses, Thermal stresses and strains. **b)Compound Stresses** Introduction, state of stress at a point, General two dimensional stress system, Principal stresses and principal planes. Mohr's circle of stresses
Unit 2	**Shear Force and Bending Moment Diagrams of Statically Determinate 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.
Unit 3	**(a)Flexural Stresses in Statically Determinate Beams** Theory of pure bending, Elastic flexural formula, Assumptions in the theory of bending, Moment of resistance, Section modulus, Flexural stresses in beams with symmetrical solid, hollow and built-up sections, Bending stress distribution
	(b)Shear Stresses in Statically Determinate Beams Concept of shear stress, Shear stress formula, Shear stresses in beams with prismatic rectangular, circular and built-up sections.
Unit 4	**.(a) Torsion of Circular Shafts** Concept of torsion, Torsion formula, Assumptions in the theory of pure torsion, , Torsional moment of resistance, Analysis of circular solid and hollow shafts, Shafts with fixed ends, Shafts in series and parallel.
	(b) Analysis of Columns and Struts: Axially loaded compression members, Crushing load, Buckling or Critical or crippling loads by Euler's theory Assumptions in Euler's theory, Concept of effective length, Effect of different idealized end conditions, slenderness ratio, Limitations of Euler's formula, Rankine's theory.
Unit 5	**(a) Slope and Deflection of Statically Determinate Beams** Concept of slope and deflection, Equation of elastic curve, Slope and deflection of beams subjected to external loads by double integration method, Macaulay's method, moment area method Deflection by principle of superposition.
	b)Analysis of Statically Determinate Plane Framed Structure Concept of perfect, Deficient and Redundant frames, Analysis of trusses by Method of resolution or Method of joints and Method of sections .

Recommended Books:

1. **S.Ramamrutham**: Strength of Material, Dhanpatrai & Sons, New Delhi.
2. **R. K. Rajput:** Strength of Material, S. Chand & Company , New Delhi.

3. **S. S. Bhavicutti:** Strength of Material (3E), Vikas Publishing House Pvt. Ltd. , New Delhi.
4. **Ferdinand P. Beer and E. Russell Johnston:** Mechanics of Material, McGraw Hill, New Delhi.
5. **James M. Gere and S.P. Timoshenko:** Mechanics of Material, CBS Publishers, New Delhi.
6. **William F. Riley, Leroy D. Struges and Don H. Morris:** Mechanics of Material, Jhon Wiley & Sons Inc., New York.
7. **E.P. Popov:** Introduction to Mechanics of Solids, Prentice Hall of India, New Delhi.
8. **S.H. Crandall, N. C. Dahl and T. V. Lardner:** Mechanics of Solids: An Introduction, McGraw Hill International, Tokyo.

Mapping of Course outcome with Program Outcomes

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

1: Low 2: Moderate 3: Strong

Teacher's Assessment: Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1. Technical quizzes
2. Application development
3. Question & answer / Numerical solution
4. Group discussion

Assessment Pattern

Assessment Pattern Level No.	**Knowledge Level**	**Test-I**	**Test-II**	**Teachers Assessment/ Assignment**	**End Semester Examination**
K1	Remember	05	05	00	10
K2	Understand	06	06	05	25
K3	Apply	04	04	05	20
K4	Analyze	00	00	00	05
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		15	15	10	60

Assessment table

Assessment Tool	K1	K2	K2	K3
	CO1	CO1,CO2	CO3	CO4
ISE I (15 Marks)	05	10	00	00
ISE II (15 Marks)	00	00	10	05
ISE III (10 Marks)	00	00	05	05
ESE Assessment (60 Marks)	10	20	15	15
Total 100 Marks	15	30	30	25

AMPCC2002: Lab- Solid Mechanics

Teaching Scheme		Evaluation Scheme	
Practical	02 Hrs/week	ISE III -Term Work	25
Credits	01	ESE - Practical Examination	25
		Total	50

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 civil engineering 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 Outcomes :

After successful completion of the course the students will be able .

CO	Course Outcomes
1	Perform Tension, Torsion, Hardness, Compression, and Deformation test Civil Engineering Materials as per Standard Procedure.
2	Determine the mechanical properties of civil engineering materials
3	Document and interpret the test results

List of Experiments:

Minimum **Ten** experiments shall be conducted from the following list.

1) Tension test on Mild steel, High Yield strength deformed and cast iron specimen
2) Cold bend test on Mild and HYSD steel bars.
3) Compression test on metals
4) Compression test on Wood (parallel and perpendicular to grains)
5) Direct shear test (Single, Double) on steel, Copper, brass specimen
6) Punching shear test on thin metallic sheets.
7) Torsion test on circular mild steel bar
8) Izod and Charpy Impact test on metals
9) Study of Buckling of column.
10) .Bending test on Timber beam.
11) Flexural test on Concrete Beams
12) Compression tests on concrete cubes
13) Hardness test on metals - Brinnell and Rockwell Hardness Number
14) Testing of structural steel
15) Compression test on helical springs

Evaluation:

Term work shall consist of submission of journal containing the experiments performed by the candidate. Viva Voce examination based on the term work shall be conducted at the end of the semester.

