Shirpur Education Society's

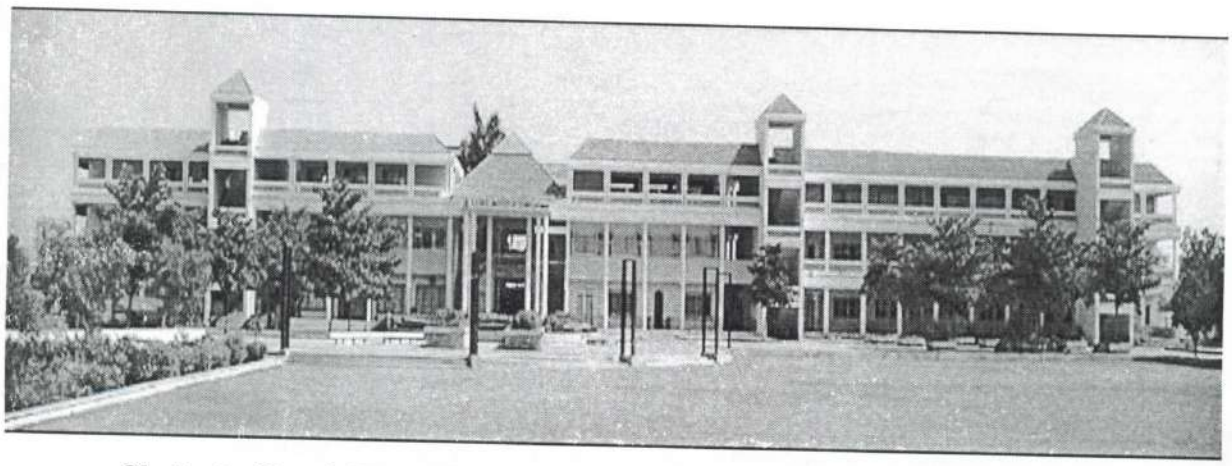
R. C. Patel Institute of Technology, Shirpur

(An Autonomous Institute)

Course Structure

Third Year B. Tech (Civil Engineering)

With effect from Year 2022-23



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Semester-V

Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credit
							Continuous Assessment (CA)				ESE		
							TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Best of (TT1 & TT2)			
				L	T	P	[A]			[B]	[C]	[A+B+C]	
1	PC	PCCE5010T	Hydraulics and Fluid Machinery	3	1		20	15	15	15	65	100	4
2	PCL	PCCE5010L	Hydraulics and Fluid Machinery Laboratory			2	25				25	50	1
3	PC	PCCE5020T	Design of Concrete Structures	3			20	15	15	15	65	100	3
4	PCL	PCCE5020L	Design of Concrete Structures Laboratory			2	25				25	50	1
5	PC	PCCE5030T	Transportation Engineering	2			20	15	15	15	65	100	2
6	PCL	PCCE5030L	Transportation Engineering Laboratory			2	25				25	50	1
7	PC	PCCE5040T	Theory of Structure	2	1		20	15	15	15	65	100	3
8	PE	PECE5050-T	Professional Elective Course – I	3			20	15	15	15	65	100	3
9	HS	HSCE5060T	Civil Engineering Social & Global Impact	1			50					50	1
10	HM	HMCE5070T	Professional & Business Communication	2			50					50	2
11	PJ	PJCE5080L	Semester Project-III			2	25				25	50	1
12	HM	HMCE5090L	Employability skills development program- II			2	50					50	1
			Total	16	2	10	350	75	75	75	425	850	23

Semester-VI

Sr	Course Category	Course Code	Course Title	Teaching Scheme			Evaluation Scheme					Total	Credit
							Continuous Assessment (CA)				ESE		
							TA	Term Test 1 (TT1)	Term Test 2 (TT2)	Best of (TT1 & TT2)			
				L	T	P	[A]			[B]	[C]	[A+B+C]	
1	PC	PCCE6010T	Estimating & Costing	3	1		20	15	15	15	65	100	4
2	PCL	PCCE6010L	Estimating & Costing Laboratory			2	25				25	50	1
3	PC	PCCE6020T	Design of Steel Structures	3	1		20	15	15	15	65	100	4
4	PCL	PCCE6020L	Design of Steel Structures Laboratory			2	25				25	50	1
5	PC	PCCE6030T	Engineering Geology	3			20	15	15	15	65	100	3
6	PCL	PCCE6030L	Engineering Geology Laboratory			2	25				25	50	1
7	PC	PCCE6040T	Construction Management	2			20	15	15	15	65	100	2
8	PE	PECE6050-T	Professional Elective Course -II	3			20	15	15	15	65	100	3
9	PJ	PJCE6060L	Project Stage-I			4	25				25	50	2
10	ES	ESCE6070L	Computer Aided Civil Engineering Drawing	1		2	50					50	1
11	MC	MCCE6080T	Environmental Studies	1	-	-	-	-	-	-		-	Audit
			Total	16	2	12	250	75	75	75	425	750	22

Prepared by

Dean Academic/Dy. Director

Checked by

C.O.E.

R. C. Patel Institute of Technology, Shirpur
SES
SHIRPUR EDUCATION SOCIETY
Autonomous

BOS Chairman

Director

Hydraulics and Fluid machinery (PCCE5010T)

Teaching Scheme
Lectures : 03 Hrs./week
Tutorial : 01 Hr/week
Credit : 04

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives

1. Student will able to Understand, analyze and design the flow through open channels.
2. Students will able to understand boundary layer condition for different condition.
3. The student must have knowledge of hydraulic machines like pumps and turbines that are commonly used in civil engineering.
4. Understand the application of Hydraulic machines impact of jet, turbine and pumps etc.

After successful completion of course, students should able to:

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply basic principles of flow in open channel to solve fluid flow problems.	3	Apply
CO2	Understand and solve problems in uniform, gradually and rapidly varied flows in open channel in steady state conditions.	2,3	Understand, Apply
CO3	Impart knowledge of boundary layer flows, governing equations of fluid flow for different flow regimes, different geometries under the effect of various boundary conditions.	2,5	Understand, Evaluate
CO4	Understand the theory of impact of jet and apply the same for analyzing hydraulic turbine.	3,4	Apply, Analyze
CO5	Discuss performance of hydraulic turbines and centrifugal pumps in terms of unit and specific quantities and demonstrate their characteristics curves.	2,3	Understand, Apply

Course Contents

Unit- I Flow in Open Channels **07 Hrs.**

Definition of open channel, difference between pipe and open channel flow, classification, types of flows, geometric properties of open channels.
Uniform flow in open channels, Chezy's & Manning's formula, most economical open sections- rectangular, trapezoidal, circular sections- derivations. Specific energy, Specific energy curve, Condition for maximum discharge & minimum specific energy, Critical flow in rectangular sections, Specific force.

Unit-II G.V.F and R.V.F **06 Hrs.**

Gradually varied Flow (G.V.F.): Definition, classification of channel Slopes, dynamic equation of G.V.F. (Assumption and derivation), classification of G.V.F. profiles-examples.
Rapidly varied flow (R.V.F.): Definition, practical examples, hydraulic jump- phenomenon, relation of conjugate depths, parameters, uses, types of hydraulic jump.

Unit-III Boundary Layer Theory **07 Hrs.**

Assumption and concept of boundary layer theory. Boundary-layer thickness, displacement, momentum & energy thickness, laminar and turbulent boundary layers on a flat plate; laminar sub-layer, smooth and rough boundaries. Local and average friction coefficients. Separation and Control.

Unit-IV Impact of jets and Turbines **10 Hrs.**

Impact of Jets: Dynamic of force and momentum, impulse momentum equation, jet force on stationary and moving vanes, jet propulsion.

Turbines: Classification and types of turbines, impulse and reaction turbines, components and parts, vane angle, inflow and outflow condition, efficiency and characteristics of turbines based on Performance, specific speed, selection criteria for turbines, Governing of turbines, cavitation, draft tube and its function.

Unit-V Pumps **09 Hrs.**

Pumps: Basics, operating characteristics, pump head curve, system head curve, pumps in series &parallel, common problems and remedies; heads and efficiencies; specific speed; multistage pump for high head and large discharge; model testing of pump with applications of dimensional analysis .

