REVISED DIPLOMA CURRICULUM OF CIVIL ENGINEERING (PART II)

For the State of Meghalaya
(SEPTEMBER, 2023)

National Institute of Technical Teachers' Training & Research
Block – FC, Sector – III, Salt Lake City, Kolkata – 700 106

Semester - III

SL. No	Category of Course	Code No	Course Title	Pre-requisite	Contact Hours/ week			Theory				Practical			Total Marks	Credits
					L	T	P	End Exam	Class Test	Assign ment	Attend ance	End Exam	Session al	Viva voce		
1	Program Core	CEPC201	Building Materials and Construction	-	4	0	0	60	20	15	5				100	4
2		CEPC203	Basic Surveying	-	2	0	0	60	20	15	5	-	-	-	100	2
3		CEPC205	Mechanics of Material	ES 106	2	0	0	60	20	15	5	-	-	-	100	2
4		CEPC207	Concrete Technology	-	2	0	0	60	20	15	5	-	-	-	100	2
5		CEPC209	Geotechnical Engineering	CEPC205	3	0	0	60	20	15	5	-	-	-	100	3
6		CEPC211	Construction Material Lab	-	0	0	2	-	-	-	-	40	40	20	100	1
7		CEPC213	Basic Surveying Lab	-	0	0	2	-	-	-	-	40	40	20	100	1
8		CEPC215	Mechanics of Material Lab	ES 112	0	0	2	-	-	-	-	40	40	20	100	1
9		CEPC217	Concrete Technology Lab	_	0	0	2	-	-	-	-	40	40	20	100	1
10		CEPC219	Geotechnical Engineering Lab	_	0	0	2	-	-	-	-	40	40	20	100	1
11	Summer Internship	SI201**	Summer Internship-I(4weeks) after IInd Semester	_	0	0	0	-	-	-	-	40	40	20	100	2
	TOTAL				13	0	10	300	100	75	25	240	240	120	1100	20

** Internship will be conducted for minimum 3 weeks duration

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Semester – IV

SL. No	Category of Course	Code No	Course Title	Pre-requisite	Contact Hours/ week			Theory				Practical			Total Marks	Credits
								End Exam	Progressive Assessment			End Exam	Progressive Assessment			
					L	T	PC		Class Test	Assign ment	Attenda nce		Sessional	Viva voce		
1	Program Core	CEPC202	Hydraulics	-	2	0	0	60	**20**	**15**	**5**	-	-	-	**100**	2
2		CEPC204	Advanced Surveying	CEPC 203	2	0	0	60	**20**	**15**	**5**	-	-	-	**100**	2
3		CEPC206	Theory of Structures	CEPC 205	3	0	0	60	**20**	**15**	**5**	-	-	-	**100**	3
4		CEPC208	Building Planning and Drawing Lab	ES101	1	0	4	_	-	-	-	60	35	5	**100**	3
5		CEPC210	Water Resource Engineering	-	2	0	0	60	**20**	**15**	**5**	-	-	-	**100**	2
6		CEPC212	Transportation Engineering	-	2	0	0	60	**20**	**15**	**5**	-	-	-	**100**	2
7		CEPC214	Hydraulics Lab	-	0	0	2	-	-	-	-	40	40	20	**100**	1
8		CEPC216	Advanced Surveying Lab	CEPC 213	0	0	2	-	-	-	-	40	40	20	**100**	1
9		CEPC218	Water Resource Engineering Lab	-	0	0	2	-	-	-	-	40	40	20	**100**	1
10		CEPC220	Transportation Engineering Lab	-	0	0	2	-	-	-	-	40	40	20	**100**	1
11	Program Elective	CEPE202	A. Construction Management B. Precast and Prestressed Concrete C. Rural Construction Technology	-	2	0	0	60	**20**	**15**	**5**	-	-	-	**100**	2
12	Minor Project	PR202	Minor Project	-	**0**	**0**	**4**	-	-	-	-	40	40	20	**100**	**2**
13	Mandatory course	AU202	Essence of Indian Knowledge and Tradition	-	2	0	0	0	**0**	**0**	**0**	**0**	**0**	**0**	**0**	0
	TOTAL				**16**	**0**	**16**	**360**	**120**	**90**	**30**	**260**	**235**	**105**	**1200**	**22**

Semester – V

SL. No	Category of Course	Code No	Course Title	Pre-requisite	Contact Hours/ week			Theory				Practical			Total Marks	Credits
					L	T	P	End Exam	Class Test	Assignment	Attendance	End Exam	Sessional	Viva voce		
1	Program Core	CEPC301	Design of steel and RCC Structures	CEPC 205, 206	3	0	0	60	20	15	5	-	-	-	100	3
2		CEPC303	Estimating costing and valuation	-	3	1	0	60	20	15	5	-	-	-	100	4
3		CEPC305	Design of steel and RCC structures lab	-	0	0	2	-	-	-	-	40	40	20	100	1
4	Program Elective	CEPE301	Elective –II (Adv. Const. Tech)	-	3	0	0	60	20	15	5	-	-	-	100	3
5		CEPE303	Elective –III (Building Services & Maintenance)	-	3	0	0	60	20	15	5	-	-	-	100	3
6	Open Elective	CEOE301	Open elective - I (Disaster Management)	-	2	0	0	60	20	15	5	-	-	-	100	2
7	Internship	CESI301	Summer internship-II, after IVth. Sem	-	0	0	0	-	-	-	-	40	40	20	100	3
8	Major project	PR302	Major project	-	0	0	2	-	-	-	-	Assessment to be done, credit to be carried over			##
		TOTAL			14	2	4	300	100	75	25	80	80	40	700	19

$$ Internship will be conducted for minimum 4 weeks
credit of Major Project to be carried over to VI sem.

Semester – VI

SL. No	Category of Course	Code No	Course Title	Pre-requisite	Contact Hours/ week			Theory				Practical			Total Marks	Credits
					L	T	P	End Exam	Class Test	Assignment	Attendance	End Exam	Sessional	Viva voce		
1	Program Core	CEPC302	Public health Engineering	CEPC207	2	0	0	60	20	15	5	-	-	-	100	2
2		CEPC304	Public health engineering lab	-	0	0	2					40	40	20	100	1
3	Program Elective	CEPE306	Elective-IV (Tendering and accounts)	-	3	0	0	60	20	15	5	-	-	-	100	3
4	Hum & Soc. Sc.	HS302	Entrepreneurship and start-ups	-	3	1	0	60	20	15	5	-	-	-	100	4
5	Open Elective	CEOE302	Open Elective - II (Sustainable Development)	-	3	0	0	60	20	15	5	-	-	-	100	3
6		CEOE304	Open Elective - III (Renewable Energy Technologies)	-	3	0	0	60	20	15	5	-	-	-	100	3
7	Mandatory	AU302	Indian constitution	-	2	0	0	-	-	-	-				0	0
8	Major Project	PR302	Major Project	-	0	0	6	-	-	-	-	100	50	50	200	4##
9	Seminar	SE302	Seminar	-	1	0	0	-	-	-	-	0	50	50	100	1
	TOTAL				**16**	**1**	**8**	**300**	**100**	**75**	**25**	**140**	**140**	**120**	**900**	**21**

List of Programme Elective Courses [PE]

SL. No.	Code No.	Course Title	Hours per week			Semester	Credits
			L	T	P		
Elective I (any one to be selected)							
1.	CEPE202	Precast and Prestressed Concrete	3	0	0	IV	3
2.	CEPE204	Construction Management	3	0	0	IV	3
3.	CEPE206	Rural construction Technology	3	0	0	IV	3
Elective II (any one to be selected)							
1.	CEPE301	Traffic Engineering	3	0	0	V	3
2.	CEPE303	Solid waste Management	3	0	0	V	3
3.	CEPE305	Advanced Construction Technology	3	0	0	V	3
Elective III (any one to be selected)							
1.	CEPE307	Pavement Design & Maintenance	3	0	0	V	3
2.	CEPE309	Green Building and Energy Conservation	3	0	0	V	3
3.	CEPE311	Buildings Services and Maintenance	3	0	0	V	3

		Elective IV (any one to be selected)					
1.	CEPE302	Repairs and Maintenance of Structures	3	0	0	VI	3
2.	CEPE304	Advanced Design of Structures	3	0	0	VI	3
3.	CEPE306	Tendering and Accounts	3	0	0	VI	3
		Total credits					12

OPEN ELECTIVE COURSES (OE)

Sl. No.	Code No.	Course Title	Hours Per week			Semester	Credits
			L	T	P		
1.	**OE # # #	Economic Policies in India	3	0	0	V / VI	3
2.	**OE # # #	Artificial Intelligence & Machine Learning	3	0	0	V / VI	3
3.	**OE # # #	Soft Computing Techniques?	3	0	0	V / VI	3
4.	**OE # # #	Project Management	3	0	0	V / VI	3
5.	**OE # # #	Renewable Energy Technologies	3	0	0	V / VI	3
6.	**OE # # #	Energy Conservation & Audit	3	0	0	V / VI	3
7.	**OE # # #	Product Design	3	0	0	V / VI	3
8.	**OE # # #	Engineering Economics & Accountancy	3	0	0	V / VI	3
9.	**OE # # #	Operations Research	3	0	0	V / VI	3
10.	**OE # # #	Renewable Energy Technologies	3	0	0	V / VI	3
11.	**OE # # #	Energy Efficiency and Audit	3	0	0	V / VI	3
12.	**OE # # #	Web Designing and Multimedia Technology (*)	3	0	0	V / VI	3

13.	**OE # # #	History of Science and Engineering (*)	3	0	0	V / VI	3
14.	**OE # # #	Internet of Things	3	0	0	V / VI	3
15.	**OE # # #	Professional Orientation (*)	3	0	0	V / VI	3
16.	**OE # # #	Disaster Management	3	0	0	V / VI	3
17.	**OE # # #	Sustainable Development (*)	3	0	0	V / VI	3
18.	**OE # # #	Smart Systems(*)	3	0	0	V / VI	3
19.	**OE # # #	Robotics (*)	3	0	0	V / VI	3
20.	**OE # # #	Introduction to E- Governance (*)	3	0	0	V / VI	3
21.	**OE # # #	Cyber Security Laws, Standards and IPR(*)	3	0	0	V / VI	3
22.	**OE # # #	Organic and Natural Farming Practices (*)	3	0	0	V / VI	3
23.	**OE # # #	Classical Text Reading (*)	3	0	0	V / VI	3
24.	**OE # # #	3-D Printing (*)	3	0	0	V / VI	3
25.	**OE # # #	Virtual Reality (*)	3	0	0	V / VI	3
26.	**OE # # #	Mechatronics	3	0	0	V / VI	3
27.	**OE # # #	Artificial Intelligence	3	0	0	V / VI	3

SEMESTER - III COURSES

BUILDING MATERIALS & CONSTRUCTION

L	T	P		Course Code No.: **CEPC 201**
4	0	0		
Total Contact hrs.: Lecture:60 Tutorial:0 Practical: 0 **Credit : 4**			**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE

This course has been designed for the students to know properties of different materials for use and quality control in construction works as per IS code of practice. Further, practical input has been given for augmenting the learning by the students.

LEARNING OUTCOMES

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

- Describe various construction materials, and their relevant characteristics.
- Identify suitability of various materials for different construction purposes.
- Explain natural and artificial materials available for various purposes of construction activities.
- Identify different components of building.
- Explain different types of foundation and their significance.
- Compare different types of masonry and their construction.
- Explain the importance of communications in building planning.

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT-I	**Overview of Construction Materials** • Scope of construction materials in Building Construction, Transportation Engineering, Environmental Engineering, and Irrigation Engineering (applications only). • Selection of materials for different civil engineering structures on the basis of strength, durability, Eco friendly and economy. • Broad classification of materials –, Natural, Artificial,	5

		special, finishing and recycled.	
UNIT-II	**Natural Construction Materials**		**7**
	- Requirements of good building stone; general characteristics of stone; quarrying and dressing methods and tools for stone. - Structure of timber, general properties and uses of good timber, different methods of seasoning for preservation of timber, defects in timber, use of bamboo in construction. - Asphalt, bitumen and tar used in construction, properties and uses. - Properties of lime, its types and uses. - Types of soil and its suitability in construction. - Properties of sand and uses - Classification of coarse aggregate according to size		
UNIT-III	**Artificial Construction Materials**		**10**
	- Constituents of brick earth, Conventional / Traditional bricks, Modular and Standard bricks, Special bricks – fly ash bricks, Characteristics of good brick, Field tests on Bricks, Classification of burnt clay bricks and their suitability, Manufacturing process of burnt clay brick, fly ash bricks, Aerated concrete blocks. - Flooring tiles – Types, uses - Manufacturing process of Cement - dry and wet (only flow chart), types of cement and its uses. field tests on cement. - Pre-cast concrete blocks- hollow, solid, pavement blocks, and their uses. - Plywood, particle board, Veneers, laminated board and their uses. - Types of glass: soda lime glass, lead glass and borosilicate glass and their uses. - Ferrous and non-ferrous metals and their uses.		
UNIT-IV	**Overview of Building Components**		**8**
	- Classification of Buildings as per National Building Code Group A to I, as per Types of Constructions- Load Bearing Structure, Framed Structure, Composite Structure. - Building Components - Functions of Building Components, substructure – Foundation, Plinth. - Superstructure – Walls, Partition wall, Cavity wall, Sill, Lintel, Doors and Windows, Floor, Mezzanine floor, Roof, Columns, Beams, Parapet.		
UNIT-V	**Construction of Substructure**		**10**
	Job Layout: Site Clearance, Layout for Load Bearing Structure and Framed Structure by Center Line and		

	Face Line Method, Precautions.		