Table1: Mapping of Course outcome with Program Outcomes

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

1: Low 2: Moderate 3: Strong

Assessment Pattern

Assessment Pattern Level No.	**Skill Level**	**Term Work Assessment (25 Marks)**
S1	Imitation	---
S2	Manipulation	05
S3	Precision	10
S4	Articulation	10
S5	Naturalization	---
Total Marks		**25**

Assessment Table

Course Outcomes	**CO1**	**CO2**	**CO3**
Assessment Tool	**(Skill level S1 to S5 as applicable)**	**(Skill level S1 to S5 as applicable)**	**(Skill level S1 to S5 as applicable)**
Term Work (25 Marks)	10	10	05
ESE (25 marks)	10	10	05
Total (50 Marks)	20	20	10

CECEP1001: Mini Project

Teaching Scheme		Evaluation Scheme	
Practical	4 Hrs/Week	ISE I Term Work	50 Marks
		ESE Viva Voce	50Marks
Total Credits	2	Total	100 Marks

Prerequisite:
Not Applicable.

Course Description:

This course offers civil engineering students an opportunity to do some mini project based upon their own curiosity. They may attempt in this course to find useful solutions to some or the other real life problems which they might have noticed while studying various courses till sixth semester in the institute. This course is basically intended to create research aptitude amongst civil engineering undergraduate students in the institute to find solutions to real life socio-technical issues related to civil engineering in association with local industry or otherwise.

Course Outcomes:

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

CO	Course Outcomes
CO1	Find, compile and interpret the literature relevant to given real life issues related to civil engineering.
CO2	Formulate and attempt trials of working solutions to define problems through systematic approachin laboratory or field.
CO3	Formulate and attempt trials of working solutions to define problems through systematic approachin laboratory or field.

Term Work:

The students will go through reference books, important research papers, IS Codes/Handbooks and look for the literature relevant to some real life issues in the field of civil engineering. The students would be encouraged to go to local industry and look for problems through interaction/discussion with concerned industries in the neighborhood. This will help them define a topic for the Mini Project. Groups of students comprising 4 to 9 members will be guided by a teacher of their choice depending upon his/her availability and interest. The Term Work submission file will contain complete information of the Mini Project undertaken by the respective group of students.

Practical/Viva Voce Examination:

The students shall prepare power point presentations and deliver it before the panel of examiners and students. The panel of examiner shall consist of guide an an internal examiner and one faculty member appointed by the Head of the Department as an external examiner. The panel of examiner will comprehensively assess the seminar contents and seminar presentation.

References:

1. Reference Books of Civil Engineering
2. Standard Journals of Civil Engineering
3. IS Codes of Civil Engineering
4. C R Kothari and Gaurav Garg, Research Methodology-Methods and Techniques, New AgeInternational Publishers, New Delhi
5. Relevant publications by Industrial Associations/Central Govt/ Govt of Maharashtra, etc.

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			3						
CO2	3	3	3	3	2	1		2	3		3		1	1
CO3							3			3		2	1	1

1: Low 2: Moderate 3: Strong

Assessment Pattern

AssessmentPattern Level No.	**Skill Level**	**Term Work Assessment**	**Practical/VivaVoce**
S1	Imitation	10	10
S2	Manipulation	12	12
S3	Precision	12	12
S4	Articulation	12	12
S5	Naturalization	04	04
Total Marks		**50**	**50**

Assessment Table

Course Outcomes	**CO1**	**CO2**	**CO3**
Assessment Tool	**(Skill level S1 to S5 as applicable)**	**(Skill level S1 to S5 as applicable)**	**(Skill level S1 to S5 as applicable)**
Term Work (25 Marks)	22	24	04
ESE (25 marks)	22	24	04
Total (50 Marks)	44	48	08

Semester- IV

AMPCC2003: Concrete Technology

Teaching Scheme		Evaluation Scheme	
Theory	3Hrs/Week	Class Test (ISE-I)	15
Total Credits	**2**	Teacher's Assessment(ISE-II)	15
		ISE-III	10
		End Semester Examination	60
		Total Marks	100

Prerequisites:

Knowledge about interaction of concrete making materials and their influence on the properties of concrete.

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 has been thoroughly discussed. It will help the students in designing the structures.