Reference Books:

1. Fluid Mechanics & Hydraulic Machines by S. C. Gupta, Darling Kindersley (I) pvt. Ltd. Pearson lieensee, Nodia, UP.
2. Fluid Mechanics – Fundamentals and applications by Yunus cengel, Jhon M Cimbala, Tata McGraw Hill Publishing Company Ltd New Delhi, latest edition/ reprint.
3. Open Channel Hydraulics by V. T. Chow.
4. Open Channel Flow- by K. Subramnaya, Tata MacGraw Hill Publishing Ltd., New Delhi.
5. Fluid Mechanics- by D.S.Kumar, S.K.Katariya & Sons, Delhi.

Text Books:

1. Hydraulics and fluid mechanics including Hydraulic machines by Dr. P. N. Modi and S. M. Seth, Latestedition, Standard book house (2002).
2. Theory and application of fluid mechanics by K Subramanya, Tata McGraw Hill Publishing Company Ltd. New Delhi.
3. A textbook of Fluid Mechanics & Hydraulic Machines by R. K. Bansal.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Best of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1. Question Paper will be based on entire syllabus summing up to 65 marks
2. Total duration allotted for writing the paper is 3 hr.

Tutorial

Min five tutorials shall be conducted

Hydraulics and Fluid Machinery Laboratory (PCCE5010L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Course Objectives

1. Demonstrate behavior of different material under axial shear and bending forces.
2. Identify various types of stresses in various structural elements.
3. Determine strength of different construction materials.

After successful completion of this course students shall be able to

Cos	Course Outcomes	Blooms Level	Blooms Description
CO1	Know various constant and coefficient used in open channel.	2	Understand
CO2	Analyze various types of losses in pipe flow.	3, 4	Apply, Analyze
CO3	Determine boundary layer distribution on various shape.	2	Understand
CO4	Understand mechanism of hydraulic jump.	2	Understand
CO5	Apply knowledge of Hydraulics and hydraulics machines in calculating the properties of hydraulics structure.	5	Evaluate

List of Experiments

Term work shall consist of performing experimental sets from the list below.

1. Determination of Chezy's and Manning's constant.
2. Determination of coefficient for Venturi flume/Standing wave flume.
3. Measurement of drag and lift force on airfoil.
4. Determination and analysis of pressure distribution over circular cylinder.
5. Determination Depth of Hydraulic Jump.
6. Trial on Pelton turbine
7. Trial on Francis turbine
8. Trial on Kaplan turbine
9. Trial on Centrifugal pump
10. Trial on reciprocating pump

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 6 experiments and subject specific lab assignment/ Case study

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks

2. Journal Submission: 05 Marks

3. Viva-voce: 05 Marks

4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to Satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the Teacher assessment.

End Semester Examination:

Oral / Practical examination will be based on the entire syllabus including, the practical's performed During laboratory sessions.

Design of Concrete Structure (PCCE5020T)

Teaching Scheme
Lectures : 03 Hrs./week
Tutorial : 00 Hr/week
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Pre-requisite – Engineering Mechanics, Mechanics of Solids, Structural Analysis,

Course Objectives

1. To introduce the various basic design philosophies followed in Reinforced Concrete Design.
2. To develop Civil Engineering graduates having clear understanding of concepts of reinforced concrete design using Limit state approach.
3. To impart the concepts of design and detailing of RCC components under flexure, shear and bond.
4. To apply the design and detailing of RCC structural components for serviceability using Limit state method.
5. To familiarize students to use of IS 456 and relevant IS codes, its importance in RCC design.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will able to learn the different design philosophies as per the provisions made in IS-456-2000.	1	Learn
CO2	Students will able to analyze and design singly and doubly reinforced section using limit state method.	4	Analyze and design
CO3	Students will able to apply limit state of Collapse for shear and bond.	3	Apply
CO4	Students will able to Evaluate and design of slab, staircase, column and footings.	5	Evaluate

Course Contents

Unit- I Design Philosophies – **06 Hrs.**

Different design philosophies - Working stress method, Ultimate load method, Limit state method, Stress-strain behavior of materials, Permissible stresses in steel and concrete, structural properties of concrete.

Unit-II Design of beam – Flexure **09 Hrs.**

a) Introduction to limit state method– Types and classification of limit states, Characteristic strength and characteristic load, Load factor, Partial safety factors.
b) Singly and Doubly Reinforced Section –Assumptions, stress & strain diagram, Balanced, under reinforced & over reinforced RC sections, Analysis and design of rectangular section.
c) Flanged Section – Properties of flanged (L and T) sections, Analysis and design of flanged sections.

Unit-III Design of beam – Shear and Bond **08 Hrs.**

Shear failure, Types of Shear reinforcement (Simply supported beams, cantilever beams & continuous beams using IS code coefficient method.)

Bond- Types of bond, Factors affecting bond resistance, Check for development length

Unit-IV Design of Slab and Staircase **08 Hrs.**

a) Design of Slabs – Simply supported One way slab, Cantilever Slab, continuous slab, Two way slab with different support conditions as per IS:456-2000.

b) Design of Staircase – Design of doglegged staircase.

Unit-V Analysis and Design of Columns and Column footings **08 Hrs**

a) Column – Assumptions, Effective height of columns, Minimum eccentricity, Short column under axial compression, requirements for reinforcement, Column with helical reinforcement, Short column under axial load and uni-axial bending.

b) Isolated Column Footing – Isolated rectangular column footing with constant depth, trapezoidal section subjected to axial loads.

Text Books:

1. Limit state theory and Design –Dr. V. L. Shah and Dr. S. R, Structures publications, Pune
2. Dr. H. J .Shah,(2008),"Reinforced Concrete, Volume 2", Charotar Publishing House Pvt. Limited, ISBN 8185594732, 536 pages
3. S. N. Sinha, (2002),"Reinforced Concrete Design, Second Revised Edition", Tata McGraw-Hill Education, ISBN 0070473323, 708 pages
4. Karve & Shah, (2011), "Illustrated Design of Reinforced concrete Buildings",
5. P.C. Varghese (2009), "Limit state design of Reinforced concrete," PHI Learning.
6. B.C. Punmia, Ashok kumar Jain and Arun kumar jain (2007), Limit State Design of Reinforced Conctrete.
7. Sinha and Roy, S. "Fundamentals of Reinforced Concrete" –Chand and company Ltd. Ram Nagar, New Delhi
8. Gambhir-Mcmillan, "Reinforced Concrete Design-M. L. India Ltd. New Delhi.
9. Bandyopadhyay J. N.(2008) "Design of concrete structures" PHI Learning, New Delhi.
10. Bhasvikatti S S, (2007), "Design of RCC structural elements RCC- I", New age International, Publishers.

Reference Books:

1. P. Dayaratnam,(2011), "Design of Reinforced Concrete Structures", Oxford &Ibh-Pubs Company-New Delhi, ISBN 8120414195
2. Ashok K. Jain(1993), "Reinforced Concrete: Limit State Design" , Nem Chand & Brothers, ISBN 8185240531, 844 pages.
3. Design of Reinforced Concrete Structures (conforming to IS 456)S. Ramamrutham, R. Narayan , Dhanpat Rai Publication, 7th edition 2013

Design Codes:

1. IS 456 (2000) Plain and reinforced concrete – Code of practice, Bureau of Indian Standard, Manak Bhavan, New Delhi.
2. Design aids for reinforced concrete to IS 456-1978, Bureau of Indian Standard, Manak Bhavan, New Delhi.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

4. Two term tests of 15 marks each will be conducted during the semester.
5. Total duration allotted for writing each of the paper is 1 hr.
6. Best of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

3. Question Paper will be based on entire syllabus summing up to 65 marks
4. Total duration allotted for writing the paper is 3 hr.

Design of Concrete Structure (PCCE5020L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment: 25 Marks
End Sem Exam : 25 Marks
Total Marks : 50 Marks

Pre-requisite – Engineering Mechanics, Mechanics of Solids, Structural Analysis

Course Objectives

1. To analyze and design G+2 building.
2. To impart understanding of various aspects of design of Reinforced Concrete.
3. Application of IS code provisions for design of structural elements. Drawing reinforcement detailing for designed structural elements.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will able to calculate forces on various structural elements	3	Calculate
CO2	Students will able design all individual structural elements	4	Design
CO3	Students will able to prepare detailed structural drawings of a RCC structure	3	Prepare

Course Contents

Lab course work shall consist of detailed structural design and drawing of G + 2 building covering slab, beam, column, footing & stair case.