- Earthwork: Excavation for Foundation, Timbering and Strutting, Earthwork for embankment, Material for plinth Filling, Tools and plants used for earthwork.
- Foundation: Functions of foundation,
- Types of foundation – Shallow Foundation, Stepped Footing, Wall Footing, Column Footing, Isolated and Combined Column Footing, Raft Foundation, Grillage Foundation.
- Deep Foundation - Pile Foundation, Well foundation and Cais- sons, Pumping Methods of Dewatering, Deep wells, Well points, Cofferdams (Introduction only).

UNIT-VI	**Construction of Superstructure**	**8**	

- **Stone Masonry:** Terms used in stone masonry-facing, backing, hearting, through stone, corner stone, cornice. Types of stone masonry: Rubble masonry, Ashlar Masonry and their types. Joints in stone masonry and their purpose. Selection of Stone Masonry, Precautions to be taken in Stone Masonry Construction.

- **Brick masonry:** Terms used in brick masonry-header, stretcher, closer, quoins, course, face, back, hearting, bat bond, joints, lap, frog line, level and plumb. Bonds in brick masonry- header bond, stretcher bond, English bond and Flemish bond. Requirements of good brick masonry. Junctions in brick masonry and their purpose and procedure. Precautions to be observed in Brick Masonry Construction. Comparison between stone and Brick Masonry. Tools and plants required for construction of stone and brick masonry. Hollow concrete block masonry and composite masonry.

- **Scaffolding and Shoring:** Purpose, Types of Scaffolding, Process of Erection and Dismantling. Purpose and Types of Shoring, Underpinning. Formwork: Definition of Formwork, Requirements of Formwork, Materials used in Formwork, Types of Formwork, Removal of formwork.

UNIT-VII	**Building Communication and Ventilation**	**6**	

- **Horizontal Communication: Doors** –Components of Doors, Full Paneled Doors, Part ly Paneled and Glazed Doors, Flush Doors, Collapsible Doors, Rolling Shutters, Revolving Doors, Glazed Doors.

	Sizes of Door recommended by BIS.	
	• **Windows:** Component of windows, Types of Windows - Full Paneled, Partly Paneled and Glazed, wooden, Steel, Aluminum windows, Sliding Windows, Louvered Window, Bay win- dow, Corner window, clear storey window, Gable and Dormer window, Skylight. Sizes of Windows recommended by BIS. Ventilators.	
	• Fixtures and fastenings for doors and windows	
	• Material used and functions of Window Sill and Lintels, Shed / Chajja.	
	Vertical Communication: Means of Vertical Communication- Stair Case,Ramps,Lift, Elevators and Escalators. Terms used in staircase steps, tread, riser, nosing, soffit, waist slab, baluster, balustrade, scotia, hand rails, newel post, landing, headroom, winder. Types of staircase (On the basis of shape): Straight, dog-legged, open well, Spiral, quarter turn, bifurcated, Three quarter turn and Half turn, (On the basis of Material): Stone, Brick, R.C.C., wooden and Metal.	
UNIT-VIII	**Building Finishes**	**6**
	• **Floors and Roofs**: Types of Floor Finishes and its suitability- Kota, Marble, Granite, Ceramic Tiles, Vitrified, Chequered Tiles, Paver Blocks, Concrete Floors, wooden Flooring, Skirting and Dado. Process of Laying and Construction, Finishing and Polishing of Floors, Roofing Ma terials- RCC, Mangalore Tiles, AC Sheets, G.I. sheets, Corrugated G.I. Sheets, Plastic and Fibre Sheets. Types of Roof: Flat roof, Pitched Roof- King Post truss, Queen Post Truss, terms used in roofs.	
	• **Wall Finishes:** Plastering – Necessity of Plastering, Procedure of Plastering, Single Coat Plas- ter, Double Coat Plaster, Rough finish, Neeru Finishing and Plaster of Paris (POP). Special Plasters- Stucco plaster, sponge finish, pebble finish. Plaster Board and Wall Claddings. Pre- cautions to be taken in plastering, defects in plastering. Pointing – Necessity, Types of point- ing and procedure of Pointing. Painting – Necessity, Surface Preparation for painting, Methods of Application.	

REFERENCES:

1. Ghose, D. N., Construction Materials, Tata McGraw Hill, New Delhi.

2. S.K. Sharma, Civil Engineering Construction Materials, Khanna Publishing House, Delhi

3. Varghese, P.C. , Building Materials, PHI learning, New Delhi.

4. Rangwala, S.C., Engineering Materials, Charator publisher, Ahemdabad.

5. Somayaji, Shan, Civil Engineering Materials, Pearson education, New Delhi.

6. Rajput, R.K, Engineering Materials, S. Chand and Co., New Delhi.

7. Sood H., Laboratory Manual on Testing of Engineering Materials, New Age Publishers, NewDelhi.

8. Sharma C. P., Engineering Materials, PHI Learning, New Delhi.

9. Duggal, S. K, Building Materials, New International, New Delhi.

10. S. P. Arora and Bindra., Building Construction, Dhanpat Rai Publication, Delhi.

11. Sushil Kumar., Building Construction, Standard Publication.

12. Rangawala, S. C., Building Construction, Charotar Publication, Anand.

13. Punmia B. C., and Jain A. K., Building Construction ,Firewall Media.

14. Sharma S. K., Building Construction, S. Chand and Co. Pvt. Ltd., New Delhi.

15. Janardan Zha , Building Construction, Khanna Publication.

16. Bhavikatti S. S., Building Construction, Vikas Publication House Pvt. Ltd., Delhi.

17. Mantri S., A to Z Building Construction, Satya Prakashan, New Delhi.

BASIC SURVEYING

L	T	P		Course Code No.: **CEPC203**
2	0	0		

Total Contact hrs.: Lecture:30 Tutorial:0 Practical: 0 **Credit : 2**	**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE

Surveying is an essential component of the day to day work of a Civil Engineering Technician. The course content of Basic Surveying includes the basic concept of surveying, horizontal linear and angular measurements and conducting surveys involving horizontal linear and angular measurements with stress on familiarization with various equipment used.

LEARNING OUTCOME

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

- Select the type of survey required for given situation.
- Compute area of open field using chain, tape and cross staff.
- Conduct traversing in the field using chain and compass.
- Use levelling instruments to determine reduced level for preparation of contour maps
- Use digital planimeter to calculate the areas.

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT-I	<u>**Overview and Classification of Survey**</u> • Survey- Purpose and Use. • Types of surveying- Primary and Secondary, Classification: Plane, Geodetic, Cadastral, Hydro graphic, Photogrammetry and Aerial. • Principles of Surveying. • Scales: Engineer's scale, Representative Fraction (RF) and diagonal scale.	**2**
UNIT-II	<u>**Chain Surveying**</u>	**6**

		• Instruments used in chain survey: Metric Chain, Tapes, Arrow, Ranging rod, Line ranger, Off-set rod, Open cross staff, Optical square. • Chain survey Station, Base line, Check line, Tie line, Offset, Tie station. • Ranging: Direct and Indirect Ranging. • Methods of Chaining, obstacles in chaining. • Errors in length: Instrumental error, personal error, error due to natural cause, random error. • Principles of triangulation. • Types of offsets: Perpendicular and Oblique. • Conventional Signs, Recording of measurements in a field book.	
UNIT-III	**Compass Traverse Survey** • Compass Traversing- open, closed. • Technical Terms: Geographic/ True Magnetic Meridians and Bearings, Whole Circle Bearing system and Reduced Bearing system and examples on conversion of given bearing to another bearing (from one form to another), Fore Bearing and Back Bearing, Calculation of internal and external angles from bearings at a station, Dip of Magnetic needle, Magnetic Declination. • Components of Prismatic Compass and their Functions, Methods of using Prismatic Compass- Temporary adjustments and observing bearings. • Local attraction, Methods of correction of observed bearings - Correction at station and correction to included angles. • Methods of plotting a traverse and closing error, Graphical adjustment of closing error.		8
UNIT-IV	**Levelling and Contouring** • Basic terminologies: Level surfaces, Horizontal and vertical surfaces, Datum, Bench Marks-GTS, Permanent, Arbitrary and Temporary, Reduced Level, Rise, Fall, Line of collimation, Station, Back sight, Fore sight, Intermediate sight, Change point, Height of instruments. • Types of levels: Dumpy, Tilting, Auto level, Digital level, Components of Dumpy Level and its fundamental axes, Temporary adjustments of Level. • Types of Leveling Staff: Self-reading staff and Target staff. • Reduction of level by Line of collimation and Rise and Fall Method. • Leveling Types: Simple, Differential, Fly, Profile and Reciprocal Leveling.		8

	• Contour, contour intervals, horizontal equivalent. • Uses of contour maps, Characteristics of contours, Methods of Contouring: Direct and indirect.		
UNIT-V	<u>**Measurement of Area and Volume**</u> • Components and use of Digital planimeter. • Measurement of area using digital planimeter. • Measurement of volume of reservoir from contour map.	**6**	

SUGGESTED LEARNING RESOURCES

1. Punmia, B.C.; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying I, Laxmi Publications, New Del-hi.

2. Basak, N. N., Surveying and Levelling, McGraw Hill Education, New Delhi.

3. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling volume I, Pune Vidyarthi Gruh Prakashan.

4. Duggal, S. K., Survey I, McGraw Hill Education, New Delhi.

5. Saikia, M D.; Das. B.M.; Das. M.M., Surveying, PHI Learning, New Delhi.

6. Subramanian, R., Fundamentals of Surveying and Levelling, Oxford University Press. New Del-hi.

7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning New Delhi.

8. Bhavikatti, S. S., Surveying and Levelling, Volume 1, I. K. International, New Delhi.

9. Arora K R , Surveying Vol. I, Standard Book House.

MECHANICS OF MATERIAL

L	T	P		Course Code No.: **CEPC205**
2	0	0		

Total Contact hrs.: Lecture:30 Tutorial:0 Practical: 0 **Credit : 2**	**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE

Mechanics of Materials deals with the internal behavior of variously loaded solid bodies, such as; shafts, bars, beams, plates, and columns, as well as structures and machines that are assemblies of these components. Mechanics of materials focuses primarily on mechanical properties of materials, analysis of stress, strain and evaluation of deformations. The aim of this course is to develop background of students for taking up engineering subjects like Theory and Design of Structures, Design of Machines etc.

