Scheme & Syllabus
For
Diploma
In
Civil Engineering

(July 2025 admission onwards)

Sant Longowal Institute of Engineering and Technology
(Deemed to be University, under Ministry of Education, Govt. of India)
Longowal -148106, Distt. Sangrur (Pb.), India

Vision of the department

To be a center of excellence in civil engineering education, producing technically skilled, ethically responsible, and industry-ready diploma professionals. The department aims to empower students with practical knowledge, sustainable engineering practices, and a spirit of innovation to contribute to the development of society and infrastructure

Mission of the department

1. To impart quality technical education in civil engineering through a balanced blend of theory, practicals, and field exposure.
2. To develop skilled diploma professionals capable of addressing real-world civil engineering challenges with sustainable and innovative solutions.
3. To promote ethical values, teamwork, and effective communication for holistic professional development.
4. To encourage continuous learning, entrepreneurship, and readiness for higher education or employment in public and private sectors.

Program Education Objectives (PEOs)

PEO 1: Diploma graduates will have the technical knowledge and hands-on skills necessary to analyze, plan, design, and execute civil engineering projects effectively, ensuring safety, sustainability, and compliance with modern engineering practices.

PEO 2: Graduates will pursue continuous professional development through higher studies, certifications, or self-learning to adapt to emerging technologies and contribute meaningfully to the civil engineering profession and society.

Programme Outcomes (POs)

Civil Engineering Certificate/Diploma holders of Sant Longowal Institute of Engineering and Technology, Longowal (Deemed University) will have ability to:

1. **Basic and Discipline specific knowledge:** Apply knowledge of basic mathematics, science and engineering fundamentals and engineering specialization to solve the engineering problems
2. **Problem analysis:** Identify and analyse well-defined engineering problems using codified standard methods
3. **Design/development of solutions:** Design solutions for well-defined technical problems and assist with the design of systems components or processes to meet specified needs
4. **Engineering Tools, Experimentation and Testing:** Apply modern engineering tools and appropriate technique to conduct standard tests and measurements
5. **Engineering practices for society, sustainability and environment:** Apply appropriate technology in context of society, sustainability, environment and ethical practices
6. **Project Management:** Use engineering management principles individually as a team member or a leader to manage projects and effectively communicate about well-defined engineering activities
7. **Life-long learning:** Ability to analyse individual needs and engage in updating in the context of technological changes

Program Specific Outcomes (PSOs)

1. The students will acquire abilities to apply knowledge of science and civil engineering by way of using the techniques and modern engineering tools for solving engineering problems.
2. The students will develop professional and entrepreneur skills along with becoming ethically responsible, besides recognizing the need for engaging in life-long learning.

Study Scheme of Integrated Certificate Diploma in Civil Engineering

Semester-I							
S.No	Code No.	Course Title	Hours per week			Hours	Credits
			L	T	P		
1.	BSMA-101	Mathematics-I	3	1	0	4	4
2.	BSPH-103	Applied Physics-I	2	1	0	3	3
3.	BSCY--105	Applied Chemistry	2	1	0	3	3
4.	HSMH-101	Communication Skills in English	2	0	0	2	2
5.	BSPH-107	Applied Physics-I Lab	0	0	2	2	1
6.	BSCY-109	Applied Chemistry Lab	0	0	2	2	1
7.	HSMH-105	Communication Skills in English Lab	0	0	2	2	1
8.	ESME-101	Engineering Graphics	0	0	2	2	1
9.	ESWS-103	Engineering Workshop Practice	0	0	4	4	2
10.	HSSP-103	Sports and Yoga	0	0	2	2	1
			9	**3**	**14**	**26**	**19**
11.	QPCV-101	Construction materials			8	8	1

Semester-II							
S.No	Code No.	Course Title	Hours per week			Hours	Credits
			L	T	P		
1.	BSMA-102	Mathematics-II	3	1	0	4	4
2.	BSPH-104	Applied Physics-II	2	1	0	3	3
3.	ESCS-102	Introduction to IT Systems	2	0	0	2	2
4.	ESEE-104	Fundamentals of Electrical Engineering	2	0	0	2	2
5.	ESEC-108	Fundamentals of Electronics Engineering	2	0	0	2	2
6.	ESME-106	Engineering Mechanics	2	1	0	3	3
7.	BSPH-106	Applied Physics-II Lab	0	0	2	2	1
8.	ESCS-110	Introduction to IT Systems Lab	0	0	2	2	1
9.	ESEE-112	Fundamentals of Electrical Engineering Lab	0	0	2	2	1
10.	ESEC-114	Fundamentals of Electronics Engineering Lab	0	0	2	2	1
11.	ESME-116	Engineering Mechanics Lab	0	0	2	2	1
			13	**3**	**10**	**26**	**21**
12.	QPCV-102	04 Nos of hr. per week AUTOCAD drawing 04 Nos of hr. per week Building construction & drawings			8	8	01
13.	EAA-102	Extra Academic Activity (A/B/C)	-	-	-	1	1(S/US)

Summer-I							
S.No	Code No.	Course Title	Hours per week			Hours	Credits
			L	T	P		
1.	TPID-101	Summer Training (4 Weeks)	-	-	24	24	03

Semester-III							
S.No	Code No.	Course Title	Hours per week			Hours	Credits
			L	T	P		
1.	PCCV-201	Irrigation Engineering	3	1	0	4	4
2.	PCCV-203	Surveying-I	3	1	0	4	4
3.	PCCV-205	Structural Mechanics	3	0	0	3	3
4.	PECV-201	Concrete Technology	3	0	0	3	3
5.	PCCV-207	Water Supply and Waste Water Engineering	3	0	0	3	3
6.	PCCV-209	Surveying-I Lab	0	0	2	2	1
7.	PCCV-211	Structural Mechanics Lab	0	0	2	2	1
8.	PCCV-213	Water Supply and Waste Water Engineering Lab	0	0	2	2	1
9.	AUCH-201	Environmental Science	2	0	0	2	0
			17	**2**	**6**	**25**	**20**
10.	QPCV-201	04 Nos of hr. per week Concrete Technology lab 04 Nos of hr. per week Irrigation Engineering drawings			8	8	01
11.	EAA-201	Extra Academic Activity (A/B/C)	-	-	-	1	1(S/US)

Semester-IV							
S.No	Code No.	Course Title	Hours per week			Hours	Credits
			L	T	P		
1.	PCCV-202	Design and Drawing of RCC Structures	3	1	0	4	4
2.	PCCV-204	Soil and Foundation Engineering	3	1	0	4	4
3.	PCCV-206	Surveying-II	3	0	0	3	3
4.	PECV-202	Professional Elective-I	3	0	0	3	3
5.	OECV-202	Open Elective-I	3	0	0	3	3
6.	PCCV-208	Design and Drawing of RCC Structures Lab	0	0	2	2	1
7.	PCCV-210	Soil and Foundation Engineering Lab	0	0	2	2	1
8.	PCCV-212	Surveying-II Lab	0	0	2	2	1
9.	AUMH-202	Essence of Indian Knowledge and Tradition	2	0	0	2	0
			17	**2**	**6**	**25**	**20**

10.	QPCV-202	study, analysis and report on various Civil Engineering codes followed in different countries			8	8	01
10.	EAA202	Extra Academic Activity (A/B/C)	-	-	-	1	1(S/US)

Summer-II

S.No	Code No.	Course Title	Hours per week			Hours	Credits
			L	T	P		
1.	TPID-201	Industrial Training (6 Weeks)	-	-	24	24	03

Semester-V

S.No	Code No.	Course Title	Hours per week			Hours	Credits
			L	T	P		
1.	HSMH-301	Entrepreneurship and Start-ups	3	1	0	4	4
2.	PCCV-301	Transportation Engineering	3	1	0	4	4
3.	PCCV-303	Fluid Mechanics	3	0	0	3	3
4.	PECV-301	Professional Elective-II	2	0	0	2	2
5.	OECV-301	Open Elective-II	3	0	0	3	3
6.	PCCV-305	Transportation Engineering Lab	0	0	2	2	1
7.	PCCV-307	Fluid Mechanics Lab	0	0	2	2	1
8.	PRCV-301	Minor Project	0	0	4	4	2
			14	**2**	**8**	**24**	**20**
9.	QPCV301	Case studies on various defects in building and its remedies (Retrofitting)			8	8	01

Semester-VI

S.No.	Code No.	Course Title	Hours per week			Hours	Credits
			L	T	P		
1.	AUMH-302	Indian Constitution	2	0	0	2	0
2.	PCCV-302	Design and Drawing of Steel Structures	3	1	0	4	4
3.	PECV-302	Professional Elective-III	3	0	0	3	3
4.	PECV-304	Professional Elective-IV	3	1	0	4	4
5.	OECV-302	Open Elective-III	3	0	0	3	3
6.	PCCV-304	Design and Drawing of Steel Structures Lab	0	0	2	2	1
7.	PRCV-302	Major Project	0	0	8	8	4
8.	SECV-302	Seminar	1	0	0	1	1
			15	**2**	**10**	**27**	**20**
9.	QPCV-302	Study of various Civil Engineering (construction) codes followed in India.			8	8	01

List of Professional Elective Subjects		
Course Code	(A)	(B)
PECV-202	Construction materials	Sustainable Construction Methods
PECV-301	Building Maintenance	Disaster Preparedness & Planning
PECV-302	Quantity Surveying and Valuation	Basics of Green Building
PECV-304	Earthquake Resistant Building Construction	Road Safety

List of Open Elective Subjects			
Course Code	(A)	(B)	(C)
OECV-202	Construction materials	Sustainable Construction Methods	Basics of Green Building
OECV-301	Concrete Technology	Building construction	Disaster Preparedness & Planning
OECV-302	Road Safety	Repairs & Rehabilitation of structure	Solid and Hazardous Waste Managements

Course Code	Definitions
L	Lecture
T	Tutorial
P	Practical
HS	Humanities & Social Science Courses
BS	Basic Science Courses
ES	Engineering Science Courses
PC	Program Core Courses
PE	Program Elective Courses
OE	Open Elective Courses
AU	Audit Courses
SI	Summer Internship
PR	Project
SE	Seminar

XX	EE (Electrical Engineering)
	IE (Instrumentation Engineering)
	EC (Electronics & Communication Engineering)
	CS (Computer Science & Engineering)
	CH (Chemical Engineering)
	CV (Civil Engineering)
	ME (Mechanical Engineering)
	FT (Food Technology)
	PH (Physics)
	CY (Chemistry)
	MA (Mathematics)
	MH (Management and Humanities)
	SP (Sports)

PCXX-XYZ

Y-stands for year code 1, 2 or 3

ZZ-odd for odd semester subject e.g. 101, 103, 201, 305 etc.

ZZ-even for even semester subject e.g. 102, 112, 202, 306 etc.

SUMMARY

Table 1: Working weeks, days and hours in a semester				
Semester	Working Weeks/Semester	Working days/Week	Working Hours/Day	Hours/Semester
Odd	15	5	8	600
Even	15	5	8	600

Table 2: Relation of credits and hours in a week		
Description	Credits	Hours/Week
Theory/Tutorial	1	1
Laboratory (Practical)	1(2)	2(3/4)
Training	1	8

Table 3: Total credits in a programme							
Programme	Total Credits	Theory		Laboratory		Training	
		Credits	%age	Credits	%age	Credits	%age
Vocational Diploma	180	72	40	18	10	12	50
Diploma	120	90	75	30	25	-	-
ICD + Voc	133	-	-	-	-	-	-

Odd Semester		Even Semester		
Semester	Credit	Semester	Credit	
1	20	2	23	43
3	22	4	20	42
5	22	6	20	42
				127
			Summer-I 3	3
			Summer-II 3	3
				133

Title of the course : **Irrigation Engineering**
Subject Code : **PCCV-201**

L	T	P	Credits	Weekly Load (hrs.)
3	1	0	4	4

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Understand the concept of necessity of irrigation in India and recognize different crops and theirwater requirements.
CO2: Study how to implement and workout different methods of irrigation.
CO3: Monitor construction and maintenance work of canal and canal linings, tube wells and water harvesting techniques.
CO4: Understand maintenance and construction work of canal head works and river training works.
CO5: Tackle issues of water logging and have knowledge about concept of ground water recharge.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	1	3	1	3	3	3	1	1
CO2	3	2	3	2	3	3	3	2	2
CO3	3	3	3	3	2	3	3	2	2
CO4	3	3	2	3	2	3	3	3	2
CO5	3	1	2	3	3	3	3	3	2
Avg.	3	2	2.6	2.4	2.6	3	3	2.2	1.8