A design report shall be prepared showing details on half imperial drawing sheets. A few typical details of beam column etc. shall be shown on A4 / A3 size sheets using drafting software also.

A report on at least one site visit shall be submitted in term work.

1) Structural Layout – (Typical detail drawing of structural elements- Sheet 1)

a) To prepare a plan of G+2 building (Residential/ Commercial).

b) To draw layout of Ground beam, plinth bean, floor beam, column, slabs etc. **(Sheet-2)**

2) Analysis and design of beams and slabs

a) To calculate of loads and internal forces on beams and slabs.

b) To decide the sections and calculate steel reinforcement.

c) To draw structural drawing of beams, slab. **(Sheet 3- For Beam, Sheet 4- For Slab)**

3) Analysis and design of column and footing

a) To calculate loads and internal forces on columns and footings.

b) To decide the sections and calculate steel reinforcement.

c) To draw structural drawing of column and footing. **(Sheet 5- For Column, Sheet 6- For Footing)**

4) Analysis and design of dog-legged staircase

a) To calculate loads and internal forces.

b) To calculate steel reinforcement.

c) To draw structural drawing of dog-legged staircase **(Sheet 7- For staircase)**

5) A report on at least one site visit.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 6 sheets, visit report and subject specified assignments/ case study/ other activities.

The distribution of marks shall be as follows:

1. Performance in practical: 05 Marks
2. Submission of bunch of sheets: 05 Marks
3. Viva-voce: 05 Marks
4. Assignments/ Case study: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to satisfactory performance of practical work and upon fulfilling minimum passing criteria in the teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practical's performed during practical sessions.

Transportation Engineering (PCCE5030T)

Teaching Scheme
Lectures : 02 Hrs./week
Tutorial : NIL
Credit : 02

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives

1. To provide a coherent development to the students for the courses in sector of Engineering like Transportation Engineering
2. To present the foundations of many basic Engineering tools and concepts related Highway Engineering
3. To provide a coherent development to the students for the courses in sector of Railway Engineering
4. To understand the basics involved in the crossing and turnout of railway track.
5. To understand the Civil engineering aspects of Highway and Railway Engineering.

Cos	Course Outcomes	Blooms Level	Blooms Description
CO1	The students will gain an experience in the implementation of Transportation Engineering on engineering concepts which are applied in field Highway Engineering	3	Apply
CO2	The students will learn to understand the theoretical and practical aspects of highway engineering along with the design and management applications	4	Analyzing
CO3	The students will learn to design the pavements by considering various aspects associated with traffic safety measures	3	Apply
CO4	Know about the basics and design of various components of railway engineering	2 2	Understand Understand
CO5	Understand the types and functions of tracks, junctions and railway stations.	3 4	Apply Analyzing

Course Contents

Unit- I Introduction to Highway Engineering **06 Hrs.**

a. Highway Planning and Development: Highway planning in India, development, rural and urban roads, road, departments in India, road classification, road authorities i.e. IRC, CRRI, NHAI, etc., Financing of road projects, road safety audit.

b. Field Surveys: Reconnaissance, aerial surveys, location surveys, location of bridges.

Highway alignment: Basic requirements of an ideal alignment and factors controlling it, special requirements for hill roads.

C. Highway Geometric Design: Topography and physical features, cross section elements like carriageway width, formation width, right of way, etc., friction, Light reflecting characteristics, roughness, camber, sight distances, horizontal alignment, design speed, super-elevation, transition curve, gradients.

Unit-II Highway Material **08 Hrs.**

a. Road Materials: Aggregates and their types, physical and engineering properties, Fillers, bitumen, characteristics, emulsions and cutbacks, basic tests on all materials, soil investigation, test on soil; CBR, test

b. Construction of Roads: Stabilized earth, gravel roads, W.B.M. roads, high cost Roads: bituminous roads, cement concrete roads.

Highway Drainage: Surface and sub-surface drainage arrangements,

c. Highway Pavements: Design of Flexible (G.I. method and CBR method using IRC recommendations) and rigid Maintenance & Strengthening of pavements.

Unit-III Traffic control **06 Hrs.**

a. Traffic Engineering: Road user characteristics, vehicular characteristics, traffic flow characteristics, speed, traffic volume studies, parking studies - definition, purpose, types, survey methods. Accident studies - purpose, types, causes, collision diagram, condition diagram, preventive measures

b. Traffic control devices: pavement marking, signs, signals, Traffic management, various types of intersection and their design criteria, Traffic Simulation & its advantages,

Roadside Developments: Arboriculture, street lighting.

c. Advanced Urban Transport Technology: Classification, mass and rapid transit system, introduction to intelligent transportation System (ITS), electronic toll Collection.

Unit-IV Introduction to Railway Engineering **8 Hrs.**

Introduction: Role of Civil Engineers in Infrastructure Development, Advantages of Railways as mode of transport, Organizational structure, Permanent Way, definition of track, basic components, and ideal requirements.

b. Railway Track Gauge: Different gauges on Indian Railways, loading gauge, construction gauge, Ungauged, Problems caused by change of gauge. **Track and Track stresses** requirements, forces acting on Track, coning of Wheels, Tilting of Rails, Rails: Functions, types of rails, rail joints, rail failure, function suitability and drainage, treatment, Defects, Standard rail sections

Alignment of Railway lines: Importance, Basic requirements of an ideal alignment, selection of a good alignment, Geometric design of Track: Necessity for geometric design, Gradients, Grade compensation on curves, Super elevation, equilibrium cant, cant deficiency, maximum permissible speed, and negative super elevation. Resistance to-friction, wave action, Causes of creep, Effects of creep

Unit-V **Points & Crossing** **8 Hrs**

a. Construction and Track maintenance: Plate laying method, operations involved Tools & common items of track maintenance.
a. Points and crossings: Important terms, types of track layouts and sketches of turn out, diamond crossing, triangle, double junction, scissors cross over, Single slip, Double slip, Gathering line, Signalling and interlocking: objectives of signalling, classification of signals, CTC and ATC system, Interlocking & it's Principles.

Reference Books:

1. Khanna and Justo, "Highway Engineering", Nemchand& Bros., Roorkee.
2. Khanna S.K., "Highway Engineering".
3. Arora N. L., "Transportation Engineering".
4. Bindra and Arora, "Highway Engineering", Standard Publishers.
5. Vazirani V.N. and Chandola S.P., "Transportation Engineering", VolIKhanna Publishers, N. Delhi.
6. Vazirani V.N. and Chandola S.P., "Transportation Engineering", Vol II Khanna.

Text Books:

1. Saxena S.C. & Arora S. P. A course of Railway Engineering, Dhanpat Rai & Sons, New Delhi.,7th edition, 2010
2. Agarwal M. M. – Indian Railway Track, Sachdeva Press, Mayapuri, New Delhi.,5th edition 2013

Evaluation Scheme:
Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

4. Two term tests of 15 marks each will be conducted during the semester.
5. Total duration allotted for writing each of the paper is 1 hr.
6. Best of the marks scored in both the two tests will be considered for final grading.

End Semester Examination ©:

3. Question Paper will be based on entire syllabus summing up to 65 marks
4. Total duration allotted for writing the paper is 3 hr.

Tutorial

Min five tutorials shall be conducted

Transportation Engineering Laboratory (PCCE5030L)

Teaching Scheme
Lectures : 0 Hrs./week
Practical : 2 Hr/week
Credit : 01

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives

1. To provide a coherent development to the students for the courses in sector of Engineering like Transportation & Traffic Engineering etc.
2. To present the foundations of many basic Engineering tools and concepts related Highway Engineering
3. To provide a coherent development to the students for the courses in sector of Railway Engineering
4. To understand the basics involved in the crossing and turnout of railway track.
5. To understand the Civil engineering aspects of Highway and Railway Engineering.

Cos	Course Outcomes	Blooms Level	Blooms Description
CO1	The students will gain an experience in the implementation of Transportation Engineering on engineering concepts which are applied in field Highway Engineering	3	Apply
CO2	The students will learn to understand the theoretical and practical aspects of highway engineering along with the design and management applications	4	Analyzing
CO3	The students will learn to design the pavements by considering various aspects associated with traffic safety measures	3	Apply
CO4	Know about the basics and design of various components of railway engineering	2 2	Understand Understand
CO5	Understand the types and functions of tracks, junctions and railway stations.	3 4	Apply Analyzing

List of Experiments

Term work shall consist of performing experimental sets from the list below.