LEARNING OUTCOME

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

- Describe the Mechanical properties of important Engineering materials.
- Determine stresses, strains and deformations in elastic bodies of different shapes under different loading conditions for engineering applications
- Determine load carrying capacity of different types of members
- Calculate the design load to design the column

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT-I	**Moment of Inertia** • Moment of inertia (M.I.): Definition, M.I. of plane lamina, Radius of gyration, section mod-ulus, Parallel and Perpendicular axes theorems (without derivations), M.I. of rectangle, square, circle, semicircle, quarter circle and triangle section (without derivations). • M.I. of symmetrical and unsymmetrical I-section, Channel section, T-section, Angle section, Hollow sections and built up sections about centroidal axes and any other reference axis.	**4**

	• Polar Moment of Inertia of solid circular sections.	
UNIT-II	**<u>Simple Stresses and Strains</u>** • Definition of rigid, elastic and plastic bodies, deformation of elastic body under various forces, Definition of stress, strain, elasticity, Hook's law, Elastic limit, Modulus of elastic-ity. • Type of Stresses-Normal, Direct, Bending and Shear and nature of stresses i.e. Tensile and Compressive stresses. • Standard stress strain curve for tor steel bar under tension, Yield stress, Proof stress, Ultimate stress, Strain at various critical points, Percentage elongation and Factor of safety. • Deformation of body due to axial force, forces applied at intermediate sections, Maximum and minimum stress induced, Composite section under axial loading. • Concept of temperature stresses and strain, Stress and strain developed due to temperature variation in homogeneous simple bar (no composite section) • Longitudinal and lateral strain, Modulus of Rigidity, Poisson's ratio, Biaxial and tri-axial stresses, volumetric strain, change in volume, Bulk modulus (Introduction only). Relation between modulus of elasticity, modulus of rigidity and bulk modulus (without derivation).	**8**
UNIT-III	**<u>Shear Force and Bending Moment</u>** • Types of supports, beams and loads. ▪ Concept and definition of shear force and bending moment, Relation between load, shear force and bending moment (without derivation). • Shear force and bending moment diagram for cantilever and simply supported beams subjected to point loads, uniformly distributed loads and couple (combination of any two types of loading), point of contra flexure.	**6**
UNIT-IV	**<u>Bending and Shear Stresses in beams</u>** • Concept and theory of pure bending,	**6**

	assumptions, flexural equation (without deriva- tion), bending stresses and their nature, bending stress distribution diagram.	
	• Concept of moment of resistance and simple numerical problems using flexural equation.	
	▪ Shear stresss equation (without derivation), relation between maximum and average shear stress for rectangular and circular section, shear stress distribution diagram.	
	• Shear stress distribution for square, rectangular, circle, hollow, square, rectangular, circular, angle sections, channel section, I-section, T section. Simple numerical problems based on shear equation.	
UNIT-V	**Columns** • Concept of compression member, short and long column, Effective length, Radius of gy- ration, Slenderness ratio, Types of end condition for columns, Buckling of axially loadedcolumns. • Euler's theory, assumptions made in Euler's theory and its limitations, Application of Eu- ler's equation to calculate buckling load. • Rankine' s formula and its application to calculate crippling load. • Concept of working load/safe load, design load and factor of safety.	**6**

SUGGESTED LEARNING RESOURCES:

1. Bedi D.S. , Strength of Materials, Khanna Publishing House, Delhi, Ed. 2018
2. Timoshenko, S., Strength of Materials, Vol. I, CBS, New Delhi.
3. Khurmi, R.S., Strength of Materials, S Chand and Co. Ltd. New Delhi.
4. Ramamurtham, S, Strength of Materials, Dhanpat Rai and sons, New Delhi.
5. Punmia B C, Strength of Materials, Laxmi Publications (p) Ltd. New Delhi.
6. Rattan S.S., Strength of Materials, McGraw Hill Education; New Delhi.
7. Bansal R K, Strength of Materials, Laxmi Publications.
8. Subramaniam R, Strength of Materials, Oxford University Press.

CONCRETE TECHNOLOGY

L	T	P		Course Code No.: **CEPC207**
2	0	0		
Total Contact hrs.: Lecture:30 Tutorial:0 Practical: 0 **Credit : 2**			**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE

The course relates to the fundamentals related to concrete and concrete material, besides dealing with masonry, reinforcement, etc. The course includes what concrete is, what are the processes involved in formation of concrete, various materials that are used in concrete formation, properties of each ingredient of concrete, standard tests to be applied to concrete and concrete ingredients.

LEARNING OUTCOME

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

- Describe the properties of cement, aggregate and water used in concrete.
- Illustrate role of admixtures in concrete.
- Explain the properties of fresh and harden concrete
- Use of code for concrete mix design
- Follow the different procedure of concreting operations

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT-I	**Cement, Aggregates and Water** • Physical properties of OPC and PPC: fineness, standard consistency, setting time, soundness, compressive strength. Different grades of OPC and relevant BIS codes. • Testing of cement: Laboratory tests-fineness, standard consistency, setting time, soundness, compressive strength. Storage of cement and effect of storage on properties of cement. • BIS Specifications and field applications of different types of cements: Rapid	**5**

	hardening, Low heat, Portland pozzolana, Sulphate resisting, Blast furnace slag, High Alumina and White cement. • Aggregates: Requirements of good aggregate, Classification according to size and shape. • Fine aggregates: Properties, size, specific gravity, bulk density, water absorption and bulking, fineness modulus and grading zone of sand, silt content and their specification as per IS 383. Concept of crushed Sand. • Coarse aggregates: Properties, size, shape, surface texture, water absorption, soundness, specific gravity and bulk density, fineness modulus of coarse aggregate, grading of coarse aggregates, crushing value, impact value and abrasion value of coarse aggregates with spec ifications. • Water: Quality of water, impurities in mixing water and permissible limits for solids as per IS: 456.	
UNIT-II	**Concrete** • Concrete: Different grades of concrete, provisions of IS 456. • Duff Abraham water cement (w/c) ratio law, significance of w/c ratio, selection of w/c ratio for different grades, maximum w/c ratio for different grades of concrete for different expo- sure conditions as per IS 456. • Properties of fresh concrete: Workability: Factors affecting workability of concrete. Determi- nation of workability of concrete by slump cone, compaction factor, Vee-Bee Consistometer. Value of workability requirement for different types of concrete works. Segregation, bleeding and preventive measures. • Properties of Hardened concrete: Strength, Durability, Impermeability.	**6**
UNIT-III	**Concrete Mix Design and Testing of Concrete** • Concrete mix design: Objectives, methods of mix design, study of mix design as per IS 10262 (only	**7**

		procedural steps).	
		• Non- destructive testing of concrete: Rebound hammer test, working principle of rebound hammer and factor affecting the rebound index, Ultrasonic pulse velocity test as per IS13311 (part 1 and 2), Importance of NDT tests.	
UNIT-IV	**Quality Control of Concrete**		**7**
	• Concreting Operations: Batching, Mixing, Transportation, Placing, Compaction, Curing and Finishing of concrete.	
	• Forms for concreting: Different types of form works for beams, slabs, columns, materials used for form work, requirement of good form work. Stripping time for removal of form works perIS 456.	
	• Waterproofing: Importance and need of waterproofing, methods of waterproofing and materials used for waterproofing.	
	• Joints in concrete construction: Types of joints, methods for joining old and new concrete, materials used for filling joints.	
UNIT-V	**Chemical Admixture, Special Concrete and Extreme Weather concreting**		**5**
	▪ Admixtures in concrete: Purpose, properties and application for different types of admixture such as accelerating admixtures, retarding admixtures, water reducing admixtures, air entraining admixtures and super plasticizers. (concepts only)	
	▪ Special Concrete: Properties, advantages and limitation of following types of Special concrete: Ready mix Concrete, Fiber Reinforced Concrete, High performance Concrete Self-com pacting concrete and light weight concrete.	
	▪ Cold weather concreting: effect of cold weather on concrete, precautions to be taken while concreting in cold weather condition. (only concepts)	
	• Hot weather concreting: effect of hot weather on concrete, precautions to be taken while concreting in hot weather condition. (only concepts)	

SUGGESTED LEARNING RESOURCES:

1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi.
2. Shetty, M.S., Concrete Technology, S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.
3. Santhakumar, A. R., Concrete Technology, Oxford University Press, New Delhi.
4. Neville, A. M. and Brooks, J.J., Concrete Technology, Pearson Education Pvt. Ltd.
5. Neville, A. M., Concrete Technology, Pearson Education Pvt. Ltd., New Delhi.
6. Sood, H., Kulkarni P. D., Mittal L. N., Laboratory Manual in Concrete Technology, CBS Publishers, New Delhi.

GEOTECHNICAL ENGINEERING

L	T	P		Course Code No.: **CEPC209**
3	0	0		

Total Contact hrs.: Lecture:45 Tutorial:0 Practical: 0 **Credit : 3**	**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE

The knowledge and skills of Geo-Technical Engineering help the Practicing Civil Engineers in Civil Engineering Construction Works, especially in the design and construction of building foundation.

LEARNING OUTCOME

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

- Determine physical and index properties and classification of soil
- Estimate permeability and shear strength of soil
- Identify the load bearing capacity of soil
- Explain various soil stabilization and compaction methods
- Use IS codes for different soil testing

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT-I	<u>**Overview of Geology and Geotechnical Engineering**</u> - Introduction of Geology, Branches of Geology, Importance of Geology for civil engineering structure and composition of earth, - Definition of a rock: Classification based on their genesis (mode of origin), formation. Classification and engineering uses of igneous, sedimentary and metamorphic rocks. (Concepts only) - Importance of soil as construction material in Civil engineering structures and as foundation bed for structures. (Concepts only) - Field application of geotechnical engineering for foundation design, pavement design, design of earth retaining structures, design of earthen dam. (Concepts only)	**8**

UNIT-II	**Physical and Index Properties of Soil**	10
	• Soil as a three phase system, water content, determination of water content by oven drying method as per BIS code, void ratio, porosity and degree of saturation, density index.	
	• Unit weight of soil mass – bulk unit weight, dry unit weight, unit weight of solids, saturated unit weight, submerged unit weight. Determination of bulk unit weight and dry unit weight by core cutter and sand replacement method, Determination of specific gravity by pycnometer.	
	• Consistency of soil, Atterberg limits of consistency: Liquid limit, plastic limit and shrinkage limit. Plasticity index.	
	• Particle size distribution test and plotting of curve, Determination of effective diameter of soil, well graded and uniformly graded soils, BIS classification of soil.	
UNIT-III	**Permeability and Shear Strength of Soil**	12
	• Definition of permeability, Darcy's law of permeability, coefficient of permeability, factors affecting permeability, determination of coefficient of permeability by constant head and falling head tests, simple problems to determine coefficient of permeability. Seepage through earthen structures, seepage velocity, seepage pressure, phreatic line, flow lines, application of flow net, (Concepts only No numerical problems).	
	• Shear failure of soil, concept of shear strength of soil.	
	• Components of shearing resistance of soil – cohesion, internal friction. Mohr-Coulomb failure theory, Strength envelope, strength equation for purely cohesive and cohesion less soils. Direct shear and vane shear test laboratory methods.	
UNIT-IV	**Bearing Capacity of Soil**	7
	• Bearing capacity and theory of earth pressure. Concept of bearing capacity, ultimate bearing capacity, safe bearing capacity and allowable bearing pressure. Introduction to Terzaghi's analysis and assumptions, effect of water table on bearing capacity.	
	• Field methods for determination of bearing capacity – Plate load and Standard Penetration Test. Test procedures as per IS:1888 & IS:2131.	
	• Definition of earth pressure, Active and Passive	

	earth pressure for no surcharge condition, coefficient of earth pressure, Rankine's theory and assumptions made for non-cohesive Soils.	
UNIT-V	**Compaction and stabilization of soil** • Concept of compaction, Standard and Modified proctor test as per IS code, Plotting of Compaction curve for determining: Optimum moisture content (OMC), maximum dry density(MDD), Zero air voids line. Factors affecting compaction, field methods of compaction – rolling, ramming and vibration. Suitability of various compaction equipment-smooth wheel roller, sheep foot roller, pneumatic tyred roller, Rammer and Vibrator, Difference between compaction andconsolidation. • Concept of soil stabilization, necessity of soil stabilization, different methods of soil stabiliza tion. California bearing ratio (CBR) test - Meaning and Utilization in Pavement Construction • Necessity of site investigation and soil exploration: Types of exploration, criteria for deciding the location and number of test pits and bores. Field identification of soil – dry strength test, dilatancy test and toughness test.	**8**

SUGGESTED LEARNING RESOURCES:

1. Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publication, Delhi.

2. Murthy, V.N.S., A text book of soil mechanics and foundation Engineering, CBS Publishers & Distributors Pvt. Ltd., New Delhi.

3. Ramamurthy, T.N. & Sitharam,T.G., Geotechnical Engineering(Soil Mechanics), S Chand andCompany LTD., New Delhi.

4. Raj, P. Purushothama, Soil Mechanics and Foundation Engineering, Pearson India, New Delhi.

5. Kasamalkar, B. J., Geotechnical Engineering, Pune Vidyarthi Griha Prakashan, Pune.

6. Arora K R, Soil Mechanics and Foundation Engineering, Standard Publisher.

CONSTRUCTION MATERIALS LAB.

L	T	P		Course Code No.: **CEPC211**
0	0	2		
Total Contact hrs.: Lecture:0 Tutorial:0 Practical: 30 **Credit : 1**			**Total marks: 100**	**Theory:** End Term Exam.:40 P.A: 60

RATIONALE

This course enables the students to have a clear understanding on structural functions and role of materials to achieve that. It helps understanding the concept of building construction and process. The lab course will put the theoretical data into practical concepts by site visits.

LEARNING OUTCOME

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

- Describe various construction materials, and their relevant characteristics.
- Identify suitability of various materials for different construction purposes.
- Explain natural, artificial, and processed materials available for various purposes of construction activities.
- Select the suitable construction material

COURSE CONTENT DETAILS

LIST OF PRACTICAL TO BE PERFORMED:

1. Identify various sizes of available coarse aggregates from sample of 10 kg in laboratory and prepare report (60,40, 20,10 mm)
2. Identify the available construction materials in the laboratory on the basis of their sources.
3. Identify the grain distribution pattern in given sample of teak wood in the laboratory and draw the various patterns. (along and perpendicular to the grains)
4. Prepare the lime putty by mixing lime (1 kg) with water in appropriate proportion and pre-pare report on slaking of lime.
5. Identify various layers and types of soil in foundation pit by visiting at least 3 construction sites in different locations of city and prepare report consisting photographs and samples. Part I
6. Identify various layers and types of soil in foundation pit by visiting at least 3 construction sites in different locations of city and prepare report consisting photographs and samples. Part II

7. Select first class, second class and third-class bricks from the stake of bricks and prepare report based on its properties.