Course Outcomes:

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

CO	Course Outcomes
CO 1	Select and evaluate the properties of ingredients required for making concrete
CO 2	Assess the properties of concrete in fresh and hardened state
CO 3	Design the concrete mixes for required properties
CO 4	Use special type of concrete for a particular application

Detailed Syllabus:

Unit 1	**Cement and Cementitious Materials:** a) Cement: Types, Production, Chemical composition, Setting time, hydration of cement, physical and chemical properties and standard Specifications of cement. b) Cementitious Materials: Types, Chemical composition, properties and their role behavior of concrete.
Unit 2	**a) 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. **b) 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. **c) Water**: Properties of water for making concrete and standard specifications
Unit 3	**a) Unit Production of Concrete**: Batching, Mixing, Transporting, Placing, Compaction, Curing, **b)Properties of Fresh Concrete:**

	Cohesiveness, Segregation, Bleeding, Setting Time. Placing conditions, Workability and methods of its Measurements. Plasticizer and superplasticizer **c)Properties of Hardened Concrete:** Compressive strength, Tensile strength Flexural Strength, Modulus of elasticity, Poisson's Ratio, Permeability and durability, Standard tests their measurement. Destructive and non-destructive testing methods
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.

Recommended 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.

Mapping of Course Outcomes with Program Outcomes:

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

1: Low 2: Moderate 3: Strong

Assessment Pattern

Assessment Pattern Level No.	**Knowledge Level**	**ISE-I**	**ISE-II**	**ISE-III**	**End Semester Examination**
K1	Remember	02	02	02	10
K2	Understand	04	04	02	20
K3	Apply	04	04	03	30
K4	Analyze	05	05	03	00
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		15	15	10	60

Assessment Table

Assessment Tool	CO1	CO2	CO3	CO4	Total Marks
	(Knowledge level K1 to K3 as applicable)	(Knowledge level K1 to K3 as applicable)	(Knowledge level K1 to K3 as applicable)	(Knowledge level K1 to K3 as applicable)	
ISE-I (15Marks)	08	07			15
ISE-II (15Marks)		07	08		15
ISE-III (10Marks)	02	02	02	04	10
ESE (60Marks)	15	15	15	15	60
Total Marks	**32**	**24**	**25**	**19**	**100**

AMPCC2004: Lab-Concrete Technology

Teaching Scheme		Evaluation Scheme	
Theory	-	ISE-I	25 Marks
Tutorial/practical	2Hrs/Week	ISE-II	-
		ISE-III	-
Total Credits	1	End Semester Examination	25 Marks
		Total Marks	**50Marks**

Prerequisites: Nil

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

Course Outcomes:
After successful completion of this course, the student will be able to.

CO	Course Outcome
CO 1	Evaluate the properties of ingredients of concrete
CO 2	Evaluate the properties of concrete in fresh and hardened state
CO 3	Design and prepare concrete of required properties

Detailed Syllabus: The term work shall consist conduction 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** 1.Sieve analysis 2. Water absorption, moisture content and specific gravity 3. Bulking of sand 4.Deleterious Material Test
3	**Coarse Aggregate** 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** 1.Workability of concrete by slump test 2.Workability of concrete by compaction factor test 3.Workability of concrete by Vee-Bee consisto meter 4.Workability of concrete by flow test
5	**Test On Hardened Concrete** 1.Compression Test 2. Flexure strength Test.

	3.Spilt Tension Test 4. Rebound hammer test. 5. Ultrasonic pulse velocity test
6	Concrete mix proportioning as per IS 10262-2019
7	Visit to construction site

Mapping of Course Outcomes with Program Outcomes:

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

1: Low 2: Moderate 3: Strong

ISE I shall be based student 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.	Skill Level	Term Work Assessment (25 Marks)
S1	Imitation	---
S2	Manipulation	05
S3	Precision	10
S4	Articulation	10
S5	Naturalization	---
Total Marks		**25**

Assessment Table

Course Outcomes	**CO1**	**CO2**	**CO3**
Assessment Tool	**(Skill level S1 to S5 as applicable)**	**(Skill level S1 to S5 as applicable)**	**(Skill level S1 to S5 as applicable)**
ISEI Term Work	10	10	05
ESE (25 Marks)	10	10	05
Total	20	20	10

CEPCC2005: Building Planning and Design

Teaching Scheme		Evaluation Scheme	
Theory	3 Hrs/Week	ISE- I	15 Marks
		ISE- II	15 Marks
Total Credits	03	ISE- III	10 Marks
		End-Semester Examination	60 Marks
		Total	**100 Marks**

Prerequisites: No

Course description: This course introduces the elements of building planning, design and construction. This course forms the foundation of the Civil Engineering, in which he will be able to decide on the requirements of various types of buildings and its components along with the standard dimensions. He will be able to plan design and draw the drawings which are required to be submitted to the various authorities for permissions. The drawings prepared by the engineers are also used by the site engineer and hence the reading, understanding and execution of work as per drawings form a major part of this course.