A) Min two Assignment from following

1. Draw neat labeled sketches of Highway & railway track in cutting and in embankment
2. Draw neat labeled sketches of left hand turnout, right hand turnout and different type of crossings.
3. Draw neat labeled plans of different types of railway stations
4. Numerical on geometric design of railway tracks

B) Any six experiments on bitumen out of following set.

1. Penetration test
2. Ductility of Bitumen
3. Softening point of Bitumen
4. Flash & fire point
5. Specific gravity of Bitumen
6. Viscosity of Bitumen
7. Stripping value of road aggregates.
8. Bitumen extraction test (on premix sample)

B) Bituminous mix design Marshal Stability test

C) Numerical based on Flexible Pavement Design

D) Numerical based on Rigid Pavement Design

E) A report on at least one site visit.

Visit to construction site of major road projects, hot mix plant etc.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 6 experiments and subject specific lab assignment/ Case study

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to Satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the Teacher assessment.

End Semester Examination ©:

Oral / Practical examination will be based on the entire syllabus including, the practical's performed During laboratory sessions.

Theory of Structures - (PECE5040T)

Teaching Scheme
Lectures : 02 Hrs./week
Tutorial : 01 Hr/week
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives

1. To study response of a structure for a unit load travels across it, in order to calculate the maximum resulting response.
2. Equip with the methods necessary for analyzing of various types of indeterminate structures such as continuous beams, frames etc.
3. To introduce matrix method for analysis of indeterminate structures.
4. To introduce method of consistent deformations for computing member forces and displacements in structural systems.
5. To understand various basic principles of plastic theory and concepts such as shape factor, plastic hinge, collapse mechanism and apply the same for analysis of beam and frame.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will be able to calculate the maximum resulting response of a structure for a unit load travels across it in the form of reaction, shear force and bending moment.	3	Remember, Analyze
CO2	Students will be able to analyze indeterminate structures such as continuous beams, frames by applying moment distribution method.	3	Evaluate
CO3	Students will be able to analyze complex structures including the statically indeterminate type by applying matrix method of analysis.	2	Apply
CO4	Students will be able to calculate member forces and displacements in structural systems using method of consistent deformation.	1	Evaluate
CO5	Students will be able to understand concept of plastic theory for analysis of beams and frames, calculation of shape factors for various cross sections.	3	Understand

Course Contents

Unit-I Influence Lines and Moving Loads **08 Hrs.**

a) Influence lines: - Basic concepts, influence line for reactions, B.M. & S.F. for simply Supported, overhanging beams, Cantilever beam, continuous beam with internal hinge. Calculations for Shear Force & Bending Moment in beam using influence lines.

b) Moving loads: - Introduction, conditions for maximum B.M. and maximum S.F. at a section due to moving point loads, UDL longer or shorter than span and train of moving loads, Absolute maximum B.M. & S.F., Construction of Max. S. F. and B.M. diagram.

Unit- II Moment Distribution Method **08 Hrs.**

Introduction, concept of carry over moment, carry over factor, distribution factor, analysis of indeterminate continuous beams, analysis of rigid jointed rectangular frames with and without sway.

Unit-III Stiffness Method of Structural Analysis **08 Hrs.**

Introduction to fundamental concept of stiffness, degree of freedom, matrix formulation for stiffness methods, analysis of continuous beam and rigid jointed plane frames (maximum up to three unknowns)

Unit-IV Flexibility Method of Structural Analysis **08 Hrs.**

Introduction to fundamental concept of flexibility, matrix formulation for flexibility methods, analysis of continuous beam and rigid jointed plane frames (maximum up to three unknowns)

Unit-V Plastic Analysis of Structure **07 Hrs.**

Introduction, stress- strain curve, concept of plastic design, shape factor (including numerical examples), plastic hinge, plastic moment capacity, plastic modulus, collapse load, collapse mechanism, lower bound and upper bound theorem, uniqueness theorem.

Reference Books:

1. A. Ghali, A. M. Neville, "Structural Analysis- A Unified classical and matrix Approach", CRC Press, 2017
2. B. C. Punmia, Ashok K. Jain and Arun K. Jain, "Theory of Structures", Laxmi Publication, 2017.
3. C. S. Reddy, "Basic Structural Analysis", McGraw Hill Education, 2017.
4. C. K. Wang, "Intermediate structural analysis", McGraw Hill Education, 2017.
5. G. S. Pandit & S. P. Gupta, "Structural Analysis – A Matrix Approach" McGraw Hill Education, 2008.
6. S. S. Bavikatti, "Structural Analysis-II", Vikas Publishing Company, 2021
7. S. Ramamruthum and R. Narayanan, "Theory of Structures", Dhanpat Rai Publishing Company, 2021
8. V. N. Vazirani, M. M. Ratwani and S. K. Duggal, "Analysis of Structures Vol-II", Khanna Publishers, 1994.

9. W. Weaver W & J. M. Gere, "Matrix Method of framed Structures", CBS Publishers & Distributors, 2018
10. R. Vaidyanathan & P. Perumal, "Structural Analysis Vol. I & II", Laxmi Publication, 2016.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 30 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Best of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1. Question Paper will be based on entire syllabus summing up to 65 marks
2. Total duration allotted for writing the paper is 3 hr.

Tutorial: Min five tutorials shall be conducted.

Elective-I Smart city Planning -I (PCCE5050T)

Teaching Scheme
Lectures : 03 Hrs./week
Tutorial : ----- Hr/week
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives:

1. To understand need and Scope of Smart city Planning.
2. To develop the concepts of Smart city Infrastructure basic requirements and apply his/her knowledge for planning and designing a smart city.
3. Understand National and Global policies to implement for smart city development.
4. To study the parameters of a smart city

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	To understand need and Scope of Smart city Planning.	3	Understand
CO2	To study the concepts of Smart city Infrastructure basic requirements and apply his/her knowledge for planning and designing a smart city.	4	Analyze and design
CO3	Understand National and Global policies to implement for smart city development.	3	Understand
CO4	Students able to design of smart city layout	2	Design

Course Content

Unit I **Fundamental of Smart City** **(06 Hrs.)**

Introduction of Smart City, Concept of smart city, Objective for smart cities, History of Smart city world and India. Need to develop smart city, Challenges of managing infrastructure in India and world, various types of Infrastructure systems, Infrastructures need assessment

Unit II **Utility in Infrastructure** **(08 Hrs.)**

Planning and development of Smart city Infrastructure: Energy and ecology, solar energy for smart city, Housing, sustainable green building, safety, security, disaster management, economy, cyber security, Project management.

Unit-III **Management of water resources and related infrastructure** **(08 Hrs.)**

Management of water resources and related infrastructure Storage and conveyance system of water, sustainable water and sanitation, sewerage system, flood management, conservation system etc.

Unit-IV **Infrastructure Management system & Policy for Smart city** **(06 Hrs.)**

Infrastructure Management system & Policy for Smart city. Integrated infrastructure management systems for smart city, Infrastructure management. System applications for existing smart city. Worldwide policies for smart city Government of India - policy for smart city, Mission statement & guidelines, Smart cities in India, Case studies of smart city

Unit-V **Case study of Smart city** **(08 Hrs.)**

Worldwide policies for smart city Government of India - policy for smart city, Mission statement & guidelines, Smart cities in India, Case studies of smart city

Text Books:

1.UDPFI guidelines, ministry of urban affairs and employment, Govt. & India.
2. Koenigsbeger, "Manual of tropical housing and building", Universities Press (India)
3. Sustainable Building - Design Manual: Sustainable Building Design Practices, 2009 by TERI

Reference Books:

1.Smart City on Future Life - Scientific Planning and Construction by Xianyi Li
2. The Age of Intelligent Cities: Smart Environments and Innovation-for-all Strategies (Regions and Cities) by Nicos Komninos
3. Smart Cities: Big Data, Civic Hackers, and the Quest for a New Utopia by Anthony Townsend
4. Grig N.S., Infrastructure engineering and management, Wiley-Interseience, 1988
5. Hudson W.R., Haas R., Uddin W., Infrastructure Management, McGraw-Hill, 1997

Elective-I Construction Equipment and Automation (PCCE5051T)

Teaching Scheme
Lectures : 03 Hrs./week
Tutorial : ----- Hr/week
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives:

1. To understand the importance, scope and application of various construction equipment's
2. Student must be able to apply a correct machine for a specific construction task and get Optimal output of the same.
3. Student must know about the robots being used for critical construction tasks and must be Able to deploy them as per need.
4. Analyze benefits of robotics versus conventional construction equipment
5. Classify application of Virtual Reality, Augmented Reality, BIM in construction industry

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will be able to understand the importance, scope and application of various construction equipment's	3	Learn
CO2	Student must be able to apply a correct machine for a specific construction task and get optimal output of the same	4	Analyze and design
CO3	Student must know about the robots being used for critical construction tasks and must be Able to deploy them as per need.	3	Understand
CO4	Classify application of Virtual Reality, Augmented Reality, BIM in construction industry	2	Analyze

Course Content

Unit I **Introduction to Construction Equipment** **(06 Hrs.)**

Introduction: Unique features of construction equipment, Need of construction Equipment, past history.