Unit	Course Description	Lectures
Unit-I	**Introduction:** Definition of irrigation. Necessity of irrigation. Water Requirement for Crops: Principal crops in India and their water requirements. Crop seasons – Kharif and Rabi. Soil water, soil crop and crop water relationships, Duty, Delta and Base Period, their relationship. Gross commanded area (GCA), culturable commanded area (CCA), Intensity of Irrigation, Irrigable area. Hydrological Cycle.	8
	Methods of Irrigation: Flow irrigation, Lift Irrigation, Sprinkler irrigation, Drip irrigation, suitabilityof drip irrigation, layout, component parts, advantages	6
	Canals: Classification, apurtenancs of a canal and their functions, Various types of canal lining - their related advantages and disadvantages, Maintenance oflined and unlined canals	6
	Tube Well Irrigation: Introduction, occurrence of ground water, location and command, advantages and disadvantages, comparison with canal irrigation. Tube wells, Yield of a well and methods of determining yield of well. Types of tube wells and their choice.	7

	Water Harvesting Techniques: Need and requirement of various methods, Run-off from roof top and ground surface, construction of recharge pits and recharge wells and their maintenance.	6
Unit-II	**Dams:** Classification of dams causes of failure, earth dam, gravity dams – types, cross-sections of a dam, Concept of small and micro dams. Concept of spillways and energy dissipaters	6
	Canal Head Works and Regulatory Works: Definition, object, general layout, functions of different parts of head works. Difference between weir and barrage	6
	Cross Drainage Works: Functions and necessity of the following types: aqueduct, super passage, level crossing, inlet and outlet. Definitions of following Hydraulic Structures: Falls. Cross and head regulators. Outlets. Canal Escapes	7
	River Training Works: Methods of river training, guide banks, retired (levees) embankments, groynes and spurs, pitched island, cut-off	6
	Water Logging and Drainage and Ground Water Re-charge: Definition of water logging – its causes and effects, detection, prevention and remedies. Surface and sub-surface drains and their layout. Concept and various techniques used for ground water re-charge	6

Recommended Books

Author(s)	Title	Publisher
Bharat Singh	Fundamentals of Irrigation Engineering	Nem Chand and Bros, Roorkee
Garg, Santosh Kumar	Irrigation Engineering and Hydraulics Structure	Khanna Publishers
Punmia, BC and Pandey	Irrigation and Water	Standard Publishers
BrijBansi	Power Engineering	Lal Distributors, Delhi
Sharma, RK	Text Book of Irrigation Engineering and Hydraulics Structures	Oxford and IBH

Title of the course : **Surveying-I**
Subject Code : **PCCV-203**

L	T	P	Credits	Weekly Load (hrs.)
3	1	0	4	4

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Develop an understanding of the principles of surveying.
CO2: Understand the basic skills of surveying work including distance and angles measurements.
CO3: Study how to collect data and analyse surveying measurements.
CO4: Understand the use of different surveying instruments.
CO5: Develop skills and apply basic surveying techniques in the field.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	2	1	2	2	3	3	2
CO2	3	3	2	3	2	2	3	3	2
CO3	2	3	3	3	2	3	3	2	2
CO4	3	2	3	3	3	2	3	2	3
CO5	3	3	3	3	2	2	3	3	2
Avg.	2.8	2.8	2.6	2.6	2.2	2.2	3	2.6	2.2

Theory

Unit	Course Description	Lectures
Unit-I	**Introduction:** Basic principles of surveying, concept and purpose of surveying, measurements-linear and angular, units of measurements, instruments used for taking these measurements, classification of surveying instruments.	10
	Chain surveying: Introduction, advantages and disadvantages. Direct and indirect rangingoffsets and recording of field notes.	10
	Compass surveying: Purpose of compass surveying. Use of prismatic compass: setting and taking observations. Introduction to: Meridian - Magnetic and True, Bearing - Magnetic, True and Arbitrary, whole circle bearing and reduced bearing, fore and back bearing, magnetic dip and declination. Local attraction - causes, detection, errors and corrections, problems on local attraction, magnetic declination and calculation of included angles in a compass traverse.	12

Unit-II	**Levelling:** Purpose of levelling, concept of a leveled surface, horizontal surface, vertical surface, datum, reduced level and bench marks. Identification of various parts of Dumpy level and use of Dumpy level, Engineer' level, Auto level: advantages and disadvantages, use of auto level. Concepts of line of collimation, axis of the bubble tube, axis of the telescope and vertical axis. Levelling staff: single piece, folding, invar precision staff, telescopic. Temporary adjustment and permanent adjustment of dumpy level by two pegmethod. Concept of back sight, foresight, intermediate sight, change point, todetermine reduces levels. Level book and reduction of levels by Height of collimation method and Rise and fall method. Arithmetic checks, problem on reduction- of levels, fly levelling, check leveling and profile levelling (L-section and X-section), errors in levelling, permissible limits, reciprocal leveling. Numerical problems. Computations of areas of regular figures and irregular figures. Simpson's rule: prismatic formula and graphical method use of planimeter for computation of areas with numerical problems	16
	Plane Table Surveying: Purpose of plane table surveying, equipment used in plane table survey: Setting of a plane table: Centering, levelling, orientation. Methods of plane table surveying: Radiation, Intersection, Traversing, Resection. Concept of two point and three point problems. Errors in plane table survey and precautions to control them. Testing and adjustment of plane table and alidade.	16

Recommended Books

Author(s)	Title	Publisher
Hussain, SK and Nagraj	Text Book of Surveying	S Chand and Co. Ltd
Deshpande	A Text Book Surveying and Levelling	United Books Corporation
Kocher	Text Book of Surveying	Katson Publishing House
Kanetkar,TP and Kulkarni	Surveying and Leveling	AVG Parkashan

Title of the course : Structural Mechanics
Subject Code : PCCV-205

L	T	P	Credits	Weekly Load (hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Understand the behavior of material under different loading.
CO2: Understand and calculate the different type of stress like, simple stress,shear stress, direct stress and bending stress in the material.
CO3: Understand and calculate the shear force and bending moment forbeam of different loading.
CO4: Study to calculate the deflection of beam for different loading.
CO5: Study to calculate moment of inertia, second moments of inertia, radius of gyration, and sectionmodulus for L, T, channel and I sections.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	2	2	2	3	1	1	3	2	1
CO2	3	2	2	3	1	1	3	3	2
CO3	3	3	3	3	1	1	3	3	2
CO4	3	3	3	3	1	1	3	3	2
CO5	3	3	3	3	1	1	3	3	1
Avg.	2.8	2.6	2.6	3	1	1	3	2.8	1.6

Theory

Unit	Course Description	Lectures
Unit-I	**Properties of Materials:** Classification of materials, elastic materials, plastic materials, ductile materials, brittle materials. Introduction to tensile test, compressive test, impact test, fatigue test, torsion test on metals.	4
	Simple Stresses and Strains: Concept of stress, normal and shear stresses. Concept of strain and deformation, longitudinal and transverse strain, Poisson's ratio, volumetric strain. Hooke's law, module of elasticity and rigidity, Bulk modulus of elasticity, relationship between the elastic constants. Stresses and strains in bars subjected to tension and compression. Extension of uniform bar under its own weight, stress produced in compound bars (two or three) due to axial load. Stress-strain Diagram for mild steel and HYSD steel, mechanical properties, factor of safety. Temperature stresses and strains.	7
	Shear Force and Bending Moment: Concept of a beam and supports (Hinges, Roller and Fixed), types of beams: simply supported, cantilever, propped, over hang, cantilever and continuous beams (only concept). Types of loads (dead load, live load, snow load, wind load seismic load as per IS Codes etc.) and types of loading (point, uniformly	7

	distributed and uniformly varying loads). Concept of bending moment and shear Force, sign conventions. Bending Moment and shear force diagrams for cantilever, simply supported and overhanging beams subjected to concentrated, Uniformly distributed. Relationship between load, shear force and bending moment, point of maximum bending moment, and point of contra flexure.	
	Moment of Inertia: Concept of moment of inertia and second moment of area and radius of gyration, theorems of parallel and perpendicular axis, second moment of area of common geometrical sections: rectangle, triangle, circle *(without derivations)*. Second moment of area for L, T and I sections, section modulus.	4
Unit-II	**Bending Stresses in Beams:** Concept of pure/simple bending. Assumptions made in the theory of simple bending, derivation and application of bending equation to circular cross-section, I section, T&L sections only. Moment of resistance. Calculations of bending stresses in simply supported beam. Combined Direct and Bending Stresses: Concentric and eccentric loads single axis eccentricity only Effect of eccentric load on the section stresses due to eccentric loads, Numerical in the case of short Columns. Simple problems on stability of masonry dams and retaining walls	6
	Shear Stresses in Beams: Concept of shear stresses in beams, shear stress distribution in rectangular,circular I, T, L sections .	5
	Slope and Deflection: Necessity for determination of slope and deflection. Moment area theorem	5
	Columns: Theory of columns- long and short columns, slenderness ratio. Numerical problem on Euler's and Rankine formula	5
	Analysis of Trusses: Concept of perfect, redundant and deficient frames. Assumptions and analysis oftrusses by: Method of joints, Method of sections.	5

Recommended Books:

Author(s)	Title	Publisher
Ramamrutham, S	Strength of Materials	Dhanpat Rai and Sons
Ram Chandra	Applied Mechanics & Strength of Materials	Standard Publishers
Punmia, BC	Strength of Materials	Standard Publishers
Prasad VS	Structural mechanics	Galgotia Publications

Title of the course : Concrete Technology
Subject Code : PECV-201

L	T	P	Credits	Weekly Load (hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Master the fundamentals of concrete ingredients and properties (Analysis and Selection)
CO2: Design and proportion concrete mixes for optimal performance.
CO3: Implement effective concreting practices across different conditions.
CO4: Identify and address defects in concrete (Diagnosis and Repair).
CO5: Understand special concretes and their applications.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	1	2	3	3	3	3	3	2
CO2	3	3	3	3	3	3	3	3	3
CO3	3	2	2	3	3	3	3	2	1
CO4	3	2	2	2	2	2	3	2	1
CO5	3	3	2	2	3	2	3	1	3
Avg.	3	2.2	2.2	2.6	2.8	2.6	3	2.2	2

Unit	Course Description	Lectures
Unit-I	**Introduction:** Definition of concrete, uses of concrete in comparison to other building materials	6
	Ingredients of Concrete: Cement: Types and properties. Aggregates: Classification, Characteristics of aggregates, Grading of aggregates: coarse aggregate, fine aggregate; All-in-aggregate; fineness modulus, Water: Quality requirements as per IS:456-2000. Water Cement Ratio: Hydration of cement & principle of water-cement ratio, Duff Abram's Water-cement ratio law: Limitations of water-cement ratio law and its effects on strength of concrete. Admixtures.	8
	Properties of Concrete: Properties in plastic state: Workability, factors affecting workability, measurement, & slumps for placement in various conditions, Segregation, Bleeding and Harshness.. Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes;	8
	Proportioning for Normal Concrete: Objectives of mix design, introduction to various grades, are proportioning for nominal mix design as, Adjustment on site for: Bulking of fine aggregate, water absorption of aggregate, workability. Difference between nominal and controlledconcrete.	7

Unit-II	**Special Concretes:** Concreting under special conditions, difficulties and precautions before, during and after concreting, Cold weather concreting, under water concreting, Hot weather concreting. Ready mix concrete. Fibre reinforced concrete. Polymer Concrete. Fly ash concrete. Silica fume concrete	9
	Concreting Operations: Storing of Cement, Effect of storage on strength of cement, Determination of warehouse capacity for storage of Cement. Storing of Aggregate, Batching and mixing, selection of proper gauge box, Transportation of concrete, Placement of concrete, Compaction, finishing concrete slabs, Curing: Objective & methods. Jointing: Location of construction joints, treatment of construction joints, expansion joints in buildings - their importance and location. Defects in concrete: Identification of and methods of repair	10

Recommended Books

Author(s)	Title	Publisher
Kulkarni, PD; Ghosh, RK	Text Book of Concrete Technology	Oxford and IBH Publishing, New Delhi
Birinder Singh	Concrete Technology	Kaption Publications
Gupta BL and Gupta Amit	Text Book of Concrete Technology	Standard Publishers Distributors, Delhi
Varshney, RS	Concrete Technology	Oxford and IBH Publishing, New Delhi

Title of the course : Water Supply and Waste Water Engineering
Subject Code : PCCV-207

L	T	P	Credits	Weekly Load (Hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Learn and calculate the water requirement for a particular population.
CO2: Check and improve the quality of water by giving required treatment to water.
CO3: Learn different components of piping system and its maintenance.
CO4: Learn the purpose of sanitation and sewage types.
CO5: Study different methods of sewage treatment and purpose of building drainage.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	2	3	3	3	1	3	3	3	1
CO2	2	3	3	3	3	2	3	2	2
CO3	3	2	3	2	2	2	3	1	2
CO4	3	1	1	2	3	2	3	1	2
CO5	3	1	2	2	3	2	3	2	2
Avg.	2.6	2	2.4	2.4	2.4	2.2	3	1.8	1.8