8. Measure dimensions of 10 bricks and find average dimension and weight. Perform field tests - dropping, striking and scratching by nail and correlate the results obtained.

9. Identify different types of flooring tiles such as vitrified tiles, ceramic tiles, glazed tiles, mosaic tiles, anti- skid tiles, chequered tiles, paving blocks and prepare report about the specifications.

10. Apply the relevant termite chemical on given damaged sample of timber.

11. Identify the type of glasses from the given samples.

12. Apply two or more coats of selected paint on the prepared base of a given wall surface for the
area of 1m x 1m using suitable brush/rollers adopting safe practices. Part I

13. Apply two or more coats of selected paint on the prepared base of a given wall surface for the
area of 1m x 1m using suitable brush/rollers adopting safe practices. Part II

14. Prepare the cement mortar of proportion 1:3 or 1:6 using artificial sand as a special processed construction material.

15. Prepare mortar using cement and Fly ash or Granite/marble polishing waste in the proportion 1:6 or 1:3.

SUGGESTED LEARNING RESOURCES:

1. Ghose, D. N., Construction Materials , Tata McGraw Hill, New Delhi.

2. S.K. Sharma, Civil Engineering Construction Materials, Khanna Publishing House, New Delhi

3. Varghese, P.C. , Building Materials, PHI learning, New Delhi.

4. Rangwala, S.C., Engineering Materials, Charator publisher, Ahemdabad.

5. Somayaji, Shan, Civil Engineering Materials, Pearson education, New Delhi.

6. Rajput, R.K, Engineering Materials, S. Chand and Co., New Delhi.

7. Sood H., Laboratory Manual on Testing of Engineering Materials, New Age Publishers, NewDelhi.

8. Sharma C. P., Engineering Materials, PHI Learning, New Delhi.

9. Duggal, S. K, Building Materials, New International, New Delhi.

BASIC SURVEYING LAB

L	T	P		Course Code No.: CEPC213
0	0	2		

Total Contact hrs.: Lecture:0 Tutorial:0 Practical: 30 **Credit : 1**	**Total marks: 100**	**Theory:** End Term Exam.:40 P.A: 60

RATIONALE

Surveying is the science and art of making all essential measurements to determine the relative position of points or physical and cultural details above, on, or beneath the surface of the Earth, and to depict them in a usable form, or to establish the position of points or details. Basic surveying lab enable the students to develop these skills through demonstration and practice.

LEARNING OUTCOME

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

- Explain types of surveying works required
- Explain the type of method and equipment to be used for different surveys
- Demonstrate the use and operational details of various surveying equipment.
- Prepare the project report of survey

COURSE CONTENT DETAILS

LIST OF PRACTICALS TO BE PERFORMED

1. Measure distance between two survey stations using chain, tape and ranging rods when two stations are inter visible.

2. Undertake reciprocal ranging and measure the distance between two stations.

3. Determine area of open field using chain and cross staff survey.

4. Measure Fore Bearing and Back Bearing of survey lines of open traverse using Prismatic Compass.

5. Measure Fore Bearing and back bearing of a closed traverse of 5 or 6 sides and correct the bearings and included angles for the local attraction.

6. Undertake Survey Project with chain and compass for closed traverse for minimum 5 sides around a building**.**

7. Plot the traverse on A1 size imperial drawing sheet for data collected in Survey Project mentioned at practical **No.6.**

8. Undertake simple leveling using dumpy level/ Auto level and

leveling staff.

9. Undertake differential leveling and determine Reduced Levels by Height of instrument meth- od and Rise and fall method using dumpy level/Auto Level and leveling staff.

10. Undertake fly leveling with double check using dumpy level/ Auto level and leveling staff.

11. Undertake Survey Project with Leveling instrument for Profile leveling and cross-sectioning
for a road length of 500 m with cross-section at 30 m interval.

12. Plot the L-section with minimum 3 cross-sections on A1 size imperial sheet for data collected in Survey Project mentioned at practical **No.11.**

13. Undertake Survey Project for plotting contour map using block contouring method for a block of 150m x 150m with grid of 10m x 10m.

14. Plot the contours on A1 size imperial drawing sheet for data collected in Survey Project men-tioned at practical **No.13.**

15. Measure area of irregular figure using Digital planimeter.

SUGGESTED LEARNING RESOURCES:

1. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying I, Laxmi Publications., New
Delhi.

2. Basak, N. N., Surveying and Levelling, McGraw Hill Education, New Delhi.

3. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling volume I, Pune Vidyarthi Gruh Prakashan.

4. Duggal, S. K., Survey I, McGraw Hill Education, New Delhi.

5. Saikia, M D.; Das. B.M.; Das. M.M., Surveying, PHI Learning, New Delhi.

6. Subramanian, R., Fundamentals of Surveying and Levelling, Oxford University Press. New Del-hi.

7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning

8. Bhavikatti, S. S., Surveying and Levelling, Volume 1, I. K. International, New Delhi.

9. Arora K R , Surveying Vol. I, Standard Book House

MECHANICS OF MATERIAL LAB.

L	T	P		Course Code No.: **CEPC215**
0	0	2		

Total Contact hrs.: Lecture: Tutorial:0 Practical: 30 **Credit : 2**	**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE

This course will enable the students to apply mechanics of materials theory on real specimens and learn the practical testing procedures and concepts.

LEARNING OUTCOME

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

- Apply the procedure for the conduct of tensile and compressive strength.
- Demonstrate the concept of stress and strain through testing of different materials.
- Determine shear force, bending moment and their corresponding stresses.
- Determine flexural strength and abrasive properties of floor tiles.

COURSE CONTENT DETAILS

LIST OF PRACTICALS TO BE PERFORMED:

- Study and understand the use and components of Universal Testing Machine (UTM).
- Perform Tension test on mild steel as per IS:432(1).
- Perform tension test on Tor steel as per IS:1608, IS:1139.
- Conduct compression test on sample test piece using Compression Testing Machine.
- Conduct Izod Impact test on three metals. e.g. mild steel/ brass/aluminum/ copper /castiron etc. as per IS:1598.
- Conduct Charpy Impact test on three metals. e.g. mild steel/ brass/aluminum/ copper /castiron etc. as per IS:1757.
- Determine Water Absorption on bricks per IS:3495 (part II), IS:1077 or tile IS:1237.
- Determine Compressive strength of dry and wet bricks as per IS:3495(part I), IS:1077.
- Conduct Flexural test on timber beam on rectangular section in both orientation as per IS:1708, IS:2408.

SUGGESTED LEARNING RESOURCES:

1. Bedi D.S., Strength of Materials, Khanna Publishing House, New Delhi (Edition 2018)
2. Timoshenko, S., Strength of Materials, Vol. I, CBS, New Delhi.
3. Khurmi, R.S., Strength of Materials, S Chand and Co. Ltd. New Delhi.
4. Ramamurtham, S, Strength of Materials, Dhanpat Rai and sons, New Delhi.
5. Punmia B C, Strength of Materials, Laxmi Publications (p) Ltd. New Delhi.
6. Rattan S.S., Strength of Materials, McGraw Hill Education; New Delhi.
7. Bansal R K, Strength of Materials, Laxmi Publications.
8. Subramaniam R, Strength of Materials, Oxford University Press.

CONCRETE TECHNOLOGY LAB

L	T	P		Course Code No.: **CEPC217**
0	0	2		

Total Contact hrs.: Lecture:0 Tutorial:0 Practical: 30 **Credit :1**	**Total marks: 100**	**Theory:** End Term Exam.:40 P.A: 60

RATIONALE

The aim of this course is to determine the physical properties of building construction materials like cement, aggregate. The tests include determination of specific gravity, fineness, normal consistency, etc. and to understand the role of admixtures in concrete.

LEARNING OUTCOME

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

- Identify different types of cement by performing laboratory tests.
- Illustrate physical properties of fine and coarse aggregates.
- Prepare concrete of required specification.
- Maintain the quality of concrete applying scientific principles.
- Use relevant admixtures for improving the workability of concrete.

COURSE CONTENT DETAILS

LIST OF PRACTICAL TO BE PERFORMED:

1. Determine fineness of cement by Blaine's air permeability apparatus Or by sieving.
2. Determine specific gravity, standard consistency, initial and final setting times of cement.
3. Determine compressive strength of cement.
4. Determine bulking of sand.
5. Determine bulk density of fine and coarse aggregates.
6. Determine water absorption of fine and coarse aggregates.
7. Determine Fineness modulus of fine aggregate by sieve analysis.
8. Determine impact value of aggregate
9. Determine crushing value of aggregate.
10. Determine abrasion value of aggregate.
11. Determine elongation and flakiness index of coarse aggregates
12. Determine workability of concrete by slump cone test.
13. Determine workability of concrete by compaction factor test.
14. To prepare concrete mix of a particular grade and determine compressive strength of

Concrete for 7 and 28 days.
15. Demonstration of NDT equipment.

SUGGESTED LEARNING RESOURCES:

1. Gambhir, M.L., Concrete Technology, Tata McGraw Hill Publishing Co. Ltd., Delhi.
2. Shetty, M.S., Concrete Technology, S. Chand and Co. Pvt. Ltd., Ram Nagar, Delhi.
3. Santhakumar, A. R., Concrete Technology, Oxford University Press, New Delhi.
4. Neville, A. M. and Brooks, J.J., Concrete Technology, Pearson Education Pvt. Ltd.
5. Neville, A. M., Concrete Technology, Pearson Education Pvt. Ltd., New Delhi.
6. Sood, H., Kulkarni P. D., Mittal L. N., Laboratory Manual in Concrete Technology, CBS Publishers, New Delhi.

GEOTECHNICAL ENGINEERING LAB

L	T	P		Course Code No.: **CEPC219**
0	0	2		
Total Contact hrs.: Lecture:0 Tutorial:0 Practical: 30 **Credit :1**			**Total marks: 100**	**Theory:** End Term Exam.:40 P.A: 60

RATIONALE

Determination of soil conditions is the most significant task in every civil engineering activity. Properties of the soil can be determined by both field and laboratory test methods. This course intends to train the students to evaluate various soil properties and explore the experimental procedures to identify the behaviour of soil for particular loading and able to understand results.

LEARNING OUTCOME

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

- Determine physical and index properties of soil.
- Estimate the permeability and shear strength of soil.
- Demonstrate the procedure for performing C.B.R test.
- Demonstrate various compaction methods for soil stabilization.

COURSE CONTENT DETAILS

LIST OF PRACTICALS TO BE PERFORMED:

1. Identification of rocks from the given specimen.
2. Determine water content of given soil sample by oven drying method as per IS: 2720 (Part-II).
3. Determine specific gravity of soil by pycnometer method as per IS 2720 (Part-III).
4. Determine dry unit weight of soil in field by core cutter method as per IS 2720 (Part- XXIX).
5. Determine dry unit weight of soil in field by sand replacement method as per IS 2720 (Part-XXVIII).
6. Determine Plastic and Liquid Limit along with Plasticity Index of given soil sample as per IS 2720 (Part- V).
7. Determine Shrinkage limit of given soil sample as per IS 2720 (Part- V).
8. Determine grain size distribution of given soil sample by mechanical

sieve analysis as per IS 2720 (Part- IV).

9. Use different types of soil to identify and classify soil by conducting field tests-through Visual inspection, Dry strength test, Dilatancy test and Toughness test.

10. Determine coefficient of permeability by constant head test as per IS 2720 (Part- XVII).

11. Determine coefficient of permeability by falling head test as per IS 2720 (Part- XVII).

12. Determine shear strength of soil by direct shear test as per IS 2720 (Part-XIII).

13. Determine shear strength of soil by vane shear test as per IS 2720 (Part-XXX).

14. Determine MDD and OMC by standard proctor test of given soil sample as per IS 2720 (Part-VII).

15. Determination of CBR value on the field as per IS2720 (Part - XVI).

SUGGESTED LEARNING RESOURCES:

1. Punmia, B.C., Soil Mechanics and Foundation Engineering, Laxmi Publication

2. Murthy, V.N.S., A text book of soil mechanics and foundation Engineering, CBS Publishers &
   Distributors Pvt. Ltd., New Delhi.

3. Ramamurthy, T.N. & Sitharam,T.G., Geotechnical Engineering(Soil Mechanics), S Chand andCompany LTD., New Delhi.

4. Raj, P. Purushothama, Soil Mechanics and Foundation Engineering, Pearson India

5. Kasamalkar, B. J., Geotechnical Engineering, Pune Vidyarthi Griha Prakashan, Pune.

6. Arora K R, Soil Mechanics and Foundation Engineering, Standard Publisher.

SEMESTER - IV COURSES

HYDRAULICS

L	T	P		Course Code No.: CEPC202
2	0	0		

Total Contact hrs.: Lecture:30 Tutorial:0 Practical: 0 **Credit : 2**	Total marks: 100	Theory: End Term Exam.:60 P.A: 40

RATIONALE

This course deals with behaviour of fluid at rest and in motion. The Civil Engineering profession is much concerned with subjects like water supply, Sanitary Engineering and Irrigation Engineering, which need a sound knowledge of Hydraulics. Therefore, hydraulics is a very important basic subject for students of civil engineering.