Construction Equipment: Capacity, Feasibility, owning and Hiring operating cost and Productivity of Different Equipment: Excavators, Pavers, Cranes and Hoists, Concrete Batching Plants, etc.

Unit II **Automation in Construction Industry** **(08 Hrs.)**

Automation in Construction Industry: Need and Benefit of automation: Automation in Canal lining, Automation in Construction of Highway, and Automation in concrete technology. Plastering machines; Pre-stressing and Post stressing jacks and grouting equipment etc.

Unit-III **Robotics in Construction Industry** **(08 Hrs.)**

Robotics in Construction: Introduction, Benefits of robots in construction industry with respect to time, cost, quality, safety. Use of robots for construction activities like Brick laying, Demolition, Material Handling, Structural steel cutting, Rebar tying/bending, Form work mold making, 3D printing- print complex, layered, parts and objects of homes, buildings, bridges and roads etc.

Unit-IV **(08 Hrs.)**

Excavating equipment Selection, basic parts, operation, and factors affecting output, Tractors and related equipment: Bulldozers, Rippers, Scrapers Power shovels, Draglines, Hoes, Clam shells and trenching machines.

Unit-V **Building Information Modeling (BIM).** **(06 Hrs.)**

Introduction to Advanced Technologies: Virtual Reality, Augmented Reality, Building Information Modeling (BIM).

Text Books:

1. Construction Planning, Equipment and Methods by R L PEURIFOY, C J Schexnayder And A V Shapira, Mc Graw Hill publication.
2. Construction Equipment and Its Management by S C Sharma, Khanna Publications.

Reference Books:

1. Construction Planning, Methods and Equipment, R.L Peurifoy, McGraw Hill, 2011
2) Construction Project management, Theory & Practice, Kumar Neeraj Jha,., Pearson Education India.
3) BIM and Construction Management: Proven Tools, Methods, and Workflows By Brad Hardin, Dave McCool, John Wiley & Sons
4) Construction equipment and its planning and application Mahesh Varma Metropolitan Book Co
5) Robotics and Automation in Construction, Open access peer- reviewed edited volum

Elective-I Prefabricated Structure (PCCE5052T)

Teaching Scheme
Lectures : 03 Hrs./week
Tutorial : ----- Hr/week
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives:

1. To understand the principles of modular coordination.
2. To study the importance of prefabricated structure.
3. Identify the different types of connections between structural members
4. Understand the concept of progressive collapse

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	To Identify design principles and IS code specifications.	3	Understand
CO2	To study the importance of prefabricated components	4	Analyze and design
CO3	To analyze and design structural components	2	Design
CO4	Understand the concept of progressive collapse	3	Understand

Course Content

Unit I **Introduction** **(06 Hrs.)**

Need for prefabrication - Principles - Materials - Modular co-ordination – Standardization – Systems Production – Transportation – Erection - Disuniting of Structures.

Unit II **Prefabricated Components** **(08 Hrs.)**

Behavior of structural components – Large panel constructions – Construction of roof, floor slabs and Wall panels – Columns – Shear walls.

Unit-III **Design Principles** **(08 Hrs.)**

Design of Structural components – Beam, Column and Corbel - Stress limitations – Handling without cracking, handling with controlled cracking – Design for stripping forces.

Unit-IV **Joints in Structural Members** **(06 Hrs.)**

Joints for different structural connections – Beam to Column, Beam to Beam, Column to Column, Column to Foundation, Connections between wall panels, Connections between floor panels - Dimensions and detailing – Design of expansion joints- Jointing Materials.

Unit-V **Design For Earthquakes and Cyclones** **(08 Hrs.)**

Progressive collapse – Code provisions – Equivalent design loads for considering abnormal effects such as earthquakes, cyclones etc. - Importance of avoidance of progressive collapse.

Text Books:

1. Hubert Bachmann and Alfred Steinle. Precast Concrete Structures, 2012.

2. Laszlo Mokk, Prefabricated Concrete for Industrial and Public Structures, Akademiai Kiado, Budapest, 1964

Reference Books:

1. PCI Design Hand Book, 6th Edition, 2004.

2. Handbook on Precast Concrete for Buildings, ICI Bulletin 02, First Edition, 2016.

3. A.S.G. Bruggeling and G.F.Huyghe, Prefabrication with concrete, Netherlands: A.A. Balkema Publishers, 1991.

4. Glover C.W, Structural Precast Concrete, Asia Publishing House, 1965.

Elective-I Repair and Rehabilitation of Structures (PCCE5053T)

Teaching Scheme
Lectures : 03 Hrs./week
Tutorial : ----- Hr/week
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives:

1. To understand need for repair and rehabilitation.
2. To develop clear understanding of concepts, and practical knowledge of modern Civil Engineering techniques.
3. To encourage students and faculty to interact with industry, alumni and other reputed institutes for purpose of better understanding of industry requirements and different materials used.
4. To deal with social, environmental and economic issues when applying various techniques.

Course Outcomes (COs): After completion of this course students will be able to:

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understanding various repair techniques as per the requirement of the problem.	2	Understanding
CO2	To act as catalyst in transferring the Civil Engineering knowledge to field usage for the socio-economic development of the society	3	Applying
CO3	To provide a platform to students, scientists, engineers and working professionals to come together and implement the academic outcome to the field.	3	Applying

Course Content

Unit I **Introduction** **(06 Hrs.)**

Need for strengthening due to various reasons such as ageing, natural calamities, increase of load, change of function and design, construction errors

Unit II **Structural Strengthening** **(08 Hrs.)**

Strengthening and retrofitting of columns, beams, walls, footings and slabs, piers of concrete structures by jacketing, external post-tensioning, replacing or adding reinforcement, plate bonding, textile reinforced concrete

Unit-III **Specialized Repairs** **(08 Hrs.)**

Electro chemical repair using re-alkalization and chloride extraction techniques, Specialized repairs for chemical disruption, fire, marine exposure etc, Repair of damaged structures of water retaining structures, hydraulic structures, Pavements and Runways, Tunnels, Bridges, Piers and Flyovers, Parking Garages, Underwater repair, Masonary Repair, Repair and Restoration of Heritage Structures

Unit-IV **Seismic Retrofitting** **(06 Hrs.)**

Seismic strengthening of existing RC structures, Use of FRP for retrofitting of damaged structures

Unit-V **Retrofitting by composite materials** **(08 Hrs.)**

Fiber reinforced concrete, Ultra-high performance fibre reinforced concrete (UHPFRC), Fiber reinforced composites, Carbon fibre reinforced polymer (CFRP), Fibre wrapping (Carbon, Aramide, Glass)

Text Books:

1. Repairs, Rehabilitation & Restoration of structures: Dr. K.Saxena .Anuvi Chemicals Ltd.
2. Repairs, Rehabilitation & water proofing to RCC structures: J J Shah.2ndEdition.