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

CO	Course Outcomes
CO1	Plan , Design and Draw various building drawings as per standard norms
CO2	Apply the knowledge of building planning and design the buildings
CO3	Draw Perspective drawing
CO4	Able to decide the suitable construction technique / methods or various construction works
CO5	Select suitable building finishes and design building services as per requirement

Detailed Syllabus:

Unit 1	**Building Byelaws and design Principles of Buildings:** Relative functions and Role of Owner, Architect, Structural Engineer and Contractor, Building byelaws, Principles of planning, Functions of local authority, Site selection and its criteria, Classification of buildings, area and height limitations, Preparation of Submission and working Drawings. RERA
Unit 2	**Perspective drawing:** Terminology and definitions used, One point and Two point Perspective, Development of Perspective **.**
Unit 3	**General requirements of different Public buildings**: Buildings for Health, Education, Industrial buildings. Residential buildings, Apartments.
Unit 4	**Construction Techniques**, Formwork, Damp proofing, termite proofing and Fire protections, Shoring, scaffolding.
Unit 5	**Building Finishes: -** Plastering, Pointing, Painting, Waterproofing Treatment, Plumbing services, Sound insulation, Air conditioning.

Recommended Books :

1. Dr. B.C. Punmia, "Building Construction" Laxmi Publications Pvt. Ltd., New Delhi, Edition, 1998
2. S.P.Arora and S.P.Bindra, "A Text Book of Building Construction", Dhanpat Rai& Sons, Delhi, Edition 1996
3. 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.
4. National Building Code of India, S.P. 7 ISI
5. Y.S.Sane, "Planning and Designing Buildings", Engineering Book Publishing Co., Pune-16 , Edition 1996

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

1: Low 2: Moderate 3: Strong

Assessment -ISEI: Shall be based on class test on First and Second units

ISEII: Shall be based on class test on third and fourth units

ISEIII: Teacher's Assessment: Teachers Assessment of 10 marks is based on one of the / or combination of few of following

1. Simulation
2. Application development
3. Power point presentation of case studies
4. Question & answer / Numerical solution
5. Study of Industry processes and its presentation
6. Mini projects
7. Attendance in the class

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
Kl	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

Assessment table

Assessment Tool	Kl, K2	Kl, K2, K3	Kl, K2, K3	Kl, K2, K3	Kl, K2, K3
	COl	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

CEPCC2007: Lab-Building Planning & Design

Teaching Scheme		Evaluation Scheme	
Practical	02 Hrs/week	ISE I -Term Work	25
Credits	01	ESE - Practical Examination	25
		Total	50

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 be able to

CO	Course Outcomes
COl	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
3	Line Plan of anyone Public Building such as . Highschool/Engineering College/Arts, commerce, Science College . Hospital of atleast100 beds . Any medium scale manufacturing industry . Commercial complex/multiplex theatres /shopping mall
4	Planning and Design of Public Building(Drawing)-Drawing working drawings of one public building, using conventional or drafting software- Anyone public building from above exercise may be considered for detailed drawing purpose.

Recommended Books:

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

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												
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		

1: Low 2: Moderate 3: Strong

Assessment:

ISE I shall be based on the assessment of term work and interaction with student
ESE shall be based on the oral exam and interaction with student

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISEI	ESE
Kl	Remember	10	10
K2	Understand	10	10
K3	Apply	5	5
K4	Analyze		
K5	Evaluate		
K6	Create		
Total Marks 50		25	25

Assessment Table

Assessment Tool	Kl, K2, K3	Kl, K2, K3	Kl, K2, K3	Kl, K2, K3	Kl, K2, K3
	COl	CO2	CO3	CO4	CO5
ISE I (25 Marks)	5	5	5	5	5
ESE (25 Marks)	5	5	5	5	5
Total Marks 50	10	10	10	10	10

CEPCC2006 Environmental Engineering

Teaching Scheme		Evaluation Scheme	
Theory	03 Hrs/week	ISE I	15
Total Credits	03	ISE II	15
		ISE III	10
		End Semester Examination	60
		Total	100

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:

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

Detailed Syllabus

Unit 1	**Water Quality and Quantity**: 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, 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, principle of sedimentation, design of settling tank and clariflocculator, 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:** Definition, factors affecting disinfection, types of disinfectant, theory and application of chlorine, break point chlorination, bleaching powder estimation, Ozone and ultra violet rays, Disposal of sludge and back wash waters of water treatment plant, Introduction to various methods of softening
Unit 3	**Sewage Quantity:** Characteristics of sewage: Physical, chemical and biological

	characteristics, sampling, analysis of sewage for pH, Suspended solids, Total Solids, COD, BOD, Chlorides and Sulphates. Process flow diagram for sewage treatment, 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) **Sewage Treatment**: Process flow diagram for sewage treatment, Theory and Design of Screen chamber, Grit Chamber and Primary Sedimentationtank as per the manual of CPHEEO.
Unit 4	**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. **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 contactors. **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.
Unit 5	**Material and Appurtenances for Water Supply Project**: Pipe Materials, various types of pipes and its classes, corrosion, lying of pipes, Distribution system. Planning ofwater supply projects. Water distribution systems and analysis. Various appurtenances of water transport and distribution system. O& M of water treatment plant, Survey of water treatment works, water supply system, Data collection and feasibility of project. Preliminary design of water supply scheme project for a medium sized township (above 1 lakh population) **Sewage Collection, Sewer Pipes and Appurtenances**: Collection and conveyance of sewage, source of sewage, variations in sewage flow, Design of circular sanitary sewers. Sewer materials, testing of sewer pipes, sewer appurtenances

Recommended Books:

1. G.M.Fair, J.C. Geyer, D.A.Okan, Elements of Water Supply and Waste Water Disposal, John Wiley and Sons Inc. 1971..
2. M.J.Hammer, Wa_ter and Waste Water Technology, John Wiley and Sons, New York, 1986

3. CPHEEO: Manual on Water supply and Treatment, Ministry of Urban Development 1991.
4. B.C.Punmia, Ashok 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.