LEARNING OUTCOMES

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

- Explain the different types of flow
- Describe the parameters associated with fluid flow and hydrostatic pressure.
- Explain head loss and water hammer in fluid flowing through pipes.
- Illustrate different types of pumps and their uses
- Measure the discharge using different equation

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT –I	**Pressure measurement and Hydrostatic pressure** • Technical terms used in Hydraulics –fluid, fluid mechanics, hydraulics, hydrostatics and hydrodynamics - ideal and real fluid, application of hydraulics. • Physical properties of fluid – density-specific volume, specific gravity, surface tension, capillarity, viscosity-Newton's law of viscosity. • Various types of pressure – Atmospheric Pressure, Gauge Pressure, Absolute Pressure, Vacuum Pressure. Concept of Pressure head and its unit, Pascal's law of fluid pressure and its uses.	5

	• Measurement of differential Pressure by different methods. • Variation of pressure with depth, Pressure diagram, hydrostatic pressure and center of pressure on immersed surfaces and on tank walls. • Determination of total pressure and center of pressure on sides and bottom of water tanks, sides and bottom of tanks containing two liquids, vertical surface in contact with liquid on either side	
UNIT –II	**Fluid Flow Parameters** • Types of flow – Gravity and pressure flow, Laminar, Turbulent, Uniform, Non-uniform, Steady, Unsteady flow. Reynolds number. • Discharge and its unit, continuity equation of flow. • Energy of flowing liquid: potential, kinetic and pressure energy. • Bernoulli's theorem : statement, assumptions, equation.	**5**
UNIT –III	**Flow through pipes** • Major head loss in pipe: Frictional loss and its computation by Darcy's Weisbach equation, • Use of Moody's Diagram and Nomograms. • Minor losses in pipe: loss at entrance, exit, sudden contraction, sudden enlargement and fittings. • Flow through pipes in series, pipes in parallel and Dupuit's equation for equivalent pipe. • Hydraulic gradient line and total energy line. • Water hammer in pipes: Causes and Remedial measures. • Discharge measuring device for pipe flow: Venturi meter - construction and working. • Discharge measurement using Orifice, Hydraulic Coefficients of Orifice.	**8**
UNIT –IV	**Flow through Open Channel** • Geometrical properties of channel section: Wetted area, wetted perimeter, hydraulic radius for rectangular and trapezoidal channel section. • Determination of discharge by Chezy's equation and Manning's equation. • Conditions for most economical rectangular and trapezoidal channel section. • Discharge measuring devices: Triangular and rectangular Notches. • Velocity measurement devices: current meter, floats and	**6**

	Pitot's tube.	
	• Specific energy diagram, Froudes' Number	
UNIT –V	**<u>Hydraulic Pumps</u>** • Concept of pump, Types of pump - centrifugal, reciprocating, submersible. • Centrifugal pump: components and working • Reciprocating pump: single acting and double acting, components and working. • Suction head, delivery head, static head, Manometric head • Power of centrifugal pump. • Selection and choice of pump.	**6**

SUGGESTED LEARNING RESOURCES:

1. Modi, P. N.and Seth, S.M., Hydraulics and Fluid Mechanics, Standard book house, Delhi.

2. S.S. Rattan, Fluid Mechanics & Hydraulic Machines, Khanna Book Publishing Co., New Delhi

3. Ramamrutham, and Narayan, R., Hydraulics, Fluid Mechanics and Fluid Machines, Dhanpat RaiPublishing Company, New Delhi.

4. Khurmi R S, Hydraulics, Fluid Mechanics, Hydraulic machines, S. Chand Publishers

5. Rajput, R K, Fluid Mechanics, S Chand, New Delhi.

6. Ojha, C S P, Berndtsson, R, and Chandramoulli P. N., Fluid Mechanics and Machinery, Oxford Uni- versity Press, New Delhi.

ADVANCED SURVEYING

L	T	P		Course Code No.: CEPC204
2	0	0		

Total Contact hrs.: Lecture:30 Tutorial:0 Practical: 0 **Credit : 2**	Total marks: 100	Theory: End Term Exam.:60 P.A: 40

RATIONALE

Now-a-days application of advanced survey equipment in Civil Engineering analysis, has become a routine. The diploma level students are directly associated with conduction of field survey. Hence this course will be immensely helpful in their service life.

LEARNING OUTCOME

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

- Explain methods of plane surveying and Theodolite surveying and their uses
- Explain tacheometric surveying and curve setting
- Illustrate the principles of Electronic Distance Measurement equipment.
- Handle the Total station.
- Explain concept of remote sensing, GPS and GI

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT – I	**Plane Table Surveying** • Principles of plane table survey. • Accessories of plane table and their use, Telescopic alidade. • Setting of plane table; Orientation of plane table - Back sighting and Magnetic meridian method, True Meridian Method. • Methods of plane table surveys- Radiation, Intersection and Traversing. • Merits and demerits of plane table survey.	5

	Theodolite Surveying	**7**
UNIT – II	• Types and uses of Theodolite, Components of transit Theodolite and their functions, Read-ing the Vernier of transit Theodolite. • Technical terms- Swinging, Transiting, Face left, Face right. • Fundamental axes of transit Theodolite and their relationship • Temporary adjustment of transit Theodolite. • Measurement of horizontal angle- Direct and Repetition method, Errors eliminated by method of repetition. • Measurement of magnetic bearing of a line, Prolonging and ranging a line, deflection angle. Measurement of vertical Angle. • Theodolite traversing by Included angle method and Deflection angle method. • Checks for open and closed traverse, Calculations of bearing from angles. • Traverse computation - Latitude, Departure, Consecutive coordinates, Independent coordinates, balancing the traverse by Bowditch's rule and Transit rule, Gale's Traverse table computation.	
UNIT – III	**Tachometric surveying and Curve setting** • Principles of Tacheometry, Tacheometer and its component parts, Anallatic lens. • Tacheometric formula for horizontal distance with telescope horizontal and staff vertical. • Field method for determining constants of tacheometer, Determining horizontal and vertical distances with tacheometer by fixed hair method and staff held vertical, Limitations of tacheometry. • Types of curves used in roads and railway alignments. Designation of curves. • Setting simple circular curve by offsets from long chord and Rankine's method of deflection angles.	**6**
UNIT – IV	**Advanced surveying equipment** • Principle of Electronic Distance Meter (EDM), its component parts and their Functions, use of EDM. • Use of micro optic Theodolite and Electronic Digital Theodolite. • Use of Total Station, Use of function keys. • Measurements of Horizontal angles, vertical angles, distances and coordinates using Total Station, Traversing, Profile Survey and Contouring with Total Station.	**7**

UNIT – V	**Remote sensing, GPS and GIS** • Remote Sensing – Overview, Remote sensing system, Applications of remote sensing in Civilengineering, land use / Land cover, mapping, disaster management. • Use of Global Positioning System (G.P.S.) instruments. • Geographic Information System (GIS): Over view, Components, Applications, Software forGIS.		**5**

SUGGESTED LEARNING RESOURCES:

1. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling Part I and II, Pune Vidyarthi GruhPrakashan, Pune.

2. Basak, N. N.,Surveying and Levelling, McGraw Hill Education (India) Pvt. Ltd.,Noida.

3. Duggal, S. K., Survey I and Survey II, Tata McGraw Hill Education Pvt. Ltd., Noida.

4. Saikia, M D.; Das. B.M.; Das. M.M., Surveying PHI Learning Pvt. Ltd., New Delhi.

5. Subramanian, R., Surveying and Levelling, Oxford University Press. New Delhi.

6. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying Vol. I and Surveying Vol. II, Laxmi Publications Pvt. Ltd., New Delhi.

7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning Pvt. Ltd., New Delhi.

8. Venkatramaiah, C, Textbook of Surveying, Universities Press, Hyderabad.

9. Anderson, James M and Mikhail, Edward M, Surveying theory and practice, Mc Graw Hill Ed-ucation, Noida.

10. De, Alak, Plane Surveying, S.Chand Publications, New Delhi.

THEORY OF STRUCTURES

L	T	P		Course Code No.: CEPC206
3	0	0		

Total Contact hrs.: Lecture:45 Tutorial:0 Practical: 0 **Credit : 3**	**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE

Theory of structures is a very important subject for diploma holders in Civil Engineering. Many of them are entrusted with the responsibility to supervise constructions, make minor remedial changes in maintenance work, analyze simple structures etc. An adequate knowledge of behaviour of structures is very essential for developing self-confidence among the diplomats for delivering quality service of work. An understanding of 'why' part of structural behiviour and failures enables them to give adequate comparative weightage of their attention to different components of construction supervision jobs.

The course content has been designed with a view to enabling students to solve problems of beams related to permissible stresses in bending and shear, check the stability of dams and retaining walls, explain and apply the principle of superposition, analyze the determinate trusses, apply the formulae for deflection to solve the problems of propped cantilever, understand and draw qualitatively the deflected shapes of beams and frames to identify the positions of main reinforcements and apply the concept of principal stresses and strains to explain and identify different types of cracks in reinforced concrete beams.

LEARNING OUTCOME

After competing this course, student will be able to:
- Analyze stresses induced in vertical member subjected to direct and bending loads.
- Analyze slope and Deflection in fixed and continuous beams.
- Analyze continuous beam under different loading conditions using the principles of Three Moments.
- Analyze continuous beam using Moment Distribution Method under different loading conditions.
- Evaluate axial forces in the members of simple truss

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT –I	**Direct and Bending Stresses in vertical members** • Introduction to axial and eccentric loads, eccentricity	7

	about one principal axis only, nature of stresses, Maximum and minimum stresses, resultant stresses and distribution diagram.	
	• Condition for no tension or zero stress at extreme fiber, Limit of eccentricity, core of section for rectangular and circular cross sections, Middle third rule.	
	• Chimneys of circular cross section subjected to wind pressure, Maximum and minimum stresses, resultant stresses and distribution diagram at base.	
	• Analysis of dams subjected to horizontal water pressure, conditions of stability, Maximum and minimum stresses, resultant stresses and distribution diagram at base.	
UNIT –II	**<u>Slope and Deflection</u>** • Concept of slope and deflection, stiffness of beams, Relation among bending moment, slope, deflection and radius of curvature, (no derivation). • Double integration method to find slope and deflection of cantilever and simply supported beams subjected to concentrated load and uniformly distributed load on entire span. • Macaulay's method for slope and deflection, application to cantilever and simply supported beam subjected to concentrated and uniformly distributed load on entire span.	**8**
UNIT –III	**<u>Fixed and Continuous Beam</u>** • Concept of fixity, effect of fixity, advantages and disadvantages of fixed beam over simply supported beam. • Principle of superposition, Fixed end moments from first principle for beam subjected to point load, UDL over entire span. • Simple application of standard formulae in finding end moments, end reactions and drawing S.F. and B.M. diagrams for a fixed beam. • Definition, effect of continuity, nature of moments induced due to continuity, concept of deflected shape, practical examples. • Clapeyron's theorem of three moment (no derivation), Application of Clapeyron's theorem maximum up to three spans and two unknown support moment only, Support at same level spans having same and uniform moment of inertia subjected to concentrated loads and uni-formly distributed loads over entire span. • Drawing SF diagrams showing point of contraflexure, shear and BM diagrams showing net BM and point of contraflexure for continuous beams.	**10**

UNIT –IV	<u>Moment distribution method</u> • Introduction to moment distribution method, sign convention, Carry over factor, stiffness factor, distribution factor. • Introduction to portal frames – Symmetrical and unsymmetrical portal frames with the concept of Bays and stories.		**8**
UNIT –V	**<u>Simple trusses</u>** • Types of trusses (Simple, Fink, compound fink, French truss, pratt truss, Howe truss, North • light truss, King post and Queen post truss) • Calculate support reactions for trusses subjected to point loads at joints • Calculate forces in members of truss using Method of joints and Method of sections.		**12**

SUGGESTED LEARNING RESOURCES:

1. Ramamrutham.S, Theory of structures, Dhanpatrai & Sons.
2. Khurmi, R. S. , Theory of Structures S. Chand and Co., New Delhi.
3. Bhavikatti, S S , Structural Analysis Vol-1, ,Vikas Publishing House Pvt Ltd.New Delhi.
4. Junnarkar, S. B. , Mechanics of structures, Volume-I and II Charotar Publishing House, Anand.
5. Pandit, G.S. and Gupta, S.P., Theory of Structures, Tata McGraw Hill, New Delhi.
6. Agor R, Structural Analysis, Khanna Publishing House, Delhi.