Reference Books:

1. Concrete Repair and Maintenance: Peter H .Emmons and Gajanan M. Sabnis, Galgotia Publication.
2. Repairs and Rehabilitation-Compilation from Indian Concrete Journal-ACC Publication.
3. Guide to Concrete Repair and Protection, HB84-2006, A joint publication of Australia Concrete Repair Association, CSIRO and Standards Australia.
4. CPWD hand book on Repairs and Rehabilitation of RCC buildings published by DG(Works), CPWD, Government of India (Nirman Bhawan), http://www.cpwd.gov.in/handbook.pdf
5. Guide to Concrete Repair, Glenn Smoak, US Department of the Interior Bureau of Reclamation, Technical Service Center , http://books.google.co.in
6. Management of Deteriorating Concrete Structures: George Somerville, Taylor and Francis Publication
7. Concrete Building Pathology: Susan Macdonald, Blackwell Publishing.
8. Testing of Concrete in Structures: John H. Bungey, Stephen G. Millard & Michael G. Grantham, Taylor & Francis Publication.
9. Durability of concrete and cement composites: C.L.Page& M.M. Page,Woodhead Publishing
10. Concrete Repair, Rehabilitation and Retrofitting: M. Alexander, H. D. Beushausen, F. Dehn& P. Moyo, Taylor & Francis Publication
11. Concrete Repair Manual, Volume I & II, Published jointly by ACI, BRE, Concrete Society, ICRI

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Best of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1. Question Paper will be based on entire syllabus summing up to 65 marks
2. Total duration allotted for writing the paper is 3hrs.

Civil Engineering Social & Global Impact (HSCE5060T)

Teaching Scheme
Lectures : 02 Hrs./week
Tutorial : NIL Hr/week
Credit : 01

Examination Scheme
Term Test : 00 Marks
Teacher Assessment: 50 Marks
End Sem Exam : 00 Marks
Total Marks : 50 Marks

Course Objectives

1. To Understanding the impact of which Civil Engineering has on the society at large and on the global area
2. To study the impact on the Infrastructure, Energy consumption and generation, sustainability of the Environment, Aesthetics of the environment, Employment creation, Contribution to the GDP, and on a more perceptible level, the Quality of Life
3. Evaluate the potential of Civil Engineering for employment creation and its contribution to the GDP.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Outline the role of Civil engineering in evolution and revolution of mankind and globally present status of development in India.	3	Learn
CO2	Estimate the level of resource utilization for present and future infrastructural projects using various tools/methods	4	Analyze and design
CO3	Infer the necessity of different conventional as well as futuristic infrastructural projects.	3	Understand
CO4	Incorporate the goal of sustainable development to minimize the potential impacts on the global environment.	2	Design
CO5	Associate various measures for enhancing the build environment, thereby improving quality of life of the occupants.	2	Prepare

Course Contents

Unit- I Introduction to Course and Overview **06 Hrs.**

Introduction to Course and Overview; Understanding the past to look into the future: Pre-industrial revolution days, Agricultural revolution, first and second industrial revolutions, IT revolution; Recent major Civil Engineering breakthroughs and innovations; Present day world and future projections, Ecosystems in Society and in Nature; the steady erosion in Sustainability; Global warming, its impact and possible causes; Evaluating future requirements for various resources; GIS and applications for monitoring systems; Human Development Index and Ecological Footprint of India Vs other countries and analysis

Unit-II Modern Infrastructure **08 Hrs.**

Infrastructure - Habitats, Megacities, Smart Cities, futuristic visions; Transportation (Roads, Railways & Metros, Airports, Seaports, River ways, Sea canals, Tunnels (below ground, under water); Futuristic systems (ex, Hyper Loop)); Energy generation (Hydro, Solar (Photovoltaic, Solar Chimney), Wind, Wave, Tidal, Geothermal, Thermal energy); Water provisioning; Telecommunication needs (towers, above-ground and underground cabling); Awareness of various Codes & Standards governing Infrastructure development; Innovations and methodologies for ensuring Sustainability.

Unit-III Environment Impact **06 Hrs.**

Environment- Traditional & futuristic methods; Solid waste management, Water purification, Wastewater treatment & Recycling, Hazardous waste treatment; Flood control (Dams, Canals, River interlinking), Multi-purpose water projects, Atmospheric pollution; Global warming phenomena and Pollution Mitigation measures, Stationarity and nonstationarity; Environmental Metrics & Monitoring; Other Sustainability measures; Innovations and methodologies for ensuring Sustainability

Unit-IV Built Environment **8 Hrs.**

Built environment – Facilities management, Climate control; Energy efficient built environments and LEED ratings, Recycling, Temperature/ Sound control in built environment, Security systems; Intelligent/ Smart Buildings; Aesthetics of built environment, Role of Urban Arts Commissions; Conservation, Repairs & Rehabilitation of Structures & Heritage structures; Innovations and methodologies for ensuring Sustainability

Unit-V Environmental Impact of Civil Engineering Projects **8 Hrs**

Civil Engineering Projects – Environmental Impact Analysis procedures; Waste (materials, manpower, equipment) avoidance/ Efficiency increase; Advanced construction techniques for better sustainability; Techniques for reduction of Green House Gas emissions in various aspects of Civil Engineering Projects; New Project Management paradigms & Systems (Ex. Lean Construction), contribution of Civil Engineering to GDP, Contribution to employment(projects, facilities management), Quality of products, Health & Safety aspects for stakeholders; Innovations and methodologies for ensuring Sustainability during Project development

Reference Books:

11. *Žiga* Turk (2014), Global Challenges and the Role of Civil Engineering, Chapter 3 in: Fischinger M. (eds) Performance-Based Seismic Engineering: Vision for an Earthquake Resilient Society. Geotechnical, Geological and Earthquake Engineering, Vol. 32. Springer, Dordrecht
12. Brito, Ciampi, Vasconcelos, Amarol, Barros (2013) Engineering impacting Social, Economical and Working Environment, 120th ASEE Annual Conference and Exposition.
13. NAE Grand Challenges for Engineering (2006), Engineering for the Developing World, The Bridge, Vol 34, No.2, Summer 2004.
14. Allen M. (2008) Cleansing the city. Ohio University Press. Athens Ohio.
15. Ashley R., Stovin V., Moore S., Hurley L., Lewis L., Saul A. (2010). London Tideway Tunnels Programme – Thames Tunnel Project Needs Report – Potential source control and SUDS applications: Land use and retrofit options
16. Ashley R M., Nowell R., Gersonius B., Walker L. (2011). Surface Water Management and Urban Green Infrastructure. Review of Current Knowledge. Foundation for Water Research FR/R0014 8. Barry M. (2003) Corporate social responsibility – unworkable paradox or sustainable paradigm? Proc ICE Engineering Sustainability 156. Sept Issue ES3 paper 13550. P 129-130

Text Books:

1. Bogle D. (2010) UK's engineering Council guidance on sustainability. Proc ICE Engineering Sustainability 163. June Issue ES2 p61-63
2. Brown R R., Ashley R M., Farrelly M. (2011). Political and Professional Agency Entrapment: An Agenda for Urban Water Research. Water Resources Management. Vol. 23, No.4. European Water Resources Association (EWRA) ISSN 0920-4741.
3.Brugnach M., Dewulf A., Pahl-Wostl C., Taillieu T. (2008) Toward a relational concept of uncertainty: about knowing too little, knowing too differently and accepting not to know. Ecology and Society 13 (2): 30
4. Cavill S., Sohail M. (2003) Accountability in the provision of urban services. Proc. ICE. Municipal Engineer 156. Issue ME4 paper 13445, p235-244.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1. Question Paper will be based on entire syllabus summing up to 65 marks
2. Total duration allotted for writing the paper is 3 hr.