Unit	Course Description	Lectures
Unit-I (Water Supply Engineering)	**Introduction:** Necessity and brief description of water supply system. Quantity of Water: Quality of Water, Physical, Chemical and bacteriological tests and their significance. Standard of potable water as per Indian Standard.	7
	Water Treatment: Sedimentation, Coagulation, flocculation. Filtration, Disinfection of water, forms ofchlorination. Flow diagram of different treatment units	7
	Conveyance of Water: Different types of pipes, their suitability and uses, types of joints in different types ofpipes. Appurtenances: Sluice, air, reflux valves, relief valves, scour valves, bibcocks, stop cocks, fire hydrants, and water meters their working and uses. Systemsof water, Wastage of water – preventive measures, Maintenance of distributionsystem, Leakage detection Water supply fixtures and installations and terminology related to plumbing.	8
Unit-II (Waste Water Engineering)	**Introduction:** Purpose of sanitation. Necessity of systematic collection and disposal of waste. Collection and conveyance of sewage, Types of sewage: Domestic, industrial, storm water and its seasonal variation, Types of sewerage systems, Appurtenance, Manholes & ventilating shafts	7

	Laying and Construction of Sewers: Setting out/alignment of sewers. Excavations, Construction of surface mains anddifferent sections required.	6
	Sewage Treatment and disposal: Meaning and principle of primary and secondary treatment and activated sludge process their flow diagrams. Introduction and uses of screens, grit chambers, detritustanks, skimming tanks, plain sedimentation tanks, primary clarifiers, secondary clarifiers, filters, control beds, intermittent sand filters, trickling filters, sludge treatment and disposal, oxidation ponds, Methods of Sewerage Disposal: General Composition of sewage and disposal methods. Disposal by dilution. Self-purification of stream. Disposal by land treatment.	8
	Building Drainage: Aims of building drainage and its requirements. Different sanitary fittings and installations. Traps, seals, causes of breaking seals.	5

Recommended Books:

Author	Title	Publisher
Duggal, KN	Elements of Public Health Engineering	S. Chand and Co
Rangwala, SC	Water Supply and Sanitary Engineering	Anand Charotar Books
Kshirsagar	Water Supply Engineering	Roorkee Publishing House
Hussain, SK	Text Book of Water Supply and Sanitary Engineering	Oxford and IBH Publishing Co

Title of the course : **Surveying-I Lab**
Subject Code : **PCCV-209**

L	T	P	Credits	Weekly Load (hrs.)
0	0	2	1	2

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Study to use the compass to measure magnetic bearings and carry out traversing.
CO2: Understand field procedures required for a professional surveyor to carry out levelling process.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	2	3	2	2	3	3	1
CO2	3	3	2	3	2	2	3	3	2
Avg.	3	3	3	3	2	2	3	3	1.5

PRACTICAL EXERCISES

I. Chain surveying:

i) **a)** Ranging a line and Chaining a line and recording in the field book
b) Taking offsets - perpendicular and oblique (with a tape only)
c) Setting out right angle with a tape
ii) Chaining of a line involving reciprocal ranging
iii) Chaining a line involving obstacles to ranging
iv) Chain Survey of a small area.

II. Compass Surveying:

i) **a)** Study of prismatic compass
b) Setting the compass and taking observations
c) Measuring angles between the lines meeting at a point

III. Leveling:

i) **a)** Study of dumpy level and leveling staff
b) Temporary adjustments of various levels
c) Taking staff readings on different stations from the single setting and finding differences of level between them
ii) To find out difference of level between two distant points by shifting the instrument
iii) Longitudinal and cross sectioning of a road/railway/canal
iv) Setting a gradient by dumpy and auto-level

V. Plane Table Surveying:

i) **a)** Study of the plane table survey equipment
b) Setting the plane table
c) Marking the North direction
d) Plotting a few points by radiation method
ii) **a)** Orientation by
Trough compass
Back sighting

b) Plotting few points by intersection, radiation and resection method

iii) Traversing an area with a plane table (at least five lines)

VI. Layout of Buildings (from given drawing of two room residential building) by use of surveying instruments.

Title of the course : Structural Mechanics Lab
Subject Code : PCCV-211

L	T	P	Credits	Weekly Load (hrs.)
0	0	2	1	2

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Analyse and evaluate properties of material by tensile test.
CO2: Understand bending in beams and analyze bending stresses.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	2	3	2	3	1	1	3	3	2
CO2	3	3	3	3	1	2	3	3	2
Avg.	2.5	3	2.5	3	1	1.5	3	3	2

PRACTICAL EXERCISES

1. Determination of yield stress, ultimate stress, percentage elongation and plot the stress strain diagram and compute the value of young's modulus on mild steel.
2. Testing of HYSD Steel.
3. Determination of Young's modulus of elasticity for steel wire with searl's apparatus.
4. Determination of modulus of rupture of a concrete beam.
5. Study of Direct Shear Test of mild steel on Universal Testing Machine.
6. Study of Brinell Hardness Test.
7. Study of Rockell Hardness Test.
8. Study of Impact Testing Machine.
9. Study of Torsion Testing Machine.

Title of the course : **Water Supply and Waste Water Engineering Lab**
Subject Code : **PCCV-213**

L	T	P	Credits	Weekly Load (Hrs.)
0	0	2	1	2

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Perform tests regarding the physical and chemical properties of water samples.
CO2: Perform standard tests to assess water quality and treatment efficiency.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	1	3	2	1	3	2	2
CO2	2	3	3	3	3	2	3	3	2
Avg.	2.5	2.5	2	3	2.5	1.5	3	2.5	2

Practical Exercises

1. To determine turbidity of water sample
2. To determine dissolved oxygen of given sample
3. To determine pH value of water
4. To perform jar test for coagulation
5. To determine BOD of given sample
6. To determine residual chlorine in water
7. To determine conductivity of water and total dissolved solids.

Title of the course : Design and Drawing of RCC Structures
Subject Code : PCCV-202

L	T	P	Credits	Weekly Load (Hrs.)
3	1	0	4	4

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO 1: Understand the concepts of RCC and its various design methods.
CO 2: Analyze and design singly and doubly reinforced beams.
CO 3: Design one way slabs.
CO 4: Design Axially Loaded Columns.
CO 5: Understand the concepts of Pre-Stressed concrete.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	2	2	2	3	2	2
CO2	3	3	3	3	2	2	3	3	1
CO3	3	3	3	2	2	2	3	3	1
CO4	3	3	3	3	2	2	3	3	1
CO5	3	2	2	2	3	1	3	2	2
Avg.	3	2.6	2.6	2.4	2.2	1.8	3	2.6	1.4

Unit	Course Description	Lectures
Unit-I	**Introduction:** Concept of Reinforced Cement Concrete (RCC). Reinforcement Materials, Introduction to different methods of RCC design: Working stress method and Limit state method. Definitions and assumptions made in limit state of collapse (flexure), Design loads. Stress block, parameters. Shear and Development Length, Shear strength of concrete without shear reinforcement, Maximum shear stress, Shear reinforcement	11
	Singly Reinforced Beams: Basic assumptions and stress strain curve, neutral axis, balanced, under-reinforcement and over reinforced beams, Moment of resistance for singly reinforced beam. Design of singly reinforced beam including sketches showing reinforcement details. Theory and design of singly reinforced beam by Limit State Method	12
	Doubly Reinforced Beams: Theory and design of simply supported doubly reinforced rectangular beam by Limit State Method.	10
Unit-II	**One Way Slab and Two Way Slab:** Theory and design of simply supported one way slab including sketches showing reinforcement details (plan and section) by Limit State Method. Theory of two-way simply supported slab.	10

	Axially Loaded Column: Definition and classification of columns. Effective length of column. Specifications for longitudinal and lateral reinforcement. Design of axially loaded square, rectangular and circular short columns by Limit State Method including sketching of reinforcement(sectional elevation and plan)	11
	Pre-stressed Concrete: Concept of pre-stressed concrete. Methods of pre-stressing: pre-tensioning and post tensioning. Advantages and disadvantages of pre-stressing.	10

Recommended Books:

Author(s)	Title	Publisher
Punmia, BC	Reinforced Concrete Structure Vol I	Standard Publishers
Ramamurtham, S	Design and Testing of Reinforced Structures	Dhanpat Rai
Singh, Birinder	RCC Design and Drawing	Kaption Publishing

Title of the course : Soil and Foundation Engineering
Subject Code : PCCV-204

L	T	P	Credits	Weekly Load (hrs.)
3	1	0	4	4

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Identify and classify various types of soils and select particular type of foundation according to loading of structure.
CO2: Understand about shear strength of soil and carry out compaction of soils as per density.
CO3: Study bearing capacity of soil and calculate liquid limit and plastic limit of soil.
CO4: Study maximum dry density of soil and optimum moisture content of soil.
CO5: Understand and perform various tests on the soil.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):

CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	1	1	3	3	1	3	2	1
CO2	3	3	3	3	2	2	3	3	2
CO3	2	3	3	3	3	2	3	2	2
CO4	2	3	3	3	3	2	3	2	2
CO5	2	3	3	3	3	3	3	1	3
Avg.	2.4	2.6	2.6	3	2.8	2	3	2	2

Unit	Course Description	Lectures
Unit-I	**Introduction:** Importance of soil studies in Civil Engineering. Geological origin of soils with special reference to soil profiles in India: residual and transported soil, alluvial deposits, lake deposits, local soil found in Punjab, dunes and loess, glacial deposits, black cotton soils, conditions in which above deposits are formed and their Engineering characteristics. Names of organizations dealing with soil engineering work in India, soil map of India. Physical Properties of Soils, Constituents of soil & representation by a phase diagram.	6
	Classification and Identification of Soils: Particle size, shape and their effect on engineering properties of soil, particle size classification of soils. Gradation and its influence on engineering properties. Relative density and its use in describing cohesion less soils. Behavior of cohesive soils with change in water content, Atterberg's limit - definitions, use and practical significance. Field identification tests for soils.	6
	Permeability of Soils: Concept of permeability and its importance. Darcy's law, coefficient of permeability, seepage velocity and factors affecting permeability. Comparison of permeability of different soils.	6

Unit-II	**Effective Stress:** Stresses in subsoil. Definition and meaning of total stress, effective stress and neutral stress. Principle of effective stress. Importance of effective stress in engineering problems	5
	Shear Strength Characteristics of Soils: Concept and Significance of shear strength. Factors contributing to shear strength of Cohesive and cohesion less soils, Coulomb's law. Stress and strain curve, peak strength and ultimate strength, their significance.	4
	Compaction: Definition and necessity of compaction. Definition and importance of optimum watercontent, maximum dry density; moisture dry density relationship for typical soilswith different compactive efforts.	5
	Soil Exploration: Purpose and necessity of soil exploration. Reconnaissance, methods of soil exploration, Sampling; undisturbed, disturbed and representative samples, number and quantity of samples, resetting, sealing and preservation of samples.	5
	Bearing Capacity of soil: Concept of bearing capacity. Definition and significance of ultimate bearing capacity, net safe bearing capacity and allowable bearing pressure. Factors affecting bearing capacity. Concept of vertical stress distribution in soils due to foundation loads, pressure bulb. Use of geo-synthetics.	6
	Foundation Engineering: Concept of shallow and deep foundation; types of shallow foundations: combined, isolated, strip, mat, and their suitability. Factors affecting the depth of shallow foundations, deep foundations, type of piles and their suitability; pile classification on the basis of material, pile group and pile cap	6

Recommended Books:

Author(s)	Title	Publisher
Punmia, BC	Soil Mechanics and Foundations	Standard Publishers
Bharat Singh and Shamsher Prakash	Soil Mechanics and Foundations Engineering	Nem Chand and Bros Roorkee
Sehgal, SB	A Text Book of Soil Mechanics	CBS Publishers
Joseph E	Engineering Properties of soils Bowles and their Measurement	Tata McGraw Hill

Title of the course : Surveying-II
Subject Code : PCCV-206

L	T	P	Credits	Weekly Load (hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Study to Interpolate contours on a given sheet of paper and align a proposed road.
CO2: Learn prolonging a line with theodolite, conduct closed traversing and measure horizontal and vertical angles.
CO3: Study the Setting out simple circular curve
CO4: Compute the area and earthwork for different works by using surveying instruments.
CO5: Understand and work with advanced surveying instrument like remote sensing, GPS and GIS.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1.	PSO2
CO1	2	2	2	3	2	3	3	2	1
CO2	3	2	1	3	2	3	3	3	2
CO3	3	3	3	3	3	3	3	3	1
CO4	3	3	3	3	2	3	3	3	3
CO5	3	2	1	2	1	1	3	3	2
Avg.	2.8	2.4	2	2.8	2	2.6	3	2.8	1.8

Unit	Course Description	Lectures
Unit-I	**Contouring:** Concept of contours, purpose of contouring, contour interval and horizontal equivalent, factors effecting contour interval, characteristics of contours, methods of contouring: Direct and indirect, use of stadia measurements in contour survey, interpolation of contours; use of contour map, Drawing cross section from a contour map; marking alignment of a road, railway and a canal on a contour map, computation of earth work and reservoir capacity from a contour map	10