BUILDING PLANNING AND DRAWING

L	T	P		Course Code No.: CEPC208
1	0	4		

Total Contact hrs.: Lecture:15 Tutorial:0 Practical: 60 **Credit : 3**	**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE

Building drawing is a means of communication between owner, architect, engineer and contractor. Civil engineering diploma holder has to supervise various construction processes and execute civil engineering structures. A civil engineer is required to understand, prepare the drawings, interpret drawings for executing the works. He should be competent to convert his ideas into the drawing. Drawing helps in detailing the structures with quality parameters. The knowledge of this course is useful for building construction, estimating and costing, surveying, projects etc.

LEARNING OUTCOME

After completing this course, student will be able to:
- Interpret the symbols, signs and conventions from the given drawing.
- Prepare line plans of residential and public buildings using principles of planning.
- Prepare submission and working drawing for the given requirement of Load Bearing Structure.
- Prepare submission and working drawing using CAD for the given requirement of Framed Structure.
- Draw two-point perspective drawing for given small objects.

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT –I	**Conventions and Symbols** • Conventions as per IS 962, symbols for different materials such as earthwork, brickwork, stonework, concrete, woodwork and glass. • Graphical symbols for doors and windows, Abbreviations, symbols for sanitary and electrical installations. • Types of lines-visible lines, centre line, hidden line,	**5**

	section line, dimension line, extension line, pointers, arrow head or dots. Appropriate size of lettering and numerals for titles, sub-titles, notes and dimensions. • Types of scale- Monumental, Intimate, criteria for Proper Selection of scale for various types of drawing. • Sizes of various standard papers/sheets. • Reading and interpreting readymade Architectural building drawing (To be procured from Architect, Planning Consultants, Planning Engineer).	
UNIT –II	**Planning of Building** • Principles of planning for Residential and Public building- Aspect, Prospect, Orientation, Grouping, Privacy, Elegance, Flexibility, Circulation, Furniture requirements, Sanitation, Economy. • Space requirement and norms for minimum dimension of different units in the residential and public buildings as per IS 962. • Rules and bye-laws of sanctioning authorities for construction work. • Plot area, built up area, super built up area, plinth area, carpet area, floor area and FAR (Floor Area Ratio). • Line plans for residential building of minimum three rooms including water closet (WC), bath and staircase as per principles of planning. • Line plans for public building-school building, primary health centre, restaurant, bank, post office, hostel, Function Hall and Library.	**10**
UNIT- III	**Drawing of Load Bearing Structure** • Drawing of Single storey Load Bearing residential building (2 BHK) with staircase. Data drawing –plan, elevation, section, site plan, schedule of openings, construction notes with specifications, area statement, • Planning and design of staircase- Rise and Tread for residential and public building. • Working drawing – developed plan, elevation, section passing through staircase or WC and bath. • Foundation plan of Load bearing structure.	**20**
UNIT- IV	**Drawing of Framed Structure** • Drawing of Two storeyed Framed Structure (G+1), residential building (2 BHK) with staircase. • Data drawing – developed plan, elevation, section, site plan, schedule of openings, construction notes with specifications, area statement. Planning and design of staircase- Rise and	**30**

	Tread for residential and public building.	
	• Working drawing of Framed structure – developed plan, elevation, section passing through staircase or WC and bath.	
	• Foundation plan of Framed Structure.	
	• Details of RCC footing, Column, Beam, Chajjas, Lintel, Staircase and slab.	
	• Drawing with CAD- Draw commands, modify commands, layer commands.	
	Draw the above mentioned drawing at serial number (B-2) using CAD software and enclosethe print out.	
UNIT- V	**Perspective Drawing** • Definition, Types of perspective, terms used in perspective drawing, principles used in perspective drawing Two Point Perspective of small objects only such as steps, monuments, pedestals.	**10**

SUGGESTED LEARNING RESOURCES:

1. Shah. M.G. Kale, CM, Patki, S.Y., Building Drawing, Mcgraw Hill Publishing

2. Malik and Mayo, Civil Engineering Drawing, Computech Publication Ltd

3. M. G. Shah and C. M. Kale, Principles of Perspective Drawing, Mcgraw Hill

4. Swamy, Kumara; Rao, N, Kameshwara, A ., Building Planning and Drawing, Charotar Publica-tion, Anand.

5. Bhavikatti, S. S., Building Construction, Vikas Publication House Pvt. Ltd., Delhi.

6. Mantri, Sandip, A to Z Building Construction, Satya Prakashan, New Delhi.

7. Singh, Ajit, Working with Auto CAD 2000, Mcgraw Hill Publishing company Ltd.

8. Sane, Y.S., Planning and design of Building, Allied Publishers, New Delhi.

WATER RESOURCES ENGINEERING

L	T	P		Course Code No.: AAPC210
2	0	0		
Total Contact hrs.: Lecture:30 Tutorial:0 Practical: 0 **Credit : 2**			**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE
This course aims to train the student in methods of developing water supplies and to briefly describe the means to treat water for consumptive use. It helps them to understand water demand of crops and provisions to meet the same. It also includes planning of reservoirs / dams and design of irrigation projects, canals and other diversion works.

LEARNING OUTCOME
After completing this course, student will be able to:
- Estimate hydrological parameters.
- Estimate crop water requirements of a command area and capacity of canals.
- Execute Minor and Micro Irrigation Schemes.
- Select the relevant Cross Drainage works for the specific site conditions.
- Design simple irrigation regulatory structures

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT –I	**Introduction to Hydrology** • Hydrology: Definition and Hydrological cycle • Rain Gauge: Symons rain gauge, automatic rain gauge, • Methods of calculating average rainfall: Arithmetic mean, Isohyetal, and Theissen polygonmethod. • Runoff, Factors affecting Run off, Computation of run–off. • Maximum Flood Discharge measurement: Rational and empirical methods, Simple numer-ical problems. • Yield and Dependable yield of a catchment, determination of dependable yield.	5
UNIT –II	**Crop water requirement and Reservoir Planning** • Irrigation and its classification. • Crop Water requirement: Cropping seasons, Crop period, base period, Duty, Delta, CCA, GCA, intensity of irrigation, factors affecting duty, Problems on water requirement and ca- pacity of canal.	5

	• Methods of application of irrigation water and its assessment. Surveys for irrigation project, data collection for irrigation project. • Area capacity curve. • Silting of reservoir, Rate of silting, factors affecting silting and control measures. • Control levels in reservoir, Simple numerical problems on Fixing Control levels.	
UNIT –III	**Dams and Spillways** • Dams and its classification: Earthen dams and Gravity dams (masonry and concrete). • Earthen Dams – Components with function, typical cross section, seepage through embank-ment and foundation and its control. • Methods of construction of earthen dam, types of failure of earthen dam and preventive measures. ▪ Gravity Dams – Forces acting on dam, Theoretical and practical profile, typical cross section, drainage gallery, joints in gravity dam, concept of high dam and low dam. • Spillways-Definition, function, location, types and components, Energy dissipaters.	**6**
UNIT –IV	**Minor and Micro Irrigation** • Bandhara irrigation: Layout, components, construction and working, solid and open bandhara. • Percolation Tanks – Need, selection of site. • Lift irrigation Scheme-Components and their functions, Lay out. • Drip and Sprinkler Irrigation- Need, components and Layout. • Well irrigation: types and yield of wells, advantages and disadvantages of well irrigation.	**8**
UNIT –V	**Diversion Head Works & Canals** • Weirs – components, parts, types, K.T. weir – components and construction • Diversion head works – Layout, components and their function. • Barrages – components and their functions. Difference between weir and Barrage. • Canals – Classification according to alignment and position in the canal network, Cross sec-tion of canal in embankment and cutting, partial embankment and cutting, balancing depth, Design of most economical canal section. • Canal lining - Purpose, material used and its properties,	**6**

	advantages.	
	• Cross Drainage works- Aqueduct, siphon aqueduct, super passage, level crossing.	
	• Canal regulators- Head regulator, Cross regulator, Escape, Falls and Outlets	

SUGGESTED LEARNING RESOURCES:

1. Punmia, B.C., Pande, B, Lal, Irrigation and Water Power Engineering, Laxmi Publications

2. Subramanayan, Engineering Hydrology, McGraw Hill.

3. Mutreja K N, Applied Hydrology, McGraw Hill

4. Sharma, R.K. and Sharma, T.K., Irrigation Engineering, S.Chand

5. Basak, N.N., Irrigation Engineering, McGraw Hill Education

6. Asawa, G.L., Irrigation and water resource Engineering, New Age

7. Dahigaonkar, J.G., Irrigation Engineering, Asian Book Pvt. Ltd., New Delhi.

8. Garg, S K, Irrigation and Hydraulic Structures, Khanna Publishers, Delhi.

9. Priyani V.B., Irrigation Engineering, Charotar Book Stall, Anand.

TRANSPORTATION ENGINEERING

L	T	P		Course Code No.: CEPC212
2	0	0		
Total Contact hrs.: Lecture:30 Tutorial:0 Practical: 0 **Credit : 2**			**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE

Airport Engineering and Railways, as specialized topics of Civil Engineering constitute important components of Transportation Engineering. Many–a-times diploma holders are involved in the construction and/or maintenance of airports, and railways. At the same time a state may not have many airports or the facility of railways. In such a case the subject may be offered as an elective to a student who plans carrier in line with the subject matter.

LEARNING OUTCOME

After completing this course, student will be able to:
- Identify the types of roads as per IRC recommendations.
- Implement the geometrical design features of different highways.
- Perform different tests on road materials.
- Identify the components of railway tracks.
- Identify the defects in railway tracks.

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT –I	**Overview of Highway Engineering** • Role of transportation in the development of nation, Scope and Importance of roads in India and its' Characteristics. • Different modes of transportation – land way, waterway, airway. Merits and demerits of roadway and railway; • General classification of roads. • Selection and factors affecting road alignment.	4
UNIT –II	**Geometric Design of Highway** • Camber: Definition, purpose, types as per IRC	8

	– recommendations. • Kerbs: Road margin, road formation, right of way. • Design speed and various factors affecting design speed as per IRC – recommendations. • Gradient: Definition, types as per IRC – Recommendations. • Sight distance (SSD): Definition, types IRC – recommendations, simple numerical. • Curves: Necessity, types: Horizontal, vertical curves. • Extra widening of roads: numerical examples. • Super elevation: Definition, formula for calculating minimum and maximum Super elevation and method of providing super-elevation. • Standards cross-sections of national highway in embankment and cutting.	
UNIT –III	**Construction of Road Pavements** • Types of road materials and their Tests – Test on aggregates-Flakiness and Elongation In-dex tests, Angularity Number test, test on Bitumen-penetration, Ductility, Flash and Fire point test and Softening point test. • Pavement – Definition, Types, Structural Components of pavement and their functions • Construction of WBM road. Merits and demerits of WBM & WMM road. • Construction of Flexible pavement / Bituminous Road, Types of Bitumen and its proper- ties, Emulsion, Cutback, Tar, Terms used in BR-prime coat, tack coat, seal coat, Merits andDemerits of BR. • Cement concrete road -methods of construction, Alternate and Continuous Bay Method, Construction joints, filler and sealers, merits and demerits of concrete roads. Types of joints.	**6**
UNIT –IV	**Basics of Railway Engineering** • Classification of Indian Railways, zones of Indian Railways • Permanent way: Ideal requirement, Components; Rail Gauge, types, factors affecting selection of a gauge.	**6**

	• Rail, Rail Joints - requirements, types. • Creep of rail: causes and prevention. • Sleepers - functions and Requirement, types - concrete sleepers and their density • Ballast - function and types, suitability. • Rail fixtures and fastenings – fish plate, spikes, bolts, keys, bearing plates, chairs-types of anchors and anti-creepers.	
UNIT - V	**Track geometrics, Construction and Maintenance** • Alignment- Factors governing rail alignment. • Track Cross sections – standard cross section of single and double line in cutting and em- bankment. Important terms-permanent land, formation width, side drains, • Railway Track Geometrics: Gradient, curves-types and factors affecting, grade compensation, super elevation, limits of Super elevation on curves, cant deficiency, negative cant, coning of wheel, tilting of rail. • Branching of Tracks, Points and crossings, Turn out- types, components, functions and inspection. Track junctions: crossovers, scissor cross over, diamond crossing, track triangle. • Station -Purpose, requirement of railway station, important technical terms, types of rail- way station, factors affecting site selection for railway station. • Station yard: Classification- Passenger, goods, locomotive and marshalling yards. Function & drawbacks of marshalling yards. • Track Maintenance- Necessity, Classification, Tools required for track maintenance with their functions, Organisation of track maintenance, Duties of permanent way inspector, gang mate and key man.	**6**

SUGGESTED LEARNING RESOURCES:

1. L.R. Kadiyali, Transportation Engineering, Khanna Book Publishing Co., Delhi (ISBN: 978-93-82609-858) Edition 2018

2. Khanna S.K., Justo, C E G and Veeraragavan, A., Highway Engineering, Nem Chand and Broth-ers, Roorkee.

3. Arora, N. L., Transportation Engineering, Khanna Publishers, Delhi.

4. Saxena S C and Arora S P, A Textbook of Railway Engineering, Dhanpat Rai Publication.

5. Birdi, Ahuja, Road, Railways, Bridge and Tunnel Engg , Standard Book House, New Delhi.

6. Sharma, S.K., Principles, Practice and Design of Highway Engineering,, S. Chand Publication,New Delhi.

7. Duggal, Ajay K. and Puri, V. P., Laboratory Manual in Highway Engineering, New Age Interna-tional (P) Limited, Publishers, New Delhi.