Professional & Business Communication (HMCE5070T)

Teaching Scheme
Lectures : 02 Hrs./week
Tutorial : 00 Hr/week
Credit : 02

Examination Scheme
Term Test : 00 Marks
Teacher Assessment: 50 Marks
End Sem Exam : 00 Marks
Total Marks : 50 Marks

Course Objectives

1. To inculcate professional and ethical attitude at the workplace
2. To enhance communication and interpersonal skills
3. To develop effective presentation skills
4. To hone written skills for technical documentation

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Plan, organize and write technical documents like reports, proposals and research papers in the prescribed format using appropriate language and style with an understanding of ethics in written communication	3	Learn
CO2	Apply techniques of writing resume, participating in a group discussion and facing interviews	4	Apply
CO3	Develop interpersonal skills in professional and personal situations	3	Understand
CO4	Understand the documentation process of meetings and conduct meetings in a professional manner	2	Design
CO5	Understand communication across cultures and work ethics	2	Prepare

Course Contents

Unit- I **08 Hrs.**

Report Writing: Types of report, parts of formal report, collection of data and survey analysis, pre-writing of report, language and style in reports, formatting of reports, referencing in report
Proposal Writing: Types of technical proposals, format of proposal, language and style, presentation of proposal
Technical Paper Writing: Parts of a technical paper, language and formatting, referencing in IEEE format
Plagiarism: Types of plagiarism, consequences of plagiarism

Unit- II **06 Hrs.**

Group Discussion: Purpose of a GD, types of GD, criteria for evaluating a GD, Dos and Don'ts of a GD, Tips to be successful in GD
Cover Letter & Resume Writing: Format and content of cover letter, types of resume, structure, content and formatting of resume
Interview Skills: Types and modes of interview, Preparation for interview, Dos and Don'ts of interview, frequently asked questions during interview

Unit- III **06 Hrs.**

Emotional Intelligence: Definition, difference between IQ and EQ, how to develop EQ
Leadership: Types of leadership, leadership styles, case studies
Team Building: Difference between group and team, importance of team work, strategies To be a good team player
Time Management: Importance of time management, cultural views of time, 80/20 rule, Time wasters, setting priorities and goals,
Conflict Management: Types of conflicts, strategies to manage conflict, case studies

Unit IV Meetings and Documentation **02 Hrs**

Planning and preparation for meetings, strategies for conducting effective meetings, notice, agenda and Minutes of a meeting, business meeting etiquettes

Unit V Cross-cultural communication and Ethics **03 Hrs**

Communication across cultures, professional and work ethics, responsible use of social media, introduction to Intellectual Property Right

Unit VI Presentation Skills **03 Hrs**

Presentation strategies, overcoming stage fear, techniques to prepare effective PowerPoint presentation

List of Assignments

1. Business Proposal (PowerPoint presentation)
2. Resume writing
3. Interpersonal Skills (documentation of activity)
4. Meetings and Documentation (Notice, Agenda, Minutes of Mock Meetings)
5. Business ethics
6. Presentation Skills

Semester Project-III (PJCE5080L)

Teaching Scheme
Lectures : -----
Practical : 02 Hr/week
Credit : 01

Examination Scheme
Teacher Assessment: 25 Marks
Total Marks : 0 Marks

Course Objectives:

Students are expected to design, simulate/implement a project based on the knowledge acquired from Current semester subjects.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Conduct a survey of several available literatures in the preferred field of study.	4	Analyze
CO2	Demonstrate various/alternate approaches to complete a Project.	2	Understand
CO3	Ensure a collaborative project environment by interacting And dividing project work among team members.	3	Apply
CO4	Present their project work in the form of a technical report / paper and thereby improve the technical communication skill.	3	Apply
CO5	Demonstrate the ability to work in teams and manage the conduct of the research study.	2	Understand

Semester Project:

The purpose of introducing semester project at second year level is to provide exposure to students with a variety of projects based on the knowledge acquired from the semester subjects. This activity is supposed to enrich their academic experience and bring enough maturity in student while selecting the project. Students should take this as an opportunity to develop skills in implementation, Presentation and discussion of technical ideas/topics. Therefore, proper attention shall be paid to the Content of semester project report which is being submitted in partial fulfillment of the requirements Of the Second Year and it is imperative that a standard format be prescribed for the report. Each student shall work on project approved by departmental committee approved by the Head of Department, a group of 03 to 05 students (max allowed: 5 students in extraordinary cases, subject To the approval of the department committee and the Head of the department) shall be allotted for Each Semester Project. Each group shall submit at least 3 topics for the Semester Project. The Departmental committee shall finalize one topic for every group. Semester Project Title or Theme Should be based on knowledge acquired during semester. The project work shall involve sufficient work So that students get acquainted with deferent aspects of knowledge acquired from semester subjects. Student is expected to:

_ Select appropriate project title based on acquired knowledge from current semester subjects.
_ Maintain Log Book of weekly work done (please see attached log book format).
_ Report weekly to the project guide along with log book.
Assessment Criteria:
_ at the end of the semester, after conformation by the project guide, each project group will
Submit project completion report in prescribed format for assessment to the departmental committee (including project guide).
_ Assessment of the project (at the end of the semester) will be done by the departmental committee (including project guide).
Prescribed project report guidelines:

Size of report shall be of minimum 25 pages. Project Report should include appropriate content for:

_ Introduction

_ Literature Survey
_ Related Theory
_ Implementation details
_Project Outcomes
_ Conclusion
_ References
Assessment criteria for the departmental committee (including project guide) for Continuous Assessment: Guide will monitor weekly progress and marks allocation will be as per Table 2.
Assessment criteria for the departmental committee (including project guide) for End Semester Exam: Departmental committee (including project guide) will evaluate project as per Table 3.Each group shall present/publish a paper based on the semester project in reputed/peer Reviewed Conference/Journal/Tech Fest/Magazine/ before the end of the semester.

Table 1 Log Book format

S.NO.	Week (Start date / End date)	Work done	Sign of Guide	Sign of Coordinator
1				
2				

Table 2 Continuous Assessment sheet

S.NO.	Exam Seat No	Name of Student	Student Attendance	Log Book Maintain	Literature review	Depth of Understanding	Report	Total
			5	5	5	5	5	25

Table 3 Evaluation sheet

S.NO.	Exam Seat No	Name of Student	Project Selection	Design Simulation logic	PCB hardware programing	Result Verification	Presentation	Total
			5	5	5	5	5	25

Employability Skill Development Programme (HMCE5090L)

Teaching Scheme
Lectures
Practical : 02 Hrs. /week
Credit : 01

Teacher Assessment: 50 Marks
Total Marks : 50 Marks

Course Objectives

1. To enhance the problem solving skills with real life examples.
2. To enable the students to express their thoughts and knowledge on various platforms.
3. Able to describe the basic database management system.
4. Able to implement basic programming project using python.

COs	Course Outcomes	Bloom's Level	Blooms Descriptor
CO1	Analyze and solve the logical problem based on words, venn diagram etc.	L4	Analyze
CO2	Understand and solve the English comprehension, Sentence completion, Sentence Correction problems.	L2 and L4	Understand, Analyze
CO3	Understand and illustrate the concept of Exception Handling, Garbage collection	L2 and L3	Understand, Apply
CO4	Understand and describe the fundamental of DBMS, NoSql, MongoDB.	L2	Understand

Course Contents

Aptitude

Unit-I

Reasoning: Data sufficiency, Logical Deductions, Logical Sequence of Words, Logical Venn Diagrams, Statement and Arguments, Statement and Assumptions, Statement and Conclusions Syllogism. English: Reading Comprehension, Para Jumbles, Cloze Test, Tenses/ Voice/ Speech, Prepositions/ SVA/ Articles, Vocab /Verbal Analogy, Sentence completion, Sentence Correction

Unit-II

Modules Introduction, Importance of Modularity programming, Import keyword, User defined Modules creation, Function based modules, Classes based modules, Connecting modules, from keyword. Collections Framework Introduction to collection of data types, Importance of Data processing, DS Algorithms introduction.

Exception Handling Introduction, The need of exception handling, Getting exceptions, Default exception handler, Handling exception, Try, Except. List Create a list, Adding elements, Deleting elements, Pre-defined functionality of List, Nested List,

Immutability and Mutability of List. Set The functionality of Set object, Frozen set, Dictionaries, Create a dictionary, Adding elements. Dict Pre-defined functions of Dict class, Programs using Collection types. Garbage collection Introduction, Importance of manual GC, Self-referenced objects, gc module, Collect () method, Threshold function.

Unit-III

Collections Framework Introduction to collection of data types, Importance of Data processing, DS Algorithms introduction. List Create a list, Adding elements, Deleting elements, Pre-de_ned functionality of List, Nested List, Immutability and Mutability of List.

Set The functionality of Set object, Frozen set, Dictionaries, Create a dictionary, Adding elements. Dict Pre-defined functions of Dict class, Programs using Collection types.

Unit-IV

Tkinter GUI Types of Layouts , Create Labels and Display images, Create Buttons, Create Events, StringVar class, Calculator program using GUI. Basic ML AI including Projects Iterators, Nested functions, Generators, Closures, Decorators, Basic ML and AI, PIP, Visualization etc. Project Domain (Per domain 1 or 2 project)

ML/AI Based Projects

Data Analysis Based projects

Test Summarization based projects

web scrapping and crawling

Unit-V

DBMS Using Python Introduction to Mysql, Mysql Python connectivity, DDL, DRL, DML, Transaction management examples (rollback and commit), GUI Database connectivity.