	Theodolite Surveying: Working of a transit vernier theodolite axes of a theodolite and their relation; temporary adjustments of a transit theodolite; concept of transiting, swinging, face left, face right and changing face; measurement of horizontal and vertical angles. Prolonging a line (forward and backward) measurement of bearing of a line; traversing by included angles and deflection angle method; traversing by stadia measurement, theodolite triangulation, plotting a traverse; concept of coordinate and solution of omitted measurements (one side affected), errors in theodolite survey and precautions taken to minimize them; limits of precision in theodolite traversing. Height of objects – accessible and non-accessible bases	11
	Tacho-metric surveying: Tachometry, Instruments to be used in tachometry, methods of tachometry, stadia system of tachometry, general principles of stadia tachometry, examples of stadia tachometry and Numerical problems	6
Unit-II	**Curves:** Simple Circular Curve: Need and definition of a simple circular curve; Elements of simple circular curve - Degree of the curve, radius of the curve, tangent length, point of intersection (Apex point), tangent point, length of curve, long chord deflection angle, Apex distance and Mid-ordinate. Setting out of simple circular curve:- By linear measurements only: Offsets from the tangent, Successive bisection of arcs, Offsets from the chord produced. By tangential angles using a theodolite. Transition Curve: Need (centrifugal force and super elevation) and definition of transition curve; requirements of transition curve; length of transition curve for roads; by cubic parabola; calculation of offsets for a transition curve; setting out of a transition curve by tangential offsets only. Vertical curve: Setting out of a vertical curve	11
	Modern Surveying: Introduction to the use of Modern Surveying equipment and techniques such as: EDM or Distomat, Planimeter, Total station, Introduction to remote sensing and GPS.	10

Recommended Books:

Author(s)	Title	Publisher
Hussain, SK and Nagraj	Text Book of Surveying	S Chand and Co
Deshpande, RS	A Text Book Surveying and Levelling	United Book Corporation, Pune
Kocher	A Text Book of Surveying	Katson Publishing House Ludhiana
Kanetkar, TP; and Kulkarni	Surveying and Leveling-Vol.2	AVG Prakashan

Title of the course : Construction materials
Subject Code : PECV-202A

L	T	P	Credits	Weekly Load (Hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Identify and describe various building components and their roles in construction projects.
CO2: Characterize and select construction materials based on specific applications and project requirements.
CO3: Evaluate and compare the properties of construction materials to determine their suitability for various projects.
CO4: Assess the advantages and disadvantages of construction materials in the context of sustainability and environmental impact.
CO5: Apply material knowledge and project management principles to plan, coordinate, and execute construction projects.

CO/PO Mapping:(Strong (3)/Medium (2)/Weak (1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	2	2	2	2	2	2	3
CO2	3	3	3	3	3	2	3	2	3
CO3	3	3	3	3	3	2	3	2	2
CO4	3	3	3	3	3	2	3	1	2
CO5	3	3	3	3	3	3	3	3	2
Avg.	3	3	2.8	2.8	2.8	2.2	2.8	2	2.4

Unit	Course Description	Lectures
Unit-I	**Stones:** Classification of rocks, Quarrying of stones by wedging & blasting, Tests on stone (Acid test, Attrition, crushing, impact & water absorption), Characteristics of a good building stone, Deterioration & Preservation of stones.	8
	Bricks: Composition of good brick earth & harmful ingredients, Manufacture of bricks, Burning of bricks by clamps-intermittent (down draught) and continuous kiln (Hoffman's), Classification of bricks as per I S, Test on bricks (Field tests, Crushing strength, absorption, shape & size, efflorescence test), Requirements of good bricks, Substitutes for bricks – Cement concrete blocks (solid), Production process of solid blocks. Fire clay/Refractory bricks, Calcium Silicate Bricks(properties and uses).	10
Unit-II	**Timber:** Classification of timber based on mode of growth, Cross- section of an exogenous tree, Properties of good timber, Defects in timber, Preservation of Timber, Seasoning of Timber, Conversion of timber and Market forms(types and uses).	10

	Cement: Composition of ordinary Portland cement, Functions of ingredient of cement, Manufacture of OPC (Mixing of raw materials by dry process, Burning &Grinding), Storage of cement, Field tests on cement, Types of cement and its uses.	12
	Paints, Varnish & Distemper: Objects, characteristics &Ingredients of paints, varnishes & distemper.	8

Recommended Books:

Author	Title	Publisher
Sharma, SK; and Mathur	Engineering Materials	S. Chand and Co
Surendra Singh	Engineering Materials	Vikas Publishing House Pvt. Ltd
Chowdhuri	Engineering Materials	Culcutta, Technical Publishers of India
Bahl, SK	Engineering Materials	Rainbow Book Co

Title of the course : Sustainable Construction Methods
Subject Code : PECV-202B

L	T	P	Credits	Weekly Load (Hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Understand the fundamental concepts of sustainability.
CO2: Study the properties and uses of sustainable building materials.
CO3: Identify suitable construction techniques and practices for sustainable buildings.
CO4: Improve fundamental knowledge of the inter-relationships between the built environment and natural systems.
CO5: Develop the technological innovations needed to safeguard, improve, and economize infrastructure.

CO/PO Mapping:(Strong (3)/Medium (2)/Weak (1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	2	3	2	3	3	1
CO2	3	2	3	3	3	2	3	2	2
CO3	3	3	3	3	3	2	3	3	3
CO4	3	2	3	2	3	2	3	2	2
CO5	3	2	3	3	3	2	3	3	3
Avg.	3	2.2	2.8	2.6	3	2	3	2.6	2.2

Unit	Course Description	Lectures
Unit-I	**Introduction:** Definitions-Various types- Pillars of Sustainability – Circle of Sustainability - Need-systems and their sustainability - Green Buildings -Difference between Green and Sustainability – Climate Change, Global warming -National and International policies and Regulations. Identification of cutting-edge sustainable construction materials, technologies, and project management strategies for use in the construction industry and evaluation of their potential to reduce the negative environmental impacts of construction activity	10
	Building Construction Methods: Conventional modular construction methods, development, Engineering principles, benefits, Modular construction methods for repetitive works, Green Roofs, Cool Roofs, Passive House, Rammed Earth Brick, Passive Solar, Grey water Plumbing Systems, Solar Thermal Cladding, Solar Power, Water Efficiency Technologies, Sustainable Indoor Environment Technologies.	12

Unit-II	**Precast Construction Methods:** Modular construction methods for repetitive works, Precast concrete construction methods; Benefits , Sustainability in Concrete Mix Design, Greener, Faster and Sustainable Construction Practices Through Precast Solutions, Use of secondary cementitious material (SCM's) like GGBS, fly ash, ultra-fine GGBS in the production of the concrete, Basics of Slip forming for tall structures, Structural 3D Printing, Self-healing Concrete, Green Insulation, Sustainable Resource Sourcing, Environmental Sustainability Benefits From Precast Concrete.	13
	New Construction Materials Technologies: Introduction to new construction materials & technologies, Synthetic Roof Underlayment, Electro chromic Glass, Biodegradable Materials, Reduction of water consumption, Impact on environment, Concepts of climate responsive building, Sustainability assessment using standard approaches-LEED/GRIHA rating evaluation process	13

Recommended Books:

Author	Title	Publisher
Margaret Robertson	Sustainability Principles and Practice	Routledge, 2014
Martin A. A. Abraham	Sustainability Science and Engineering: Defining Principles	Elsevier Science, 2005
Tony Clayton, Nicholas J. Radcliffe, Anthony M. H. Clayton	Sustainability: A Systems Approach	Routledge, 1996
Gursharan Singh Kainth	Climate Change,Sustainable Development and India	Lambert Academic Publishing, 2011

Title of the course : Construction materials
Subject Code : OECV-202A

L	T	P	Credits	Weekly Load (Hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Identify and describe various building components and their roles in construction projects.
CO2: Characterize and select construction materials based on specific applications and project requirements.
CO3: Evaluate and compare the properties of construction materials to determine their suitability for various projects.
CO4: Assess the advantages and disadvantages of construction materials in the context of sustainability and environmental impact.
CO5: Apply material knowledge and project management principles to plan, coordinate, and execute construction projects.

CO/PO Mapping:(Strong (3)/Medium (2)/Weak (1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	2	2	2	2	2	2	3
CO2	3	3	3	3	3	2	3	2	3
CO3	3	3	3	3	3	2	3	2	2
CO4	3	3	3	3	3	2	3	1	2
CO5	3	3	3	3	3	3	3	3	2
Avg.	3	3	2.8	2.8	2.8	2.2	2.8	2	2.4

Unit	Course Description	Lectures
Unit-I	**Stones:** Classification of rocks, Quarrying of stones by wedging & blasting, Tests on stone (Acid test, Attrition, crushing, impact & water absorption), Characteristics of a good building stone, Deterioration & Preservation of stones.	8
	Bricks: Composition of good brick earth & harmful ingredients, Manufacture of bricks, Burning of bricks by clamps-intermittent (down draught) and continuous kiln (Hoffman's), Classification of bricks as per I S, Test on bricks (Field tests, Crushing strength, absorption, shape & size, efflorescence test), Requirements of good bricks, Substitutes for bricks – Cement concrete blocks (solid), Production process of solid blocks. Fire clay/Refractory bricks, Calcium Silicate Bricks (properties and uses).	10
Unit-II	**Timber:** Classification of timber based on mode of growth, Cross- section of an exogenous tree, Properties of good timber, Defects in timber, Preservation of Timber, Seasoning of Timber, Conversion of timber and Market forms(types and uses).	10

	Cement: Composition of ordinary Portland cement, Functions of ingredient of cement, Manufacture of OPC (Mixing of raw materials by dry process, Burning &Grinding), Storage of cement, Field tests on cement, Types of cement and its uses.	12
	Paints, Varnish & Distemper: Objects, characteristics &Ingredients of paints, varnishes & distemper.	8

Recommended Books:

Author	Title	Publisher
Sharma, SK; and Mathur	Engineering Materials	S. Chand and Co
Surendra Singh	Engineering Materials	Vikas Publishing House Pvt. Ltd
Chowdhuri	Engineering Materials	Culcutta, Technical Publishers of India
Bahl, SK	Engineering Materials	Rainbow Book Co

Title of the course : Sustainable Construction Methods
Subject Code : OECV-202B

L	T	P	Credits	Weekly Load (Hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to

CO1: Understand the fundamental concepts of sustainability.

CO2: Study the properties and uses of sustainable building materials.

CO3: Identify suitable construction techniques and practices for sustainable buildings.

CO4: Improve fundamental knowledge of the inter-relationships between the built environment and natural systems.

CO5: Develop the technological innovations needed to safeguard, improve, and economize infrastructure.

CO/PO Mapping:(Strong (3)/Medium (2)/Weak (1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	2	3	2	3	3	1
CO2	3	2	3	3	3	2	3	2	2
CO3	3	3	3	3	3	2	3	3	3
CO4	3	2	3	2	3	2	3	2	2
CO5	3	2	3	3	3	2	3	3	3
Avg.	3	2.2	2.8	2.6	3	2	3	2.6	2.2

Unit	Course Description	Lectures
Unit-I	**Introduction:** Definitions-Various types- Pillars of Sustainability – Circle of Sustainability - Need-systems and their sustainability - Green Buildings -Difference between Green and Sustainability – Climate Change, Global warming -National and International policies and Regulations. Identification of cutting-edge sustainable construction materials, technologies, and project management strategies for use in the construction industry and evaluation of their potential to reduce the negative environmental impacts of construction activity	10
	Building Construction Methods: Conventional modular construction methods, development, Engineeringprinciples, benefits, Modular construction methods for repetitive works, Green Roofs, Cool Roofs, Passive House, Rammed Earth Brick, Passive Solar, Grey water Plumbing Systems, Solar Thermal Cladding, Solar Power, Water Efficiency Technologies, Sustainable Indoor Environment Technologies.	12

Unit-II	**Precast Construction Methods:** Modular construction methods for repetitive works; Precast concrete construction methods; Benefits , Sustainability in Concrete Mix Design, Greener, Faster and Sustainable Construction Practices Through Precast Solutions, Use of secondary cementitious material (SCM's) like GGBS, fly ash, ultra-fine GGBS in the production of the concrete, Basics of Slip forming for tall structures, Structural 3D Printing, Self-healing Concrete, Green Insulation, Sustainable Resource Sourcing, Environmental Sustainability Benefits From Precast Concrete.	13
	New Construction Materials Technologies: Introduction to new construction materials & technologies, Synthetic Roof Underlayment, Electro chromic Glass, Biodegradable Materials, Reduction of water consumption, Impact on environment, Concepts of climate responsive building, Sustainability assessment using standard approaches-LEED/GRIHA rating evaluation process	13

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Martin A. A. Abraham	Sustainability Science and Engineering: Defining Principles	Elsevier Science, 2005
Tony Clayton, Nicholas J. Radcliffe, Anthony M. H. Clayton	Sustainability: A Systems Approach	Routledge, 1996
Gursharan Singh Kainth	Climate Change, Sustainable Development and India	Lambert Academic Publishing, 2011

Title of the course : Basics of Green Building
Subject Code : OECV-202C

L	T	P	Credits	Weekly Load (Hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Understand basic concepts of sustainability and its impact on the environment and planning.
CO2: Explain building science aspects like energy use, materials, and indoor air quality.
CO3: Identify sustainable materials including traditional and recycled options.
CO4: Apply green design practices in water, waste, and energy management.
CO5: Evaluate green building rating systems and analyze case studies in India and abroad.