Indian Standard Code - IS 3025 (All Parts), IS 10500-2012

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	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			

1: Low 2: Moderate 3: Strong

Assessment -ISEI: Shall be based on class test on First and Second units

ISEII: Shall be based on class test on third and fourth units

ISEIII: Teacher's Assessment: Teachers Assessment of 10 marks is based on one of the / or combination of few of following

8. Simulation
9. Application development
10. Power point presentation of case studies
11. Question & answer / Numerical solution
12. Study of Industry processes and its presentation
13. Mini projects
14. Attendance in the class

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISEI	ISEII	ISEIII	End. Semester Examination
K1	Remember	5			15
K2	Understand	5	5	5	15
K3	Apply	5	5	5	15
K4	Analyze		5		15
KS	Evaluate				
K6	Create				
Total Marks 100		15	15	15	10

Assessment Table:

Assessment Tool	Kl,K2,K3,K4	Kl,K2,K3,K4	Kl,K2,K3,K4	Kl,K2,K3,K4
	COl	CO2	CO3	CO4
ISEI (15Marks)	5	5	5	
ISEII (15Marks)		5	5	5
ISEIII (10Marks)			5	5
ESE Assessment (60Marks)	15	15	15	15
Total Marks 100	20	25	30	25

CEPCC2008 Lab. Environmental Engineering

Teaching Scheme		Evaluation Scheme	
Practical	02 Hrs/week	ISE I -Term Work	25
Credits	01	ESE - Practical Examination	25
		Total	50

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 completing the course, students 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:

1	Detailed design report of water and sewage treatment plant for given population of town
2	List of Experiments (Any Eight) 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 Biological Oxygen Demand (BOD) 8. Determination of Chemical Oxygen Demand (COD) 9. Determination of different types of solids 10. Determination of SVI
3	**Term Work:** The Term Work shall consist of any eight laboratory experiments from above list and preliminary detailed design report of water and Sewage treatment plant for given population of town

4	**Practical Examination/ Viva voce Examination:** The panel of an External Examiners shall evaluate the understanding / knowledge of the student by performing experiments and/ or conducting viva voce.

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

Assessment:

ISE I 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 Outcome

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	

1: Low 2: Moderate 3: Strong

Assessment Pattern:

Assessment Pattern Level No.	Knowledge Level	ISEI	ISEII	ISEIII	End. Semester Examination
S1	Remember/Perception	5			10
S2	Understand/Set	5	5		10
S3	Apply/Guided Response		5	5	5
S4	Analyze/Mechanism				
SS	Evaluate/Complex Overt Response				
S6	Create / Adaptation				
Total Marks 50		10	10	10	25

Assessment Table:

Assessment Tool	S1,S2,S3	S1,S2,S3	S1,S2,S3	S1,S2,S3
	CO1	CO2	CO3	CO4
ISE I-(25Marks)	5	5	10	5
ESE (25Marks)	5	5	10	5
Total Marks (50Marks)	10	10	20	10

CEPCC1001: Engineering Geology

Teaching Scheme		Evaluation Scheme	
Theory	2 Hrs/ Week	ISE I	10 Marks
Tutorial		ISE II	10 Marks
Total Credit	2	ISE III	
		End Semester Examination	30 Marks
		Total	50 Marks

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

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

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

Detailed Syllabus:

Unit 1	Geology definition, scope, importance in Civil Engineering, Mineralogy introduction, important rock forming minerals groups. Classification and mineral composition, important igneous rocks
Unit 2	Strike, dip, parts and important types of folds, faults, fractures and joints, unconformity, discordant and concordant igneous intrusions, geological works, 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 in Civil Engineering sites, significance of stratification strike dip fold faults jointsfractures, dykes in the study, surface and subsurface surveys, use of pit trenches, exploratory drilling in the subsurface exploration, preparation of the geological maps and sections, Sub surface water types, water table, porosity, permeability zones, perched water table, occurrence of subsurface water, geological conditions favorable for the natural springs and seepages, depression and contact springs, hot springs and geysers and drill holes
Unit 4	Building stones, requirement of good building stones and their dependability on the geological characters of rocks, common building stones, Building stones of India, Landslides, angle of repose, causes, stability of hillslopes, 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

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 FG, "Engineering Geology" Butterworth-Heinemann

CEOEC1020: Open Elective II- Disaster Management

Teaching Scheme		Evaluation Scheme	
Theory	3 Hrs/Week	ISE I	15 Marks
Total Credits	3	ISE II	15 Marks
		ISE-III	10 Marks
		End Semester Examination	60 Marks
		Total Marks	**100 Marks**

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 society needs. Disaster management includes various types of Disasters such as Earthquake, Cyclone, Tsunami, Fire, Flood, Landslides, Avalanches, Lightening, and Thundering and the role of Government, NGOs, Public about the Disaster Management.