8. Subramanian, K.P., Highway, Railway, Airport and Harbour Engineering, Scitech Publications,Hyderabad.

HYDRAULICS LAB

L	T	P		Course Code No.: CEPC214
0	0	2		

Total Contact hrs.: Lecture:0 Tutorial:0 Practical: 30 **Credit : 1**	**Total marks: 100**	**Theory:** End Term Exam.:40 P.A: 60

RATIONALE
This course provides the student with an opportunity to explore the fundamental principles of fluid mechanics through experimentation.

LEARNING OUTCOME

After completing this course, student will be able to:
- Measure pressure and total hydrostatic pressure for different conditions.
- Determine head loss of fluid flow through pipes.
- Find the fluid flow parameters in open channels.
- Select relevant hydraulic pumps for different applications

COURSE CONTENT DETAILS

LIST OF PRACTICALS TO BE PERFORMED:

1. Use piezometer to measure pressure at a given point.
2. Use Bourdon's Gauge to measure pressure at a given point.
3. Use U tube differential manometer to measure pressure difference between two given points.
4. Find the resultant pressure and its position for given situation of liquid in a tank.
5. Use Reynold's apparatus to determine type of flow.
6. Use Bernoulli's apparatus to apply Bernoulli's theorem to get total energy line for a flow in a closed conduit of varying cross sections.
7. Use Friction factor Apparatus to determine friction factor for a given pipe.
8. Determine minor losses in pipe fittings due to sudden contraction and sudden enlargement.
9. Determine minor losses in pipe fitting due to Bend and Elbow.
10. Calibrate Venturi meter to find out the discharge in a pipe.
11. Calibrate the Orifice to find out the discharge through a tank
12. Use Current meter to measure the velocity of flow of water in open channel.
13. Use Pitot tube to measure the velocity of flow of water in open channel.
14. Use triangular notch to measure the discharge through open channel.
15. Use Rectangular notch to measure the discharge through open channel.

SUGGESTED LEARNING RESOURCES:

1. Modi, P. N. and Seth, S.M., Hydraulics and Fluid Mechanics, Standard book house, Delhi.
2. S.S. Rattan, Fluid Mechanics and Hydraulic Machines, Khanna Publishing House, Delhi
3. Ramamrutham, and Narayan, R., Hydraulics, Fluid Mechanics and Fluid Machines, Dhanpat Rai Publishing Company, New Delhi.
4. Khurmi, R S, Hydraulics, Fluid Mechanics, Hydraulic machines, S Chand Publishers, New Delhi.
5. Rajput, R K, Fluid Mechanics, S Chand, New Delhi.
6. Ojha, C S P, Berndtsson, R, and Chandramoulli P. N., Fluid Mechanics and Machinery, Oxford University Press, New Delhi.

ADVANCED SURVEYING LAB

L	T	P		Course Code No.: CEPC216
0	0	2		

Total Contact hrs.: Lecture:0 Tutorial:0 Practical: 30 **Credit : 1**	**Total marks: 100**	**Theory:** End Term Exam.:40 P.A: 60

RATIONALE

The aim of this course is to make students aware with different advance surveying methodologies applied to carry out large scale survey works as modern instruments have largely changed the approach to survey works with the principles being same.

LEARNING OUTCOME

After completing this course, student will be able to:
- Prepare plans using Plane Table Surveys.
- Prepare plans using Theodolite surveys.
- Find distances and elevations using Tachometer.
- Make measurements using Total Station.
- Locate coordinates of survey stations using GPS

COURSE CONTENT DETAILS

LIST OF PRACTICALS TO BE PERFORMED

1. Use plane table survey to prepare plans of a plot of seven sided closed traverse by Radiation Method.
2. Use plane table survey to prepare plans, locate details by Intersection Method.
3. Use plane table survey to prepare plans, locate details by Traversing Method.
4. Use plane table survey to carry out Survey Project for closed traverse for minimum five sides around a building.
5. Use transit theodolite to measure Horizontal and Vertical angle by Direct Method.
6. Plot the traverse on A1 size imperial drawing sheet for the collected data from preceding Theodolite Survey Project.
7. Use Thedolite as a Tacheometer to compute reduced levels and horizontal distances.
8. Set out a circular curve by Rankine's Method of Deflection Angles.
9. Use EDM to measure horizontal distance.
10. Use Total station instrument to measure horizontal distances.
11. Use Total station instrument to measure vertical angle.

12. Use Total station instrument to carry out Survey Project for closed traverse for minimum five sides.
13. Plot the traverse on A1 size imperial drawing sheet for the collected data from precedingTotal Station Survey Project.
14. Use GPS to locate the coordinates of a station.

SUGGESTED LEARNING RESOURCES

1. Kanetkar, T. P.; Kulkarni, S. V., Surveying and Levelling Part I and II, Pune Vidyarthi GruhPrakashan, Pune.

2. Basak, N. N.,Surveying and Levelling, McGraw Hill Education (India) Pvt. Ltd.,Noida.

3. Duggal, S. K., Survey I and Survey II, Tata McGraw Hill Education Pvt. Ltd., Noida.

4. Saikia, M D.; Das. B.M.; Das. M.M., Surveying PHI Learning Pvt. Ltd., New Delhi.

5. Subramanian, R., Surveying and Levelling, Oxford University Press. New Delhi.

6. Punmia, B.C,; Jain, Ashok Kumar; Jain, Arun Kumar, Surveying Vol. I and Surveying Vol. II, Laxmi Publications Pvt. Ltd., New Delhi.

7. Rao, P. Venugopala Akella, Vijayalakshmi, Textbook of Surveying, PHI Learning Pvt. Ltd., New Delhi.

8. Venkatramaiah, C, Textbook of Surveying, Universities Press, Hyderabad.

9. Anderson, James M and Mikhail, Edward M, Surveying theory and practice, Mc Graw Hill Ed-ucation, Noida.

10. De, Alak, Plane Surveying, S.Chand Publications, New Delhi.

WATER RESOURCES ENGINEERING LAB

L	T	P		Course Code No.: CEPC218
0	0	2		

Total Contact hrs.: Lecture:0 Tutorial:0 Practical: 30 **Credit : 1**	**Total marks: 100**	**Theory:** End Term Exam.:40 P.A: 60

RATIONALE

This course aims to enable the students to learn estimation of hydrological parameters. How to plan and design irrigation projects, canals and other diversion works.

LEARNING OUTCOME

After completing this course, student will be able to:
- Estimate hydrological parameters.
- Estimate crop water requirements of a command area and capacity of canals.
- Execute Minor and Micro Irrigation Schemes.
- Select relevant Cross Drainage works for the specific site conditions.
- Design, construct and maintain simple irrigation regulatory structures

COURSE CONTENT DETAILS

List of Practicals to be performed

1. Calculate average rainfall for the given area using arithmetic mean method.
2. Calculate average rainfall for the given area using isohyetal, Theissen polygon method.
3. Compute the yield of the Catchment area demarcated in **Sr.No.2**.
4. Delineation of contributory area for the given outlet from the given topo-sheet.
5. Estimate crop water requirement for the given data.
6. Estimate capacity of the canal for the given data.
7. Calculate reservoir capacity from the given data.
8. Calculate control levels for the given data for a given reservoir.
9. Draw a labeled sketch of the given masonry/earthen dam section.
10. Draw the theoretical and practical profile of the given gravity dam section.
11. Prepare a model of any irrigation structure using suitable material in your area, based on field visit.
12. Draw a labeled sketch of the given diversion head works and Cross Drainage works.

SUGGESTED LEARNING RESOURCES:

1. Punmia, B.C., Pande, B, Lal, Irrigation and water power engineering, Laxmi Publications

2. Subramanayan, Engineering Hydrology, McGraw Hill.

3. Mutreja K N, Applied Hydrology, McGraw Hill

4. Sharma, R.K. and Sharma, T.K., Irrigation Engineering, S.Chand and Company

5. Basak, N.N., Irrigation Engineering, McGraw Hill Education India Pvt. Ltd.

6. Asawa, G.L., Irrigation and water resource Engineering, New Age International(P)

7. Dahigaonkar, J.G., Irrigation Engineering, Asian Book Pvt. Ltd., New Delhi.

8. Garg, S K, Irrigation and Hydraulic structures, Khanna Publishers, Delhi.

9. Priyani V.B., Irrigation Engineering, Charotar Book Stall, Anand.

TRANSPORTATION ENGINEERING LAB

L	T	P		Course Code No.: CEPC220
0	0	2		

Total Contact hrs.: Lecture:0 Tutorial:0 Practical: 30 **Credit : 1**	**Total marks: 100**	**Theory:** End Term Exam.:40 P.A: 60

RATIONALE

This course intends to train the students understand and apply the types of roads as per IRC recommendations, geometrical design features of different highways.

LEARNING OUTCOME

After completing this course, student will be able to:
- Identify the types of roads as per IRC recommendations.
- Implement the geometrical design features of different highways.
- Perform different tests on road materials.
- Select the suitable material for road construction

COURSE CONTENT DETAILS

LIST OF PRACTICALS TO BE PERFORMED

1. Flakiness and Elongation Index of aggregates.
2. Angularity Number of aggregates.
3. Softening point test of bitumen.
4. Penetration test of bitumen.
5. Flash and Fire Point test of bitumen.
6. Ductility test of Bitumen.
7. Visit the constructed road for visual inspection to identify defects and suggest remedial measures.
8. Prepare the photographic report containing details for experiment **No. 7**
9. Visit the hill road constructed site to understand its components.
10. Prepare the photographic report containing details for experiment **No. 9**
11. Visit the road of any one type (flexible or rigid) to know the drainage condition.
12. Prepare the photographic report suggesting possible repairs and maintenance for experiment **No. 11**.

SUGGESTED LEARNING RESOURCES:

1. L.R. Kadiyali, Transportation Engineering, Khanna Book Publishing Co., New Delhi (ISBN:978-93-82609-858) Edition 2018

2. Khanna S.K., Justo, C E G and Veeraragavan, A., Highway Engineering, Nem Chand and Broth-ers, Roorkee.

3. Arora, N. L., Transportation Engineering, Khanna Publishers, Delhi.

4. Saxena S C and Arora S P, A Textbook of Railway Engineering, Dhanpat Rai Publication.

5. Birdi, Ahuja, Road, Railways, Bridge and Tunnel Engg , Standard Book House, Delhi.

6. Sharma, S.K., Principles, Practice and Design of Highway Engineering,, S. Chand

7. Duggal, Ajay K. and Puri, V. P., Laboratory Manual in Highway Engineering, New Age International (P) Limited, Publishers, New Delhi.

8. Subramanian, K.P., Highway, Railway, Airport and Harbour Engineering, Scitech Publications,Hyderabad.

ELECTIVE I : Any One

CONSTRUCTION MANAGEMENT

L	T	P		Course Code No.: CEPE202A
2	0	0		
Total Contact hrs.: Lecture:30 Tutorial:0 Practical: 0 **Credit : 2**			**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE

This course enables the students to learn about professional service that provides a project's owner(s) with effective management of the project's schedule, cost, quality, safety, scope, and function.

LEARNING OUTCOME

After competing this course, student will be able to:
- Understand the contract management and associated labour laws.
- Prepare and understand the nuances of executing the site layout.
- Prepare networks and bar charts for the given construction project.
- Understand the intricacies of disputes, related arbitration and settlement laws.
- Apply safety measures at construction projects.