CO/PO Mapping:(Strong (3)/Medium (2)/Weak (1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	2	3	2	3	3	1
CO2	3	2	3	3	3	2	3	2	2
CO3	3	3	3	3	3	2	3	3	3
CO4	3	2	3	2	3	2	3	2	2
CO5	3	2	3	3	3	2	3	3	3
Avg.	3	2.2	2.8	2.6	3	2	3	2.6	2.2

Unit	Course Description	Lectures
Unit-I	**Introduction to green building:** Introduction to the ideas, issues and concepts of sustainable planning, global environment and the built environment, principles of environmentally and ecologically supportive planning.	8
	Building Science Fundamentals: General features- Use of energy, materials, health and global environment, indoor air quality as related to the construction and operation of buildings.	8
	Green materials: Traditional and Recycled Materials in context of Sustainability	8
	Green Design: Sustainable and conservation practices – water conservation, harvesting and recharge – Traditional and Modern Methods sewerage treatment, solid waste treatmentSolid and Liquid Waste Management, (with special reference to energy efficiency, recycling and re-use) , economics and management	8
Unit-II	**Overview of Green Building rating systems:** USGBC, TERI-GRIHA and LEED rating systems	8
	Case studies on specific contemporary sustainable practices: Case studies on green practices of abroad countries, Case studies on green practices in India countries,contemporary and famous examples of sustainable / energy efficient architecture / settlement planning across the world.	8

Recommended Books:

Author	Title	Publisher
R.K .Gautham	Green homes : Efficient,Healthyand Smart	BS publications,2009

Title of the course : **Design and Drawing of RCC Structures Lab**
Subject Code : **PCCV-208**

L	T	P	Credits	Weekly Load (Hrs.)
0	0	2	1	2

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Create detailed structural drawings of beams, slabs, and columns with an appropriate reinforcement.
CO 2: Interpret and apply design specifications and standards to structural drawings.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	3	3	2	2	2	3	2
CO2	3	3	3	3	2	2	3	3	1
Avg.	3	2.5	3	3	2	2	2.5	3	1.5

Practical Exercises:

Making Drawings on following:

1. Rectangular beams- singly reinforced, doubly reinforced and cantilever beams with shear reinforcement
2. Slabs- one-way, two-way slabs with torsional reinforcement.
3. Columns – square, rectangular and circular columns with isolated footing

Title of the course : Soil and Foundation Engineering Lab
Subject Code : PCCV-210

L	T	P	Credits	Weekly Load (hrs.)
0	0	2	1	2

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Analyses and determine index properties of any type of soil, and further classify and list the soil based on these index properties.
CO2: Study and estimate the field density of soil by core cutter and sand replacement methods.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	1	1	3	3	1	3	2	2
CO2	3	3	3	3	2	2	3	2	1
Average	3	2	2	3	2.5	1.5	3	2	1.5

PRACTICAL EXERCISES

1. To determine the moisture content of a given sample of soil
2. Field Density Measurement (Sand Replacement and Core Cutter Method)
   a) Calibration of sand
   b) Conducting field density test at a given location
   c) Determination of water content
   d) Computation and interpretation of results
3. Liquid Limit and Plastic Limit Determination:
   a) Identifying various grooving tools
   b) Preparation of sample
   c) Conducting the test
   d) Observing soil behavior during tests
   e) Computation, plotting and interpretation of results
4. Mechanical Analysis
   a) Preparation of sample
   b) Conducting sieve analysis
   c) Computation of results
   d) Plotting the grain size distribution curve
   e) Interpretation of the curve
5. Laboratory Compaction Tests (Standard Proctor test)
   a) Preparation of sample
   b) Conducting the test
   c) Observing soil behavior during test
   d) Computation of results and plotting
   e) Determination of optimum moisture and maximum dry density

Title of the course : Surveying-II Lab
Subject Code : PCCV-212

L	T	P	Credits	Weekly Load (hrs.)
0	0	2	1	2

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Analyses and determine index properties of any type of soil, and further classify and list the soil based on these index properties.
CO2: Study and estimate the field density of soil by core cutter and sand replacement methods.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	1	1	3	3	1	3	2	2
CO2	3	3	3	3	2	2	3	2	1
Average	3	2	2	3	2.5	1.5	3	2	1.5

PRACTICAL EXERCISES:

1. Contouring:
   - i. Preparing a contour plan by radial line method by the use of a Tangent Clinometer/Tachometer
   - ii. Preparing a contour plan by method of squares
   - iii. Preparing a contour plan of a Road/Railway track/Canal by taking cross sections

2. Theodolite:
   - i. Taking out the Theodilite, mounting on the tripod and placing it back in the box
   - ii. Study of a transit vernier theodolite; temporary adjustments of theodolite
   - iii. Reading the vernier and working out the least count, measurement of horizontal angles by repetition and reiteration methods
   - iv. Measurement of vertical angles and use of tachometric tables
   - v. Measurement of magnetic bearing of a line
   - vi. Running a closed traverse with a theodolite (at least five sides) and its plottin
   - vii. Height of objects with and without accessible bases

3. Curves

i.Setting out of a simple circular curve with given data by the following methods

a) Offsets from the chords produced

b) One theodolite method

4. Minor instruments:

i.Demonstration and use of minor instruments like Ceylon Ghat Tracer, Tangent Clinometer, Pantagraph, Abney level etc.

ii.Use of planimeter for computing areas

5. Demonstration of digital instruments through field visits to Survey of India and other government agencies.

6. Total Station (only demonstrations).

Title of the course : Transportation Engineering
Subject Code : PCCV-301

L	T	P	Credits	Weekly Load (Hrs.)
3	1	0	4	4

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO 1: Understand the importance and functions of highway institutions.
CO 2: Conduct highway surveys and planning.
CO 3: Learn to apply road geometrics and design principles.
CO 4: Understand and utilize road materials and design pavement.
CO 5: Learn about railway engineering and track maintenance.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	1	2	3	3	1	2
CO2	3	2	3	3	3	3	3	2	2
CO3	3	3	3	3	2	3	3	3	1
CO4	3	3	3	3	3	3	3	3	1
CO5	3	2	2	2	3	3	3	2	2
Avg.	3	2.4	2.6	2.4	2.6	3	3	2.2	1.6

Unit	Course Description	Lectures
Unit-I	**Highway :** Importance of Highway engineering. Functions of IRC, CRRI, MORT&H, NHAI. IRC classification of roads.	4
	Highway Surveys and Plan: Topographic map, reading the data given on a topographic map.Basic considerations governing alignment for a road in plain and hilly area. Highway location; marking of alignment	5
	Road Geometrics: Glossary of terms used in road geo-metrics and their importance, Necessity of curves, Super elevation and methods of providing super elevation. Sketch of typical cross-sections in cutting and filling on straight alignment and at a curve.	5
	Road Materials: Different types of road materials in use; soil, aggregate, binders – bitumen, cutback, Emulsion and Modified Bitumen. Introduction to California Bearing Ratio, method of finding CBR value and its significance. Aggregate: Source and types, important properties, strength, durability. Binders: Common binders; bitumen, properties as per BIS specifications, penetration, softening point, ductility and viscosity test of bitumen, procedures and significance, cut back and emulsion and their uses, Bitumen modifiers	5

	Road Pavements: Road pavement: Flexible and rigid pavement, their merits and demerits, typical cross-sections, functions of various components. Sub-grade preparation, Sub base course, Base Course including water Bound Macadam (WBM) & Wet Mix Macadam (WMM) Bitumen Courses: Bituminous Macadam, Dense Bituminous Macadam (DBM). Surfacing: -Types of surfacing: Prime coat and tack coat, Surface dressing with seal coat, Open graded premix carpet, Mix seal surfacing, Semi dense bituminous concrete, Bituminous Concrete.	5
	Road Drainage: Necessity of road drainage work, cross drainage works. Surface and subsurfacedrains and storm water drains.	3
	Road Maintenance: Common types of road failures of flexible pavements: Pot hole, cracks, rutting, alligator, cracking, upheaval - their causes and remedies (brief description). Maintenance of bituminous road such as seal-coat, patch-work and resurfacing. Maintenance of concrete roads-filling cracks, repairing joints, maintenance of shoulders (berms), maintenance of traffic control devices.	5
Unit-II	**RAILWAYS:** Introduction to Indian Railways. **Railway surveys:** Factors influencing the railways route, brief description of various types of railway survey.	4
	Classification of permanent way describing its component parts. Rail Gauge: Definition, types, practice in India.	4
	Rails – types of rails. Rail Fastenings: Rail joints, types of rail joints, fastenings for rails, fish plates, bearing plates. Sleepers: Functions of sleepers, types of sleepers, requirements of an ideal material for sleepers. Ballast: Function of ballast, requirements of an ideal material for ballast	4
	Maintenance of track: Necessity, maintenance of track, maintenance and boxing of ballast.	3

Recommended Books:

Author(s)	Title	Publisher
Khanna, SK and Justo	Highway Engineering	Nem Chand and Bros
Vaswani, NK	Highway Engineering	Roorkee Publishing House
Priyani, VB	Highway and Airport Engineering	Anand,Charotar BookStall
Sehgal, SB; and Bhanot, KL	A Text Book on Highway Engineering and Airport	S Chand and Co
Vaswani, NK	Railway Engineering	Anand Publishing House, Roorkee
Rangwala, SC	Railway Engineering	Charotar Book Stall
Deshpande, R	A Text Book of Railway Engineering	Poonam United Book

Title of the course : Fluid Mechanics
Subject Code : PCCV-303

L	T	P	Credits	Weekly Load (hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Study to calculate discharge through pipes, irrigation channels, and water supply pipe lines.
CO2: Study to use different flow measurement devices like Venturimeter, mouthpiece, notches, weir, Orifice meter.
CO3: Understand to prepare the details like dimensions, slope of the irrigation, canals and water courses.
CO4: Study to differentiate between different type of water pumps used in the field.
CO5: Understand to measure the loss of head in pipes and channels.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	2	3	2	2	3	3	1
CO2	3	2	3	3	2	2	3	2	2
CO3	3	3	2	3	2	2	3	3	1
CO4	3	3	1	3	2	2	3	2	2
CO5	3	2	3	2	2	2	3	3	1
Avg.	3	2.6	2.2	2.8	2	2	3	2.6	1.4

Unit	Course Description	Lectures
Unit-I	**Introduction:** Fluids: Real and ideal fluids, Hydrostatics, Hydrodynamics, and Hydraulics Properties of Fluids: Mass density, specific weight, specific gravity, viscosity, surface tension-cohesion, adhesion, capillarity, vapour pressure and compressibility. Units of measurement and their conversion	10
	Hydrostatic Pressure: Pressure, intensity of pressure, pressure head, Pascal's law and its applications. Total pressure, resultant pressure, and centre of pressure, total pressure and centre of pressure on horizontal, vertical and inclined plane surfaces of rectangular, triangular, trapezoidal and circular shapes.	10
	Measurement of Pressure: Atmospheric pressure, gauge pressure, vacuum pressure and absolute pressure.Piezometer, simple manometer and differential manometer.	5
Unit-II	**Fundamentals of Fluid Flow:** Types of Flow: Steady and unsteady flow, laminar and turbulent flow, uniform and non-uniform flow. Discharge and continuity equation (flow equation) Types of hydraulic energy: potential energy, kinetic energy, pressure energy. Bernoulli's theorem; statement and description (without proof of theorem) Flow Measurements (brief description with simple numerical problems): Venturimeter and mouthpiece, Pitot tube, Orifice and Orificemeter, Current meters, Notches and weirs (simple numerical	12

	problems)	
	Flow through Pipes: Definition of pipe flow; Reynolds number, laminar and turbulent flow, critical velocity and velocity distributions in a pipe for laminar flow. Head loss in pipe lines due to friction, sudden expansion and sudden contraction, entrance, exit, obstruction and change of direction . Hydraulicgradient line and total energy line. Flow from one reservoir to another througha long pipe of uniform cross section (simple problems). Pipes in series and parallel. Water hammer phenomenon and its effects.	12
	Flow through open channels: Definition of an open channel, uniform flow and non-uniform flow. Discharge through channels using: - Chezy's formula, Manning's formula. Most economical channel sections:- Rectangular, Trapezoidal. Head loss in open channel due to friction	10
	Hydraulic Pumps: Introduction to hydraulic pump, reciprocating pump, centrifugal pumps	5

Recommended Books:

Author(s)	Title	Publisher
JagdishLal	Fluid Mechanics and Hydraulics	Delhi MetropolitanBook Co
Modi, PN, and Seth, SM	Hydraulics and Fluid Mechanics	Delhi StandardPublishers
Khurmi RS	Hydraulics and Hydraulics Machines	S Chand and Co