Course Outcomes:

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

CO	Course Outcomes
CO 1	Explain terms related with Disaster Management
CO 2	Illustrate various Disaster Management Techniques
CO 3	Study and uses of equipments in Disaster Management
CO 4	Demonstrate construction equipments and 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, Policies for disaster preparedness program, Roles and responsibilities of different organization
Unit 3	**Hazard and vulnerability profile of India and Disaster Management Framework** : Disaster management about Indian scenario, Components of Disaster relief - Water, Flood, Sanitation, shelter, Health and Waste management. Disaster management act 2005, policies and guidelines. Effect to mitigate natural disasters at National and Global level, National and International strategies for Disaster reduction. Role of Media, NGOs, Central Government, State Government, District and Local Administration, Armed forces Police Department.

Unit 4	**Pre disaster and Post disaster Planning Structures:** Pre and post disaster planning, failures of framed and load bearing structures, sources of weaknesses in structures, retrofitting techniques of structures, Earthquake resisting building structure techniques. Case studies of Kuchh earthquake (2001) and Latur, Killari earthquake (1993)
Unit 5	**Technological Advances in Disaster Management:** 1. GIS and Remote Sensing Applications 2. Drones in Disaster Response 3. Artificial Intelligence in Early Warning Systems **Research and Innovation:** 1. Academic Research in Disaster Management 2. Innovations in Technology and Practices 3. Future Trends in Disaster Management

ISE-I: Class test based on Unit I and Unit II

ISE-II: Class test based on Unit III and Unit IV

ISE-III : Teacher's Assessment- Teachers Assessment of 10 marks may be based on one or more of the following

1. Simulation
2. Application development
3. Power point presentation of case studies
4. Question & answer / Numerical solution
5. Study of Industry processes and its presentation
6. Mini projects
7. Attendance in the class

Mapping of Course Outcomes with Program Outcomes:

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

1: Low 2: Moderate 3: Strong

Table 2: Recommended Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE-I	ISE-II	ISE-III	End Semester Examination
K1	Remember	02	02	02	10
K2	Understand	04	04	02	20
K3	Apply	04	04	03	30
K4	Analyze	05	05	03	00
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		15	15	10	60

Assessment Table

Assessment Tool	CO1	CO2	CO3	CO4	Total marks
	(Knowledge level K1 to K3 as applicable)	(Knowledge level K1 to K3 as applicable)	(Knowledge level K1 to K3 as applicable)	(Knowledge level K1 to K3 as applicable)	
ISE – I(15Marks)	08	07			15
ISE-II(15Marks)		07	08		15
ISE-III (10Marks)	02	02	02	04	10
ESE (60Marks)	15	15	15	15	60
Total Marks	**25**	**31**	**25**	**19**	**100**

CEMDM5003 (MDM): Basics of Surveying

Teaching Scheme		Evaluation Scheme	
Theory	3 Hrs/Week	ISE I	15 Marks
Total Credits	3	ISE II	15 Marks
		ISE-III	10 Marks
		End Semester Examination	60 Marks
		Total Marks	**100 Marks**

Prerequisites:
Surveying in generally used to take linear measurements and to prepare land maps.

Course Description:
Every civil project involves collection, presentation and interpretation of data for execution works. Diploma civil engineer should acquire competencies to undertake linear measurements, angular measurements and understand the concept of digital mapping. This basic technology level course aims at imparting skills in identifying and making the of basic survey instruments to undertake survey works required for different civil engineering projects.

Course Outcomes:
After successful completion of this course, the student will be able to.

CO	Course Outcomes
CO 1	Relate various maps, scale, symbols and principles of surveying.
CO 2	Select suitable instrument for linear measurement and method of ranging
CO 3	Make suitable use of theodolite and Plane Table survey
CO 4	Illustrate the concept of GPS and application of GPS.