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT –I	**Construction industry and management** • Organization-objectives, principles of organization, types of organization: government/public and private construction industry, Role of various personnel in construction organization Agencies associated with construction work- owner, promoter, builder, designer, architects. • Role of consultant for various activities: Preparation of Detailed Project Report (DPR), monitoring of progress and quality, settlement of disputes.	**4**
UNIT –II	**Site Layout**	**6**

	• Principles governing site layout. • Factors affecting site layout. • Preparation of site layout. • Land acquisition procedures and providing compensation.	
UNIT –III	**Planning and scheduling** • Identifying broad activities in construction work & allotting time to it, Methods of Scheduling, Development of bar charts, Merits & limitations of bar chart. • Elements of Network: Event, activity, dummy activities, Precautions in drawing Network, Numbering the events. • CPM networks, activity time estimate, Event Times by forward & backward pass calculation, start and finish time of activity, project duration. Floats: Types of Floats-Free, independent and total floats, critical activities and critical path, • Purpose of crashing a network, Normal Time and Cost, Crash Time and Cost, Cost slope, Optimization of cost and duration. • Material Management- Ordering cost, inventory carrying cost, Economic Order Quantity • Store management, various records related to store management, inventory control by ABC technique, Introduction to material procurement through portals (e.g. www.inampro.nic.in).	**8**
UNIT –IV	**Construction Contracts and Specifications** • Types of Construction contracts • Contract documents, specifications, general special conditions • Contract Management, procedures involved in arbitration and settlement (Introduction only)	**6**
UNIT –V	**Safety in Construction** • Safety in Construction Industry—Causes of Accidents, Remedial and Preventive Measures. • Labour Laws and Acts pertaining to Civil construction activities (Introduction only)	**6**

SUGGESTED LEARNING RESOURCES

1. Sharma S C and Deodhar S V, Construction Engineering and Management, Khanna Book Publishing, New Delhi

2. Gahlot,P.S. and Dhir, B.M Construction planning and management New Age International
   (P) Ltd. Publishers, New Delhi.

3. Shrivastava, U.K., Construction planning and management, Galgotia Publication Pvt Ltd. NewDelhi

4. Mantri, S., The A To Z of Practical Building Construction and its Management, Satya Prakashan
New Delhi

5. Khanna, O.P. , Industrial Engineering and management, Dhanpat Rai New Delhi

6. Punmia, B.C. and Khandelwal, K.K., Project Planning and Controlling with PERT And CPM,
Laxmi Publications (P)Ltd.

7. Sengupta, B., Guha H., Construction Management and Planning, Tata-McGraw Hill.

8. Harpal, Singh, Construction Management and accounts, Mc-Graw Hill.

9. Sharma, S.C., Industrial Engineering and Management, Khanna Publications, New Delhi

PRECAST AND PRESTRESSED CONCRETE

L	T	P		Course Code No.: CEPE202B
2	0	0		
Total Contact hrs.: Lecture:30 Tutorial:0 Practical: 0 **Credit : 2**			**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE

This course aims to introduce various types of precast and prefabricated concrete elements to the students. As an Civil Engineer, he will understand prestressing methods, systems for Reinforced Concrete members and issues involved in design of prestressing system and loss of prestressing.

LEARNING OUTCOME

After competing this course, student will be able to:
- Select the relevant precast concrete element for a given type of construction.
- Use relevant components for prefabricated structures.
- Justify the relevance of prestressed element in a given situation.
- Select relevant methods / systems for given construction work.
- Propose suitable cable profile for the given prestressed concrete members.

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT –I	**Precast concrete Elements** • Advantages and disadvantages of precast concrete members • Non-structural Precast elements - Paver blocks, Fencing Poles, Transmission Poles, Manhole Covers, Hollow and Solid Blocks, kerb stones as per relevant BIS specifications • Structural Precast elements – tunnel linings, Canal lining, Box culvert, bridge panels, foundation, sheet piles • Testing of Precast components as per BIS standards	4
UNIT –II	**Prefabricated building** • Precast Structural Building components such as slab panels, beams, columns, footings, walls, lintels and	6

	chajjas, staircase elements, • Prefabricated building using precast load bearing and non load bearing wall panels, floor systems - Material characteristics, Plans & Standard specifications • Modular co-ordination, modular grid, and finishes • Prefab systems and structural schemes and their classification including design considerations • Joints – requirements of structural joints and their design considerations • Manufacturing, storage, curing, transportation and erection of above elements, equipment needed	
UNIT –III	**<u>Introduction to Prestressed Concrete</u>** • Principles of pre-stressed concrete and basic terminology. • Applications, advantages and disadvantages of prestressed concrete • Materials used and their properties, Necessity of high-grade materials • Types of Pre-stressing steel -Wire, Cable, tendon, Merits-demerits and applications	**5**
UNIT –IV	**<u>Methods and systems of prestressing</u>** • Methods of prestressing – Internal and External pre-stressing, Pre and Post tensioning- applications • Systems for pre tensioning – process, applications, merits and demerits - Hoyer system • Systems for post-tensioning - process, applications, merits and demerits - Freyssinet system, Magnel Blaton system, Gifford Udall system. • Prestressing force in Cable, Loss of prestress during the tensioning process - loss due to friction, length effect, wobbling effect and curvature effect, (Simple Numerical problems to determine loss of pre-stress), Loss of pre-stress at the anchoring stage. • Loss of pre-stress occurring subsequently: losses due to shrinkage of concrete, creep of concrete, elastic shortening, and creep in steel, (Simple Numerical problems to determine loss of pre-stress). • BIS recommendations for percentage loss in case of Pre and Post tensioning.	**8**
UNIT –V	**<u>Analysis and design of Prestressed rectangular beam section</u>** • Basic assumptions in analysis of pre-stressed concrete beams. • Cable Profile in simply supported rectangular beam	**7**

| | | section – concentric, eccentric straight and parabolic
• Effect of cable profile on maximum stresses at mid span and at support.
• Numerical problems on determination of maximum stresses at mid spans with linear (concentric and eccentric) cable profiles only.
• Simple steps involved in Design of simply supported rectangular beam section (No numerical problems) | |

SUGGESTED LEARNING RESOURCES

1. Krishna Raju, N., Pre-stressed Concrete, Tata McGraw Hill, New Delhi.

2. Shrikant B. Vanakudre, Prestressed Concrete, Khanna Publishing House, New Delhi

3. Marzuki, Nor Ashikin, Pre Cast and Pre Stress Technology: Process, Method and Future Technology, Createspace Independent Publication.

4. Indian Concrete Institute., Handbook on Precast Concrete buildings.

5. Elliott, Kim S., Precast Concrete Structures, CRC Press, New York.

6. Lin, T.Y., Design of Pre-Stressed Concrete Structures, John Wiley and Sons, New York Nagarajan, Pravin., Pre-stressed Concrete Structures, Pearson Education India

7. BIS, New Delhi. IS 12592 Precast Concrete Manhole Cover and Frame, BIS, New Delhi

8. BIS, New Delhi. IS 15658 Precast concrete blocks for paving - Code of Practice, BIS, New Delhi

9. BIS, New Delhi. IS 15916 Building Design and Erection Using Prefabricated Concrete - Code of Practice, BIS, New Delhi

10. BIS, New Delhi. IS 15917 Building Design and Erection Using Mixed/Composite Construction - Code of Practice, BIS, New Delhi

11.BIS, New Delhi. IS 458 Precast Concrete Pipes (with and without reinforcement) — Specification, BIS, New Delhi

RURAL CONSTRUCTION TECHNOLOGY

L	T	P		Course Code No.: CEPE202C
2	0	0		

Total Contact hrs.: Lecture:30 Tutorial:0 Practical: 0 **Credit : 2**	**Total marks: 100**	**Theory:** End Term Exam.:60 P.A: 40

RATIONALE

This course enables the students to learn development and planning of low cost housing infrastructure, different government schemes for rural development, techniques for rural road construction and watershed management in rural areas.

LEARNING OUTCOME

After competing this course, student will be able to:
- Plan low cost housing using rural materials.
- Make use of relevant government schemes for construction of roads and housing.
- Use guidelines for rural road construction.
- Implement different irrigation systems for rural areas.
- Identify the need of watershed management in rural areas

COURSE CONTENT DETAILS

UNIT NO.	CONTENT	TIME ALLOTTED (HRS.)
UNIT –I	**Rural Development and Planning** • Scope; development plans; various approaches to rural development planning. • Significance of rural development. • Rural development programme/projects.	**4**
UNIT –II	**Rural Housing** • Low cost construction material for housing • Composite material- ferro-cement & fly ash, autoclaved calcium silicate bricks and • soil-stabilized un-burnt brick; Plinth protection of mud walls. • Water-proof and fire-retardant roof treatment for thatch roofs. Pre-cast stone masonry, rat trap bond for walls; Panels for roof, ferro-cement flooring/roofing units. • Biomass - types of fuels such as firewood, agricultural residues, dung cakes. • Renewable energy and integrated rural energy program - Objectives, Key elements, Implementation, Financial	**8**

	provisions, sources of renewable energy. • Working of gobar gas and bio gas plants.	
UNIT –III	**Water Supply and Sanitation for Rural Areas** • Sources of water: BIS & WHO water standards. • Quality, Storage and distribution for rural water supply works. • Hand pumps-types, installation, operation, and maintenance of hand pumps. • Conservation of water - rainwater harvesting, drainage in rural areas. • Construction of low cost latrines: Two pit pour flush water seal, septic tank etc. • Low cost community and individual Garbage disposal systems, Ferro-cement storage tanks.	6
UNIT –IV	**Low Cost Rural Roads** • Broad categories of Pavement Layers, types of Granular Sub-Bases and Bases. • Guidelines for Surfacing of Rural Road as per relevant IRC codes. • Pradhan Mantri Gram Sadak Yojna (PMGSY)- Highlights of Scheme.	5
UNIT –V	**Low Cost Irrigation** • Design consideration and construction of tube-well, drip & sprinkler irrigation systems. • Watershed and catchment area development –problems and features of watershed management. • Watershed management structures - K. T. weir, Gabian Structure, Cement Plug, Contour Bunding, Farm pond, Bandhara system.	7

SUGGESTED LEARNING RESOURCES

1. Madhov Rao A G, and Ramachandra Murthy, D S, Appropriate Technologies for low cost Housing Oxford and IBH Publishing Co. Pvt. Ltd.

2. CBRI, Roorkee, Advances in Building Materials and Constriction.

3. Desai,Vasant , Rural Development in India: Past, Present and Future : a Challenge in the Crisis, Himalaya Publishing House, Delhi.

4. Rastogi, A.K.Rural Development Strategy, Wide Vision, Jaipur.

5. Singh, Katar, Rural Development Principles, Policies and Management, Sage Publications India Pvt Ltd.

6. Gaur, Keshav Dev, Dynamics of Rural Development, Mittal Publications, Delhi.

7. Document Published by Ministry of Rural development, Govt. of India, Ministry of Rural development

ESSENCE OF INDIAN KNOWLEDGE AND TRADITION

L	T	P		Course Code No.: AU202
2	0	0		

Total Contact hrs.: Lecture: 30 Tutorial:0 Practical: 0 **Credit : 0**	Max. Marks: 100	Min. Passing Marks:40 (Progressive Assessment Only)

Rationale:

Considering the need of protecting Indian knowledge and tradition, the diploma level students of Automobile Engineering should be facilitated the concepts Indian traditional knowledge and to make them understand the importance of roots of knowledge system and methods of application in today's life and how to protect traditional knowledge system. Interpretation of the concepts of Intellectual property to protect the traditional knowledge as well as importance of Traditional knowledge in Agriculture and Medicine must be known

Course Outcome:
On successful completion of the course, students will be able to:
- Discuss the concepts of traditional Indian knowledge and roots of knowledge system and indigenous knowledge system
- Explain the technique of protection of traditional Indian knowledge
- Discuss legal frameworks of traditional knowledge
- State intellectual property rights
- State traditional knowledge in Different Sectors

Course content details

UNIT	TOPIC/SUB-TOPIC	HRS.
1	Introduction to traditional knowledge: Define traditional knowledge, nature and characteristics, scope and importance, kinds of traditional knowledge (Unani / Siddha/ Ayurveda), Indigenous Knowledge (IK), characteristics, traditional knowledge vis-a-vis indigenous knowledge, traditional knowledge of Meghalaya	07
2	Protection of traditional knowledge (TK): The need for protecting traditional knowledge, Significance of TK Protection, value of TK in global economy, Role of Governmentto harness TK.	07
3	Legal framework and TK: The Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006, Plant Varieties Protection and Farmer's Rights Act, 2001 (PPVFR Act); The Biological Diversity Act 2002 andRules 2004, the protection of traditional knowledge bill, 2016.	06

4	Traditional knowledge and intellectual property: Systems of traditional knowledge protection, Legal concepts for the protection of traditional knowledge, Patents and traditional knowledge, Strategies to increase protection of traditional knowledge, Geographical Indications (GI).	04
5	Traditional Knowledge in Different Sectors: Traditional knowledge and engineering, Traditional medicine system, TK in agriculture, Traditional societies depend on it for their food and healthcare needs, Importance of conservation and sustainable development of environment, Management of biodiversity, Food security of the country and protection of TK	06

Reference

Books:

1. Traditional Knowledge System in India, by Amit Jha, 2009.

2. "Knowledge Traditions and Practices of India" Kapil Kapoor.

3. Madhya Himalayi Sanskriti mein Gyan, Vigyan evam Paravigyan by Prof PC Pandey.

Suggested Online Link:

Web Links:
1.https://www.youtube.com/watch?v=LZP1StpYEPM
2.http://nptel.ac.in/courses/12110600/