Title of the course : Building Maintenance
Subject Code : PECV-301A

L	T	P	Credits	Weekly Load (Hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Understand and state various factors causing deterioration to buildings
CO2: Investigate/diagnose various defects in buildings
CO3: Study main causes of defects in buildings
CO4: Understand to select the materials for repair and maintenance of buildings
CO5: Learn to implement remedial measures.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	2	1	3	1	3	2	1
CO2	3	2	3	2	3	2	3	3	2
CO3	3	3	3	2	3	2	3	2	2
CO4	3	2	3	3	3	3	3	2	2
CO5	3	3	3	2	3	3	3	3	2
Avg.	3	2.6	2.8	2	3	2.2	3	2.4	1.8

Unit	Course Description	Lectures
Unit-I	**Need for Maintenance:** Importance and significance of repair and maintenance of buildings. Meaning of maintenance. Objectives of maintenance. Factors influencing the repair and maintenance	4
	Deterioration of Buildings : Definition of deterioration/decay. Factors causing deterioration, their classification Human factors causing deterioration, Chemical factors causing deterioration, Environmental conditions causing deterioration, Miscellaneous factors. Effects of various agencies of deterioration on various building materials i.e. bricks, timber, concrete, paints, metals, plastics, stones.	6
	Investigation and Diagnosis of Defects: Systematic approach/procedure of investigation. Sequence of detailed steps for diagnosis of building defects/problems. List non-destructive and others tests on structural elements and materials to evaluate the condition of the building and study of three most commonly used tests	6
Unit-II	**Defects and their root causes:** Define defects in buildings. Classification of defects. Main causes of building defects in various building elements- Foundations, basements and DPC, Walls, Column and Beams, Roof and Terraces, Joinery, Decorative and protective finishes, Services, Defects caused by dampness.	6

	Materials for Repair, maintenance and protection: Compatibility aspects of repair materials. State application of following materials in repairs:- Anti corrosion coatings, Adhesives/bonding aids, Repair mortars, Curing compounds, Joints sealants, Waterproofing systems for roofs, Protective coatings.	4
	Remedial Measures for Building Defects: Preventive maintenance considerations. Surface preparation techniques for repair. Crack repair methods- Epoxy injection, Grooving and sealing, Stitching, Adding reinforcement and grouting, Flexible sealing by sealant, Repair of surface defects of concrete, Repair of corrosion in RCC elements, Prevention of corrosion in reinforcement. Repair of DPC against Rising Dampness, Waterproofing of wet areas and roofs, various water proofing systems and their characteristics. Repair of joints in buildings- Types of sealing joints with different types of sealants, Techniques for repair of joints, Repair of overhead and underground water tanks.	6

Recommended Books:

Author(s)	Title	Publisher
Sushil Kumar Srivastava	Industrial Maintenance Management	S Chand & Co.
Mishra	Maintenance Engineering	PHI
A.K.Gupta	Reliability, Maintenance and Safety Engineering	University Science Press
Reliability Engineering	L.S. Srinath	East-West Press

Title of the course : Disaster Preparedness & Planning
Subject Code : PECV-301B

L	T	P	Credits	Weekly Load (hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Learn basic concepts in disaster management.
CO2: Understand definitions and terminologies used in disaster management.
CO3: Study types and categories of disasters.
CO4: Analyse the challenges posed by disasters
CO5: Study the impacts of disasters key skills.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	2	3	3	3	2	2
CO2	3	2	1	2	3	3	3	2	2
CO3	3	3	3	2	3	3	3	3	2
CO4	3	3	3	2	3	3	3	3	2
CO5	3	3	3	2	3	3	3	3	2
Avg.	3	2.6	2.4	2	3	3	3	2.6	2

Unit	Course Description	Lectures
Unit-I	**Introduction:** Concepts and definitions: disaster, hazard, vulnerability, resilience, risks severity, frequency and details, capacity, impact, prevention, mitigation.	7
	Disasters: Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.); manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.	9
	Disaster Impacts: Disaster impacts (environmental, physical, social, ecological, economic, political, etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.	8

Unit-II	**Disaster Risk Reduction (DRR):** Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR Courses in India and the activities of National Disaster Management Authority.	12
	Disasters, Environment and Development: Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction an development methods.	12

Recommended Books

Author(s)	Title	Publisher
Iyengar	Natural Hazards in the Urban Habitat	Tata McGraw Hill
Jon Ingleton (Ed)	Natural Disaster management	Tudor Rose, Leicester
Singh B.K	Handbook of disaster management: Techniques & Guidelines	Rajat Publications
R.B. Singh	Disaster Management	Rawat Publications

Title of the course : Concrete Technology
Subject Code : OECV-301A

L	T	P	Credits	Weekly Load (hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Master the fundamentals of concrete ingredients and properties (Analysis and Selection)
CO2: Design and proportion concrete mixes for optimal performance.
CO3: Implement effective concreting practices across different conditions.
CO4: Identify and address defects in concrete (Diagnosis and Repair).
CO5: Understand special concretes and their applications.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	1	2	3	3	3	3	3	2
CO2	3	3	3	3	3	3	3	3	3
CO3	3	2	2	3	3	3	3	2	1
CO4	3	2	2	2	2	2	3	2	1
CO5	3	3	2	2	3	2	3	1	3
Avg.	3	2.2	2.2	2.6	2.8	2.6	3	2.2	2

Unit	Course Description	Lectures
Unit-I	**Introduction:** Definition of concrete, uses of concrete in comparison to other building materials	5
	Ingredients of Concrete: Cement: Types and properties. Aggregates: Classification, Characteristics of aggregates:, Grading of aggregates: coarse aggregate, fine aggregate; All-in-aggregate; fineness modulus, Water: Quality requirements as per IS:456-2000. Water Cement Ratio: Hydration of cement & principle of water-cement ratio, Duff Abram's Water-cement ratio law: Limitations of water-cement ratio law and its effects on strength of concrete. Admixtures.	8
	Properties of Concrete: Properties in plastic state: Workability, factors affecting workability, measurement, & slumps for placement in various conditions, Segregation, Bleeding and Harshness. Properties in hardened state: Strength, Durability, Impermeability, Dimensional changes;	8

	Proportioning for Normal Concrete: Objectives of mix design, introduction to various grades, are proportioning for nominal mix design as, Adjustment on site for: Bulking of fine aggregate, water absorption of aggregate, workability. Difference between nominal and controlled concrete.	5
Unit-II	**Special Concretes:** Concreting under special conditions, difficulties and precautions before, during and after concreting, Cold weather concreting, under water concreting, Hot weather concreting. Ready mix concrete. Fibre reinforced concrete. Polymer Concrete. Fly ash concrete. Silica fume concrete	10
	Concreting Operations: Storing of Cement, Effect of storage on strength of cement, Determination of warehouse capacity for storage of Cement. Storing of Aggregate, Batching and mixing, selection of proper gauge box, Transportation of concrete, Placement of concrete, Compaction, finishes concrete slabs, Curing: Objective & methods. Jointing: Location of construction joints, treatment of construction joints, expansion joints in buildings - their importance and location. Defects in concrete: Identification of and methods of repair	12

Recommended Books

Author(s)	Title	Publisher
Kulkarni, PD; Ghosh, RK	Text Book of Concrete Technology	Oxford and IBH Publishing, New Delhi
Birinder Singh	Concrete Technology	Kaption Publications
Gupta BL and Gupta Amit	Text Book of Concrete Technology	Standard Publishers Distributors, Delhi
Varshney, RS	Concrete Technology	Oxford and IBH Publishing, New Delhi

Title of the course : Building Construction
Subject Code : OECV-301B

L	T	P	Credits	Weekly Load (hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Learn the different components and classification of building and select a foundation for particular type of building.
CO2: Study the different types of walls, scaffolding, shoring and their constructional methodology.
CO3: Demonstrate the construction details of lintels and arches at appropriate level in building and select different types of doors, windows, floors and stairs cases in building.
CO4: Recognize different parts of roof trusses and drainage system of roofs.
CO5: Identify and select application procedure for different types of surface finishes in building and evaluate the possible reason of dampness at various level in building and remedial means.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	2	2	3	3	3	3	2
CO2	3	1	3	2	3	3	3	2	2
CO3	3	2	3	2	3	3	3	3	3
CO4	3	2	3	2	3	3	3	2	2
CO5	3	2	2	2	3	3	3	3	3
Avg.	3	2	2.6	2	3	3	3	2.6	2.4

Unit	Course Description	Lectures
Unit-I	**Introduction:** Definition of a building, classification of buildings based on occupancy. Different parts of a building.	2
	Foundations: Concept of foundation and its purpose. Types of foundation-shallow and deep: Shallow foundation - constructional details of: Spread foundations for walls, thumb rules for depth and width of foundation and thickness of concrete block, stepped foundation, masonry pillars and concrete columns. Earthwork: Layout/setting out for surface excavation, cutting and filling, Excavation of foundation, trenches, shoring, timbering and de- watering	4

	Walls: Purpose of walls. Classification of walls - load bearing, non-load bearing, dwarf wall, retaining,breast walls and partition walls. Classification of walls as per materials of construction: brick, stone, reinforced brick, reinforced concrete, precast, hollow and solid concrete block and composite masonry walls. Partition walls: Constructional details, suitability and uses of brick and wooden partition.	4
	Masonry: Brick Masonry: Terminology, Bond – meaning and necessity; types of bonds, Construction of brick walls, Expansion and contraction joints, Stone Masonry: Glossary of terms, types of stone masonry, principles to be observed in Construction of stone masonry walls.	5
	Arches and Lintels: Meaning and use. Glossary of terms Arches: Types of Arches and their construction. Lintels: Purpose of lintel, Materials used for lintels, Cast-in-situ and pre-cast lintels, Lintel along with sun-shade.	5
Unit-II	**Doors:** Glossary of terms with neat sketches. Classification based on materials. Different type of doors and windows. Ventilators, sky light window, Louvres shutters, Door and window frames – materials and sections, door closures, hold fasts.	3
	Damp Proofing and Water Proofing: Dampness and its ill effects on bricks, plaster, wooden fixtures, metal fixtures and reinforcement, Damp proofing materials and their specifications.	4
	Floors: Glossary of terms. Types of floor, description with sketches. The methods of construction of concrete, terrazzo and timber floors	3
	Roofs: Types of roofs. False ceilings. Special emphasis on maintenance of slopes, overlaps of roofing materials, applicability and problems of wind ties, size of anchoring bolts	3
	Stairs: Glossary of terms, Classification of staircase. Planning and layout of staircase: Relations between rise and tread, determination of width of stair, landing etc. Various types of layout.	3
	Surface Finishes: Plastering, Pointing, Painting, Selection of appropriate paints/finishes for interior and exterior surfaces. Importance of preparation of surfaces such as hacking, grooving etc before application of surface finishes.	4
	Anti-Termite Measures: Anti-termite treatment of foundations, top surface of earth filling, junction of walls and floors, external perimeter of building and timber. Treatment in existing buildings	4
	Building Services: Introduction to firefighting systems, Ducting for Air-conditioning, service lines for cable telephone, and electrical wiring , garbage disposal systems.	4

Recommended Books

Author(s)	Title	Publisher
Gupta, Sushil Kumar, Singla, DR. and Juneja BM	A Text Book of Building Construction	Katson Publishing House
Rangwala, SC	Building Construction	Anand, Charotar Book
Kulkarni, GJ	A Text Book of Building Construction	Ahmedabad Book Depot

Title of the course : Disaster Preparedness & Planning
Subject Code : OECV-301C

L	T	P	Credits	Weekly Load (hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Learn basic concepts in disaster management.
CO2: Understand definitions and terminologies used in disaster management.
CO3: Study types and categories of disasters.
CO4: Analyse the challenges posed by disasters
CO5: Study the impacts of disasters key skills.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	2	3	3	3	2	2
CO2	3	2	1	2	3	3	3	2	2
CO3	3	3	3	2	3	3	3	3	2
CO4	3	3	3	2	3	3	3	3	2
CO5	3	3	3	2	3	3	3	3	2
Avg.	3	2.6	2.4	2	3	3	3	2.6	2

Unit	Course Description	Lectures
Unit-I	**Introduction:** Concepts and definitions: disaster, hazard, vulnerability, resilience, risks severity, frequency and details, capacity, impact, prevention, mitigation.	7
	Disasters: Disasters classification; natural disasters (floods, draught, cyclones, volcanoes, earthquakes, tsunami, landslides, coastal erosion, soil erosion, forest fires etc.);manmade disasters (industrial pollution, artificial flooding in urban areas, nuclear radiation, chemical spills, transportation accidents, terrorist strikes, etc.); hazard and vulnerability profile of India, mountain and coastal areas, ecological fragility.	9
	Disaster Impacts: Disaster impacts (environmental, physical, social, ecological, economic, political,etc.); health, psycho-social issues; demographic aspects (gender, age, special needs); hazard locations; global and national disaster trends; climate change and urban disasters.	8