Detailed Syllabus:

Unit 1	**Classification of Surveying** Surveying: Introduction, Purpose, use and principles. Types of surveying, classification of surveying. Conventional signs and symbols. Representative fraction, conversion of scale to RF and vice-versa. Scale, types of scales.
Unit 2	**Linear Measurements** Instruments for linear measurement, methods of linear measurement, accessories of linear measurements, chain and tape corrections, Ranging: signals for ranging, direct and indirect ranging.
Unit 3	**Introduction to Theodolite and Plane Table Survey** **A)** Uses of theodolite, sketch and parts of transit vernier theodolite, reading of main scale and vernier scale on horizontal and vertical plate. Temporary adjustments of a theodolite , definition and various technical terms, methods of measuring horizontal and vertical angles. **B)** Principle of plane table survey, accessories of plane table and their uses , setting of plane table, Orientation of plane table, Methods of plane table survey, merits and demerits of plane table survey.
Unit 4	**Introduction to Global Positioning System (GPS)**

	Introduction to GPS, Overview Of GPS, GPS segments, Applications of GPS in civil engineering. **Introduction to Geographic Information System (GIS)** Introduction, Definition, Objectives, components and functions. **Introduction to Remote Sensing** Introduction, Definition, Necessity, Importance and use.
Unit 5	**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, Stereoscopic vision, fusion, stereoscope, parallax in aerial stereoscopic views, difference in elevation by stereoscopic parallax, Photographic interpretation, applications of photogrammetry.

ISE-I: Class test based on Unit I and Unit II
ISE-II: Class test based on Unit III and Unit IV
ISE-III : Teacher's Assessment- Teachers Assessment of 10 marks may be based on one or more of the following

1) Technical quizzes
2) Application development
3) Question & answer / Numerical solution
4) Group discussion
5) Assignments on course content
6) Attendance in the class
7) Other if any

Mapping of Course Outcomes with Program Outcomes:

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

1: Low 2: Moderate 3: Strong

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE-I	ISE-II	ISE-III	End Semester Examination
K1	Remember	02	02	02	10
K2	Understand	04	04	02	20
K3	Apply	04	04	03	30
K4	Analyze	05	05	03	00
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 100		15	15	10	60

Table 3: Assessment Table

Assessment Tool	CO1	CO2	CO3	CO4	Total Marks
	(Knowledge level K1 to K3 as applicable)	(Knowledge level K1 to K3 as applicable)	(Knowledge level K1 to K3 as applicable)	(Knowledge level K1 to K3 as applicable)	
ISE I (15Marks)	08	07			15
ISE II (15Marks)		07	08		15
ISEIII (10Marks)	02	02	02	04	10
ESE (60Marks)	15	15	15	15	60
Total Marks	**25**	**31**	**25**	**19**	**100**

CEEEM1020- (HSSM) Finance and Accounting

Teaching scheme		Evaluation scheme	
Theory	02 hrs/week	ISE-I	10 Marks
Total credits	02	ISE-II	10 Marks
		ISE-III	-
		ESE	30 Marks
		Total	50 Marks

Prerequisite: Nil

Course Description: The course helps the students in getting a specialized knowledge in the area of Accounts, Cost Accounting, Financial Management and Taxation in the field of engineering & entrepreneurship. The teaching methods includes lectures, presentations and case studies.

Course outcomes:

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

CO	Course Outcomes
CO 1	Understand fundamentals concepts of accounting.
CO 2	Apply the basic knowledge of financial accounting
CO 3	Understand the project planning with a specific view on project financing
CO 4	Know decision making techniques based on financial guidelines
CO 5	Know the methods of tax collection, tax audit

Detailed Syllabus

Unit 1	**Introduction To Accounting & Book Keeping:** Definition, steps of accounting, objectives & importance of accounting, functions, characteristics & advantages of accounting, limitations of accounting, types of accounts (personal, impersonal), rules of accounting, some basic terminologies (debit, credit, journal entry, ledger, invoice, E-way bills, system of accounting. **Book keeping**: Definition, objectives, methods of book keeping, Illustration of journal entries.
Unit 2	**Cost Accounting & Financial Accounting:** meaning, objectives, advantages, differentiation of Cost & financial accounting, elements of cost (material, labor & expenses), types of costs (direct, indirect, fixed, variable, opportunity, controllable, operating, sunk cost), types of cost accounting methods, Break even analysis- meaning, importance, uses, Types of account (trading, manufacturing, profit & loss), Balance sheet-meaning & use, classification of assets & liabilities, tangible assets.
Unit 3	**Taxation:** Meaning, classification, merits & demerits of direct & indirect tax, tax registrations-PAN, TAN, TIN, applicability of tax to individual, proprietor partnership firm, private limited company, listed company, tax benefits, tax exemptions, tax payment & collection systems (TDS, TCS), filing of tax returns. **Finance** Definition, importance/purpose of finance, rate of interest, return on investment (ROI), types of ROI, calculation methods of ROI, examples, types of finance,

	banking-non banking finance, govt. finance subsidy, capital budgeting, financial management, Role of valuer for finance.

Recommended Books:

1. Cost accounting principles & practice by S.P. Jain, K.L. Narang, Agrawal, Kalyani publications.
2. Financial accounting by S.P. Jain, K.L. Narang, Agrawal, Kalyani publications.
3. Financial accounting by P.C. Tulsian, Pearson Education (Singapore), published by Dorling Kindersley Delhi.
4. Entrepreneurship development by S. Anilkumar, S.C. Poornima, K. Jayashri, (new age international (P) limited publishers Delhi.