Unit-II	**Disaster Risk Reduction (DRR):** Disaster management cycle – its phases; prevention, mitigation, preparedness, relief and recovery; structural and non-structural measures; risk analysis, vulnerability and capacity assessment; early warning systems, Post disaster environmental response (water, sanitation, food safety, waste management, disease control, security, communications); Roles and responsibilities of government, community, local institutions, NGOs and other stakeholders; Policies and legislation for disaster risk reduction, DRR Courses in India and the activities of National Disaster Management Authority.	12
	Disasters, Environment and Development: Factors affecting vulnerability such as impact of developmental projects and environmental modifications (including of dams, land use changes, urbanization etc.), sustainable and environmental friendly recovery; reconstruction an development methods.	12

Recommended Books

Author(s)	Title	Publisher
Iyengar	Natural Hazards in the Urban Habitat	Tata McGraw Hill
Jon Ingleton (Ed)	Natural Disaster management	Tudor Rose, Leicester
Singh B.K	Handbook of disaster management: Techniques & Guidelines	Rajat Publications
R.B. Singh	Disaster Management	Rawat Publications

Title of the course : **Transportation Engineering Lab**
Subject Code : **PCCV-305**

L	T	P	Credits	Weekly Load (Hrs.)
0	0	2	1	2

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO 1: Analyze and determine and the physical properties of bitumen and road aggregates.
CO 2: Learn to conduct and interpret standard tests on different road materials.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	2	3	2	2	2	2	2
CO2	3	3	3	3	3	2	3	3	2
Avg.	3	3	2.5	3	2.5	2	2.5	2.5	2

Practical Exercises:

1. Determination of penetration value of bitumen
2. Determination of softening point of bitumen
3. Determination of ductility of bitumen
4. Determination of impact value of the road aggregate
5. Determination of abrasion value (Los Angeles') of road aggregate
6. Determination of the California bearing ratio (CBR) for the sub-grade soil
7. Visit to Hot mix plant

Title of the course : Fluid Mechanics Lab
Subject Code : PCCV-307

L	T	P	Credits	Weekly Load (hrs.)
0	0	2	1	2

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Analyse to distinguish between different types of fluid motion based on Reynolds number.
CO2: Study to apply Bernoulli's equation to fluid flow problems and boundary layer theory to determine lift and drag forces.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	2	3	3	3	2	2	3	2	1
CO2	2	2	3	3	2	2	3	3	1
Avg.	2	2.5	3	3	2	2	3	2.5	1

Practical Exercises

1. To verify Bernoulli's Theorem
2. To find out Venturimeter coefficient
3. To determine coefficient of velocity (C_v), Coefficient of discharge (C_d) Coefficient of
4. Contraction (Cc) of an orifice and verify the relations between them
5. To perform Reynolds's experiment

a) To verify loss of head in pipe flow due to:
b) Sudden enlargement
c) Sudden contraction
d) Sudden bend

6. To determine coefficient of discharge of a rectangular notch/triangular notch.
7. To determine the viscosity by using redwood viscometer.

Title of the course : Design and Drawing of Steel Structures
Subject Code : PCCV-302

L	T	P	Credits	Weekly Load (hrs.)
3	1	0	4	4

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Understand the structural properties of steel and its designation as per Indian Standards different types of joints.
CO2: Analyze and design single and double angle section struts and I section compression members.
CO3: Learn about different types of trusses, their different components and usability.
CO4: Analyze and design of simply supported steel beams.
CO5: Identify various types of plate girders and prepare drawings of plate girder from given design data.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	3	2	3	3	3	1
CO2	3	3	3	2	1	3	3	3	2
CO3	3	2	1	2	1	3	3	2	2
CO4	3	3	3	3	1	3	3	3	1
CO5	3	2	2	2	2	3	3	3	2
Avg.	3	2.4	2.2	2.4	1.4	3	3	2.8	1.6

Unit	Course Description	Lectures
Unit-I	**Structural Steel and Sections:** Properties of structural steel as per IS Code. Designation of structural steel sections as per IS handbook and IS:800	4
	Riveted Connections: Types of rivets, permissible stresses in rivets, types of riveted joints, specifications for riveted joints as per IS 800. Failure of a riveted joint. Assumptions in the theory of riveted joints. Strength and efficiency of a riveted joint. Design of riveted joints for axially loaded members (No Staggered riveting).	9
	Welded connections: Types of welds and welded joints, advantages and disadvantages of welded joints design of fillet and butt weld. Plug and slot welds (Descriptive No numerical on plug and slot welds)	9
	Tension Members: Analysis and design of single and double section tension members and their riveted and welded connections with gusset plate as per IS:800	9
	Compression Members: Analysis and design of single and double angle sections compression members (struts) and their riveted and welded connections with gusset plate as per BIS:800	9

Unit-II	**Roof Trusses:** Form of trusses, pitch of roof truss, spacing of trusses, spacing of purlins, connection between purlin and roof covering. Connection between purlin and principal rafter (no design, only concept)	6
	Columns: Concept of buckling of columns, effective length and slenderness ratio, permissible stresses in compression as per IS: 800 for different end conditions. Analysis and Design of axially loaded single section steel column. Types of column bases (Descriptive only). Beam and column, frame and seated connections (descriptive only, no design)	9
	Beams: Analysis and design of single section simply supported laterally restrained steel beams. Introduction to plate girder and functions of various elements of a plate girder Fabrication and Erection of Steel Structures like trusses, columns and girders. Masonry structures – Design of brick column and wall foundations	9

Recommended Books:

Author(s)	Title	Publisher
Duggal, SK	Design of Steel Structures	Standard Publishers
Birinder Singh	Steel Structures Design and Drawing	Kaption Pub.house
Ram Chandra	Design of Steel Structures	Standard Publishers
LS Negi	Design of Steel Structure	Tata McGraw Hill

Title of the course : **Quantity Surveying and Valuation**
Subject Code : **PECV-302A**

L	T	P	Credits	Weekly Load (hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Analyse and calculate quantities of material required for construction of foundation and living room
CO2: Study and prepare detailed and abstract of estimates from drawings
CO3: Study to calculate rate per cubic meter for concrete work, brick work, plastering etc. inconstruction
CO4: Prepare tender document and contract for different civil engineering works in practice
CO5: Understand principles of valuation for current and future valuation of a building

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	3	2	1	3	3	3	1
CO2	3	3	3	1	1	3	3	3	2
CO3	3	3	3	2	1	3	3	3	2
CO4	3	3	3	2	1	3	3	2	2
CO5	3	3	3	1	1	3	3	3	3
Avg.	3	3	3	1.6	1	3	3	2.8	2

Unit	Course Description	Lectures
Unit-I	**Introduction:** Quantity surveying and its importance. Duties of quantity surveyor, types of estimates Detailed estimates: Definition, Stages of preparation – details of measurement and calculation of quantities and abstract, Units of measurement for various items of work as per BIS:1200. Rules for measurements. Different methods of taking out quantities – centre line method and long wall and short wall method.	8
	Preparation of Detailed and Abstract Estimates from Drawings for: A small residential building with a flat roof comprising of- Two rooms with W.C., bath, kitchen and verandah. Earthwork for unlined channel. WBM road and pre-mix carpeting. Single span RCC slab culvert. Earthwork for plain and hill roads. RCC work in beams, slab, column and lintel, foundations. 10 users' septic tank.	7
	Calculation of quantities of materials for: Cement mortars of different proportion, Cement concrete of different proportion, Brick/stone masonry in cement mortar, Plastering and pointing, White washing, painting.	7

	Analysis of Rates: Steps involved in the analysis of rates. Requirement of material, labor, sundries, contractor's profit and overheads. Analysis of rates for finished items when data regarding labour, rates of material and labour is given: Earthwork in excavation in hard/ordinary soil and filling with a concept of lead and lift, RCC in roof slab/beam/lintels/columns, Brick masonry in cement mortar, Cement Plaster, White washing, painting. Running and maintenance cost of construction equipment.	8
	Contractor ship: Meaning of contract. Qualities of a good contractor and their qualifications. Essentials of a contract. Types of contracts, their advantages, dis-advantages and suitability, system of payment. Single and two cover-bids; tender, tender forms and documents, tender notice, submission of tender and deposit of earnest money, security deposit, retention money, maintenance period. Classification and types of contracting firms/construction companies.	6
Unit-II	**Preparation of Tender Document based on Common Schedule Rates (CSR):** Introduction to CSR and calculation of cost based on premium on CSR. Exercises on writing detailed specifications of different types of building works from excavation to foundations, superstructure and finishing operation. Exercises on preparing tender documents for the following:- Earth work, Construction of a small house as per given drawing, RCC works, Pointing, plastering and flooring, White-washing, distempering and painting, Wood work including polishing, Sanitary and water supply installations, False ceiling, aluminum partitioning, Tile flooring.	6
	Valuation: Purpose of valuation, principles of valuation. Definition of various terms related to valuation like depreciation, sinking fund, salvage and scrap value, market value, fair rent, year's purchase etc. Methods of valuation (i) replacement cost method (ii) rental return method	6

Recommended Books:

Author(s)	Title	Publisher
Pasrija, HD, Arora, CL and S. Inderjit Singh	Estimating, Costing and Valuation (Civil)	New Asian Publishers
Rangwala, S.CAnand	Estimating and Costing	Charotar BookStall
Mahajan Sanjay	Estimating and Costing	Satya Parkashan, Delhi
Chakraborti, M	Estimating, Costing and Specification in Civil Engineering	Calcutta

Title of the course : **Basics of Green Building**
Subject Code : **PECV-302B**

L	T	P	Credits	Weekly Load (Hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Understand basic concepts of sustainability and its impact on the environment and planning.
CO2: Explain building science aspects like energy use, materials, and indoor air quality.
CO3: Identify sustainable materials including traditional and recycled options.
CO4: Apply green design practices in water, waste, and energy management.
CO5: Evaluate green building rating systems and analyze case studies in India and abroad.

CO/PO Mapping:(Strong (3)/Medium (2)/Weak (1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	2	3	2	3	3	1
CO2	3	2	3	3	3	2	3	2	2
CO3	3	3	3	3	3	2	3	3	3
CO4	3	2	3	2	3	2	3	2	2
CO5	3	2	3	3	3	2	3	3	3
Avg.	3	2.2	2.8	2.6	3	2	3	2.6	2.2

Unit	Course Description	Lectures
Unit-I	**Introduction to green building:** Introduction to the ideas, issues and concepts of sustainable planning, global environment and the built environment, principles of environmentally and ecologically supportive planning.	8
	Building Science Fundamentals: General features- Use of energy, materials, health and global environment, indoor air quality as related to the construction and operation of buildings.	8
	Green materials: Traditional and Recycled Materials in context of Sustainability	8
	Green Design: Sustainable and conservation practices – water conservation, harvesting and recharge – Traditional and Modern Methods sewerage treatment, solid waste treatmentSolid and Liquid Waste Management, (with special reference to energy efficiency, recycling and re-use) , economics and management	8
Unit-II	**Overview of Green Building rating systems:** USGBC, TERI-GRIHA and LEED rating systems	8
	Case studies on specific contemporary sustainable practices: Case studies on green practices of abroad countries, Case studies on green practices in India countries,contemporary and famous examples of sustainable / energy efficient architecture / settlement planning across the world.	8

Recommended Books:

Author	Title	Publisher
R.K .Gautham	Green homes : Efficient,Healthyand Smart	BS publications,2009

Title of the course : **Earthquake Resistant Building Construction**
Subject Code : **PECV-304A**

L	T	P	Credits	Weekly Load (Hrs.)
3	1	0	4	4

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO 1: Understand seismic principles.
CO 2: Analyze building behavior under seismic loads.
CO 3: Use and implement seismic design codes in design.
CO 4: Incorporate seismic strengthening and retrofitting measures.
CO 5: Implement disaster management strategies.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	2	2	2	3	2	1
CO2	3	3	3	3	1	2	3	3	2
CO3	3	3	3	3	2	2	3	3	2
CO4	3	3	3	3	3	3	3	3	3
CO5	3	2	3	3	3	3	3	3	3
Avg.	3	2.6	2.8	2.8	2.2	2.4	3	2.8	2.2

Unit	Course Description	Lectures
Unit-I	**Elements of Engineering Seismology:** General features of tectonic of seismic regions. Causes of earthquakes, Seismic waves, earthquake size (magnitude and intensity), Epicentre, Seismograph, Classification of earthquakes, Seismic zoning map of India,Static and Dynamic Loading, Fundamental period. Seismic Behavior of Traditionally- Built Constructions of India. Performance of building during earthquakes and Mode of failure (Out-of-plane failure, in-plane failure, Diaphragm failure, Connection failure, Non-structural components failure). Special construction method, tips and precautions to be observed while planning, designing and construction of earthquake resistant building	24
Unit-II	**Introduction to IS: 4326, IS: 13828, IS: 1893(Part 1), 154326 and IS: 13920 (latest edition).** Seismic Provision of Strengthening and Retrofitting Measures for Traditionally-Built Constructions, Brick and RCC Structures. Provision of reinforcement detailing in masonry and RC constructions. Disaster Management: Disaster rescue, psychology of rescue, rescue workers, rescue plan, rescue by steps, rescue equipment, safety in rescue operations, debris clearance and causality management.	24