Mapping of course outcomes with program outcomes:

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

1: Low 2: Moderate 3: Strong

Assessment Pattern

Assessment Pattern level No.	**Knowledge Level**	**ISE-I**	**ISE-II**	**ISE-III**	**End Semester Examination**
K1	Remember	02	02	00	10
K2	Understand	04	04	00	10
K3	Apply	04	04	00	10
K4	Analyze	00	00	00	00
K5	Evaluate	00	00	00	00
K6	Create	00	00	00	00
Total Marks 50		**10**	**10**	**00**	**30**

Assessment Table:

Assessment Tool	**CO1**	**CO2**	**CO3**	**CO4**	**Total Marks**
	(Knowledge Level K1 to K3 as applicable)	**(Knowledge Level K1 to K3 as applicable)**	**(Knowledge Level K1 to K3 as applicable)**	**(Knowledge Level K1 to K3 as applicable)**	
ISE-I (10 Marks)	04		06		10
ISE-II (10 Marks)	02	02	06		10
ESE (30 Marks)	06	08	08	08	30
Total Marks	**12**	**10**	**20**	**08**	**50**

CEVSE2001: Python Programming

Teaching scheme		Evaluation scheme	
Theory	02 hrs/week	ISE-I	10 Marks
Total credits	02	ISE-II	10 Marks
		ISE-III	-
		ESE	30 Marks
		Total	50 Marks

Prerequisites: None

Course Description:
Python is a language with a simple syntax, and a powerful set of libraries. It is an interpreted language, with a rich programming environment, including a robust debugger and profiler. While it is easy for beginners to learn, it is widely used in many scientific areas for data exploration. This course is an introduction to the Python programming language for students without prior programming experience.

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

CO	Course Outcomes
CO1	Understand installation procedure and system requirement for Python
CO2	Describe Data Types, Variables, Operators and other Conditional blocks
CO3	Apply in build functions of Python and Create User Defined Functions, Use Strings, Tuples, List etc., in programming

Detailed Syllabus:

Unit 1	**Introduction:** Introduction and history, Features, Setting up and Installation, Working with Python, Understanding Python Variables and Operators, Understanding python blocks. Understanding Python Data Types, Working with Operators1/0 and File Handling using function like read, write, write lines etc., Errors & Exception Syntax Errors, Exceptions, Handling Exceptions, User Defined Exceptions, Clean-up actions.
Unit 2	**Data Types, Variables, Operators and other Conditional blocks** Python Numbers- integer, float and complex. Conditional blocks using if-else and elif. Simple for loops in python, for loop using ranges, Use of while loops in python, Loop manipulation using pass, continue, break and else, Programming using Python conditional and loops block Functions: Built in Functions, Invoking built-in function, Modules-Importing entire module or selected object using from statement. Functions from Math, random. Time & date. Composition, User defined functions - Defining. Invoking, Passing Parameters
Unit 3	**Strings and Tuples in Python:** Python Strings slicing strings, modify strings, concatenate strings, format strings, escape characters, sting methods. Python Booleans. Python List Access list items, change list items, add list items, remove list items, loop lists, list comprehension,

	sort lists, copy list, join list, list methods. Python Tuples-Access, Update and unpack tuple, Loop tuple, Join tuple, Tuple methods. Python Sets Access, add and remove set items, loop sets, join sets, se methods. Python Dictionaries Access, change, add, remove items, loop dictionaries, copy dictionaries, nested dictionaries.

Recommended Books:

1.Mark Lutz, Learning Python, 5th ed. O'Reilly Publication, 2013 1. 2.
2.Michael Dawson. Programming with Python, A User Book 3rd ed. Boston, Cengage learning,2010
3. David Beazley Python Essentials Reference, 3rd ed, New York 2006

Web Resources

1. https://nptel ac in/courses/106106182
2. https://docs.python.org

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	2	2	2		1	1							
CO2	3	1	1	1					1					
CO3	3	2	2	2	2	1	1							

1: Low 2: Moderate 3: Strong

Assessment: ISE I Shall be based on the class test OR on the basis of Assignments/ Quizzes/ Field visits/ Presentations/ Course Projects on Unit I and Unit II

ISE II: Shall be based on class test on Unit II and Unit III

Assessment Pattern

Assessment Pattern Level No.	Knowledge Level	ISE I	ISE II	ISE III	End Semester Examination
K1	Remember				
K2	Understand	10	10		10
K3	Apply				10
K4	Analyze				
K5	Evaluate				
K6	Create				10
Total Marks 50		10	10		30

Assessment table:

Assessment Tool	K1	K2	K3
	CO1, CO2 & CO3	CO1, CO2 & CO3	CO1, CO2 & CO3
ISE I (10 Marks)	00	10	00
ISE II (10 Marks)	00	10	00
ISE III (00Marks)	00	00	00
ESE Assessment (30 Marks)	10	00	20
Total Marks 50	10	20	20