Recommended Books:

Author(s)	Title	Publisher
Jai Krishana & AR Chandersekaran	Elements of Earthquake Engineering	Sarita Parkashan Meerut
RL Weigel	Earthquake Engineering	Prentice Hall Inc.
BL Gupta and NL Arora	Building Construction	Satya Prakashan

Title of the course : Construction Management and Accounts
Subject Code : PECV-304B

L	T	P	Credits	Weekly Load (hrs.)
3	1	0	4	4

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Study the significance and main objectives of construction management and identify the functions of construction management and the roles of key stakeholders in the construction team.
CO2: Develop construction plans using bar charts and network techniques (PERT/CPM).
CO3: Organize a construction site efficiently and implement effective methods for monitoring project progress, analyzing deviations, and taking corrective actions.
CO4: Apply principles of inspection and quality control for various construction activities and identify common causes of construction accidents and implement safety measures for various construction tasks.
CO5: Understand and navigate the public works accounting system, including technical sanction, budget, accounts, and bill preparation.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	3	2	3	3	3	1	2
CO2	3	3	3	2	3	3	3	3	2
CO3	3	2	3	2	3	3	3	2	2
CO4	3	2	3	2	3	3	3	2	2
CO5	3	2	3	2	3	3	3	3	2
Avg.	3	2.6	3	2	3	3	3	2.2	2

Unit	Course Description	Lectures
Unit-I (Construction Management)	**Introduction:** Significance & main objectives of construction management. Functions of construction management, The construction team: owner, engineer, architect and contractors, their functions and inter-relationship	3
	Construction Planning: Stages of construction planning, Scheduling construction works by bar charts- Definition of activity, identification of activities though, Preparation of barcharts for simple construction work, Preparation of schedules for labour, materials, machinery and finances for small works, Limitations of bar charts. Scheduling by network techniques- Introduction to network techniques; PERT and CPM, differences between PERT and CPM terminology	5
	Site Organization: Principle of storing and stacking materials at site. Location of equipment. Preparation of actual job layout for a building. Organizing labour at site	4

	Control of Progress: Methods of recording progress. Analysis of progress. Taking corrective actions, keeping head office informed. Cost time optimization for simple jobs - Direct and indirect cost, variation with time, cost optimization	4
	Inspection and Quality Control: Need for inspection and quality control. Principles of inspection. Stages of inspection and quality control for- Earth work, Masonry, RCC, Sanitary and water supply services	4
	Accidents and Safety in Construction: Accidents – causes and remedies. Safety measures for- Excavation work, Drilling and blasting, Hot bituminous works, Scaffolding, ladders, form work, Demolitions. Safety campaign and safety devices	4
Unit-II (Accounts)	**Public Work Accounts:** Introduction, technical sanction, allotment of funds, re-appropriation of funds bill, contractor ledger, measurement book running and final account bills complete, preparation of bill of quantities (BOQ), completion certificate & report, hand receipt, aquittance roll. Muster roll labour, casual labour roll-duties and responsibility of different cadres, budget-stores, returns, account of stock, misc. P.W. advances T & P – verification, survey report, road metal material charged direct to works, account - expenditure & revenue head, remittance and deposit head, definition of cash, precaution in custody of cash book, imprest account, temporary advance, treasury challan, preparation of final bills.	24

Recommended Books:

Author(s)	Title	Publisher
Shriath, LS	PERT and CPM- Principles and Applications	East West Press
Harpal Singh	Construction Management & Accounts	Tata McGraw Hill
Gahlot PS; Dhir, BM	Construction Planning & Management	Wiley Eastern Ltd.

Title of the course : Road Safety
Subject Code :OECV-302A

L	T	P	Credits	Weekly Load (hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Know the fundamentals of road safety and road safety audit.
CO2: Learn various road safety techniques, measures and their applications
CO3: Analyze and evaluate various road safety measures
CO4: Analyze and examine the road accident data and various mitigation measures.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	3	2	3	3	3	2	2
CO2	3	3	3	2	3	3	3	3	2
CO3	3	3	2	2	3	3	3	3	3
CO4	3	3	3	2	3	3	3	3	3
Avg.	3	2.75	2.75	2	3	3	3	2.75	2.5

Unit	Course Description	Lectures
Unit-I	**Road Accidents:** Causes of road accidents: Vehicle design factors & Driver characteristic s influencing road safety, Road condition, Parking and its influence on traffic safety	12
	Road safety measures: Accident data collection methods; Representation of accident data: Collision and condition diagram; Methods to Identify and PrioritizeBlack spots; Road safety measures	11
Unit-II	**Road safety audits:** Key elements in Road safety audit; Road safety audit procedure and investigations; Role of ITS in Road safety	10
	Ensuring Traffic Safety in Road Operation: -Ensuring Traffic Safety during Repair and Maintenance, Prevention of Slipperiness and Influence of Pavement Smoothness, Restriction speeds on Roads, Safety of Pedestrians, Cycle Paths, Informing Drivers on Road Conditions with Aid of Signs, Traffic Control Lines & Guide Posts, Guardrails & Barriers and Road Lighting	15

Recommended Books

Author(s)	Title	Publisher
BABKOV, V.F	Road conditions and Traffic Safety	MIR, publications, Mascow - 1975.
Kadiyali, L.R	Traffic Engineering and Transport Planning'	Khanna Publications
Khanna and Justo	Text book of Highway Engineering	Nemchand Brothers, Roorkee,2001

Title of the course : Repairs & Rehabilitation of structure
Subject Code : OECV-302B

L	T	P	Credits	Weekly Load (hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Understand the cause of deterioration of concrete structures.
CO2: Assess the damage for different types of structure.
CO3: Learn the principles of repair and rehabilitation of structures.
CO4: Recognize the ideal material for different repair and retrofitting techniques.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	2	3	3	3	3	2
CO2	3	3	2	2	3	3	3	3	2
CO3	3	2	2	2	3	3	3	3	3
CO4	3	3	2	2	3	3	3	3	3
Avg.	3	2.5	2	2	3	3	3	3	2.5

Unit	Course Description	Lectures
Unit-I	**Introduction to Rehabilitation of Structures**: Aging of Structures, Performance of Structures, need for rehabilitation of structural members, Maintenance, Facets of Maintenance, Importance of Maintenance, Various aspects of Inspection, Assessment procedure for evaluating a damaged structure, Causes of deterioration.	7
	Evaluation and Deterioration of Concrete Buildings: Visual Integration, Destructive Testing Systems, Non Destructive Testing Techniques, Semi Destructive Testing Techniques, Chemical Testing, Embedded Metal Corrosion, Disintegration Mechanisms, Moisture Effects, Thermal effects, Structural effects, Faulty construction, Distress in structure due to corrosion, fire, leakage, earthquake and effects, case studies, damage assessment and evaluation models.	10
	Strength and Durability of Concrete: Quality assurance for concrete – Strength, Durability and Thermal properties of concrete – Cracks, different types, causes – Effects due to climate, temperature, Sustained elevated temperature, Corrosion – Effects of cover thickness and cracking, Methods of corrosion protection, Corrosion inhibitors, corrosion resistant steels, coatings, and cathodic protection, Special concretes -- Polymer concrete, Sulphur infiltrated concrete, Fiber reinforced concrete, High strength concrete, High performance concrete, Vacuum concrete, Self-compacting concrete, Geo-polymer concrete, Reactive powder concrete, Concrete made with industrial wastes.	12

Unit-II	**Surface Repair and Retrofitting:** Strategy and Design, Selection of Repair Materials, Surface Preparation, Bonding Repair Materials to existing concrete, Placement methods, Epoxy bonded replacement concrete, Preplaced aggregate concrete, Shotcrete/ Gunite, Grouting, Injection Grouting, Micro concrete, Mortar repair for cracks, shoring and underpinning.	11
	Strengthening Techniques and Seismic Rehabilitation: Beam Shear Capacity Strengthening, Shear Transfer Strengthening between members, Column Strengthening, Flexural Strengthening and Crack Stabilization, Seismic strengthening of structures, Guidelines for Seismic Rehabilitation, Seismic Vulnerability and Strategies for Seismic Retrofit.	8

Recommended Books

Author(s)	Title	Publisher
mended Books: 1. R.T. Allen and SC Edwards	Repair of Concrete Structures	Blakie and Sons, 1987
Emmons, P.H.	Concrete Repair and Maintenance	Galgotia Publication,2001
Ravishankar. K, Krishnamoorthy. T.S,	Structural Health Monitoring, Repair and Rehabilitation of Concrete Structures	Allied Publishers, 2004
Malhotra, V.M. and Carino, N.J.	Handbook on Non Destructive Testing of Concrete	CRC press, 2004

Title of the course : **Solid and Hazardous Waste Managements**
Subject Code : **OECV-302C**

L	T	P	Credits	Weekly Load (hrs.)
3	0	0	3	3

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Understand the components of solid waste management system.
CO2: Learn the significance of recycling, reuse and reclamation of solid wastes.
CO3: Develop an insight into the collection, transfer, and transport of municipal solid waste.
CO4: Understand the importance and operation of a various facilities for resource recovery and waste disposal.

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	2	2	2	3	3	3	2	2
CO2	3	3	2	2	3	3	3	3	1
CO3	3	2	2	2	3	3	3	3	2
CO4	3	3	2	2	3	3	3	3	3
Avg.	3	2.5	2	2	3	3	3	2.75	2

Unit	Course Description	Lectures
Unit-I	**Introduction:** Definition of solid wastes and hazardous wastes, Nuisance potential and extent of solid waste problems, Objectives and scope of integrated solid waste management.	6
	Collection, Storage and Transportation of Wastes: Types of collection systems and their components, Concept of waste segregation at source and recycling and reuse of wastes.	8
	Solid Waste Processing and Treatment: Waste processing – processing technologies – biological and chemical conversion technologies–Composting-thermal conversion technologies-energy recovery.	10
Unit-II	**Hazardous Waste Treatment and Disposal:** Biological and chemical treatment of hazardous wastes; Solidification and stabilization of wastes; Incineration for the treatment and disposal of hazardous wastes; Land farming; Landfill disposal of hazardous waste; Bioremediation of hazardous waste disposal sites.	11
	Sanitary Landfills: Design, development, operation and closure of landfills, Management of leachate and landfill gases, environmental monitoring of landfill sites.	7
	Legal Requirements: Municipal solid waste rules; Hazardous waste rules; Biomedical waste rules; E-waste rules; Rules related to recycled plastics, used batteries, flyash, etc.	6

Recommended Books

Author(s)	Title	Publisher
Pichtel, J.	Waste Management Practices– Municipal, Hazardous and Industrial	CRC Press
Vesilind, P.A	Solid Waste Engineering	Thomson Learning Inc
Tchobanoglous, G., Vigil, S.A. and Theisen, H.	Integrated Solid Waste Management: Engineering Principles and Management Issues	McGraw Hill
HowardS. Peavy, Donald R. Rowe & George Tchobanoglous	Environmental Eng.	McGraw Hill

Title of the course : **Design and Drawing of Steel Structures Lab**
Subject Code : **PCCV304**

L	T	P	Credits	Weekly Load (hrs.)
0	0	2	1	2

COURSE OUTCOMES: After successful completion of course, the students should be able to
CO1: Study the structural properties of steel and its designation as per Indian Standards different types of joints
CO2: Analyze and design single and double angle section struts and I section compression members

CO/PO Mapping:(Strong(3)/Medium(2)/Weak(1)indicates strength of correlation):									
CO/PO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PSO1	PSO2
CO1	3	3	3	2	1	3	3	3	2
CO2	3	3	3	2	1	3	3	3	2
Avg.	3	3	3	2	1	3	3	3	2

Practical Exercises:

1. Drawing No. 1: Roof Truss – Drawing of Fink Roof Truss with details of joints, fixing details of purlins and roof sheets.
2. Drawing No.2: Column and Column Bases - Drawing of splicing of steel columns. Drawings of slab base, gusseted base and grillage base for single section steel columns.
3. Drawing No.3: Column Beam Connections
   (a) Sealed and Framed Beam to Beam Connections
   (b) Sealed and Framed Beam o Column Connections
4. Drawing No. 4: Plate Girder (Bolted)

Plan and Elevation of Plate Girder with details at supports and connection of stiffness, flange angles and cover plate with web highlighting curtailment of plates.

Dr. Daljit Singh
Guest Faculty

Dr. Pavitar Singh
Guest Faculty

Dr. Shilpa Singla
AP Contractual

Dr. Deepak Swami
AsP, IIT, Jodhpur

Dr. Sagar Rohidas Chavan
AsP , IIT, Ropar

Dr. Dericks Praise Shukla
AsP, IIT, Mandi

Dr. Rajinder Ghai
S.E, Water Resource Deptt.

Dr. Prem Pal Bansal
Prof.,TIET, Patiala

11/07/2025
Dr. Shankar Singh
HOD (Civil)