No Sql Using Python Installation and Configuration, Mongo DB Tools, Collection and Documents, CRUD and the Mongo DB Shell, Introduction to CRUD, Introduction to the Mongo DB API, Creating a Database, Collection and Documents. Data Modelling and Schema Design Mongo DB Database References Model Tree Structures, Mongo DB Analyzing Queries, Atomic Operations, Map Reduce, Text Search, Regular Expression, Capped Collections. Administration Mongo DB Deployment and Cluster setup, Mongo DB Grid FS, Trident Spout, Working with Replica Sets, Mongo DB Sharding

Reference Books

1. Quantitative Aptitude for Competitive Examinations by Dr. R S Aggarwal, S Chand Publication
2. Programming Techniques through C, by M. G. Venkateshmurthy, Pearson Publication.
3. A Computer Science Structure Programming Approaches using C, by Behrouz Forouzan, Cengage Learning.
4. Let Us C, by Yashwant Kanetkar, BPB Publication.

Evaluation Scheme

Teacher Assessment(TA):

Teacher's Assessment (TA) will carry weightage of 50 marks. The components of TA are

1	MCQ Test based on Aptitude	20 Marks
2	MCQ Test based on Programming skills	20 Marks
3	Mock Interview	10 Marks

Any other component recommended by BOS and approved by Dean Academics.

SEM-VI

Estimating & Costing (PCCE6010T)

Teaching Scheme
Lectures : 03 Hrs./week
Tutorial : 01 Hr/week
Credit : 04

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives

1. Impart the knowledge of Estimating, Costing and Valuation for Civil Engineering Structures
2. This subject covers the various aspects of estimating of quantities of items of works involved in buildings, water supply and sanitary works, road works and irrigation works.
3. At the end of this course the student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents. Student should also be able to prepare value estimates

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the concept of Estimating and its importance	2	Understanding
CO2	Students able to Calculate the detailed quantity, costing & numbers of man power etc. related to construction project	3	Applying
CO3	Analyze the rates for various items of work and to prepare an abstract estimate	4	Analyzing
CO4	Identify the preparation of bar bending schedule for reinforcement works.	4 2	Analyzing Understanding
CO5	Understand the concept of Valuation and Preparation of standard specifications for different items of building construction	2,3	Understanding Applying

Course Contents

Unit I Introduction of Estimating and Costing. **(10 Hrs.)**

Estimate, detailed estimate, types of detailed estimate, purpose, and data required for preparing detailed estimate, factors to be consider during preparation of detailed estimate, methods of taking out quantities, abstracting, units of measurements, building cost index, prime cost, provisional sum, centage charges, work charged establishment, administrative approval, technical sanction.
Approximate estimate, importance, purposes, approximate methods of building estimating and various civil engineering works

Unit-II Detailed Estimate **10 Hrs.**

Detailed estimate of load bearing structure, framed structure, community well, septic tank, pipe culvert, earthwork in roads and cannels

Unit-III Detailed Estimate of RC.C. Element **07 Hrs.**

Detailed estimate of reinforcement quantities of R.C.C. elements like isolated column, footings, beam, staircase, slab, and preparation of bar bending schedule.

Unit-IV DSR & Rate analysis **8 Hrs.**

Study of current year district schedule rates, significance, necessity, importance, factors considering while preparing schedule of rates.
Task work, factors affecting task work, schedule of rate, task work of various items of construction, analysis of rates, factors affecting cost of an item of work, material, labor etc. analysis of various items of construction

Unit-V **Specification & Valuation** **8 Hrs.**

Specifications, purposes, types, drafting of specifications, and specifications of a few main items of civil engineering works.
Valuation, purposes, price, cost and value, factors affecting value of a property, various types of value like market value, sentimental value, mortgage, year's purchase and outgoings, legal aspects of valuation and easement act. Methods of valuation, land and building method, rental method, belting method of valuation of land. Standard rent and Standard rent fixation. Depreciation, various methods of depreciation, sinking fund, book value, free hold and lease hold properties.

Text Books:

1. B.N. Dutta, "Estimating and costing", 28th Edition, UBH Publishing.
2. B.S. Patil, "Civil Engineering Contracts and Estimates", 4th Edition, Universities press.
3. Bhasin P. L., "Quantity Surveying: For Building and Civil Engineering Works", S. Chand, Limited, 3rd Edition 1987.
4. Chakraborti M. "Estimating, Costing and Specification in Civil Engineering", 24th Edition.
5. G.H. Birdie, "Estimating and Costing (Civil Engineering)", 7th Edition 2015, Dhanpat Rai Publishing.
6. Rangwala, "Elements of Estimating and Costing", 8th Edition, Charotar Publishing House.

Reference Books:

1. PWD Hand Book and Red Book.
2. PWD District Schedule of Rates (DSR) – Latest.
3. IS 1200 (Part1-Part 28) Method of measurement of building and civil engineering works.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Best of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

5. Question Paper will be based on entire syllabus summing up to 65 marks
6. Total duration allotted for writing the paper is 3 hr.

Tutorial

Min five tutorials shall be conducted

Estimating & Costing Laboratory (PCCE6010L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Course Objectives

1. Impart the knowledge of Estimating, Costing and Valuation for Civil Engineering Structures
2. This subject covers the various aspects of estimating of quantities of items of works involved in buildings, water supply and sanitary works, road works and irrigation works.
3. At the end of this course the student shall be able to estimate the material quantities, prepare a bill of quantities, make specifications and prepare tender documents. Student should also be able to prepare value estimates

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand the concept of Estimating and its importance	2	Understanding
CO2	Students able to Calculate the detailed quantity, costing & numbers of man power etc. related to construction project	3	Applying
CO3	Analyze the rates for various items of work and to prepare an abstract estimate	4	Analyzing
CO4	Identify the preparation of bar bending schedule for reinforcement works.	4 2	Analyzing Understanding
CO5	Understand the concept of Valuation and Preparation of standard specifications for different items of building construction	2,3	Understanding Applying

Course content

List of Experiments

Term work shall consist of performing Min Five experimental sets from the list below.

List of Experiments:

1. Units of measurements of various items of civil engineering works / Study of DSR, study and use of check list of PWD for estimating of various building works.
2. Approximate estimate of
   i) Residential building. ii) Public building.
   iii) Elevated service reservoir. iv) Road and bridges.
3. Prepare check list of items, detailed estimate of a single storey (up to 2 BHK) load bearing structure by using current DSR.
4. Site visit (attached estimate and photographs) / study standard estimate of PWD or any civil organization
5. Prepare check list of items, detailed estimate of a framed residential double storey structure by using current DSR and estimate of detailed quantities of steel. Reinforcement and prepare bar bending schedule.
6. Detailed estimate of any two of following i) Compound wall. ii) Septic tank. iii) Earth work in road / cannel.
7. Rate Analysis of Any Five Items.

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 6 experiments and subject specific lab assignment/

Case study

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks

2. Journal Submission: 05 Marks

3. Viva-voce: 05 Marks

4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to

Satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the

Teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practical's performed

During laboratory sessions.

Design of Steel Structures (PCCE6020T)

Teaching Scheme
Lectures : 03 Hrs./week
Tutorial : 01 Hr/week
Credit : 04

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Prerequisite Course: Engineering Mechanics, Mechanics of Solids, Structural Analysis, Structural Mechanics

Course Objectives:

1. To introduce behavior and design of simple steel structures according to limit state design concept.
2. To have the basic knowledge about the design and failure mode of steel structural members.

Course Outcomes (COs): After completion of this course students will be able to:

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Recognize the material properties of steel products, design philosophy of steel structures and concept of limit state design	1	Remembering
CO2	Understand provisions in relevant BIS Code	2	Understanding
CO3	Describe the mechanism and behavior of various connection types under different loading conditions for analysis and design of connection	4	Analyzing
CO4	apply the principles, procedures and current code requirements to the analysis and design of steel tension members, beams, columns, column bases,	3	Applying
CO5	Evaluating design loads for trusses and welded plate girder	5	Evaluating

Course Content

Unit I **Introduction, Connections** **(06 Hrs.)**

a) Introduction: Introduction to types of steel, mechanical properties of steel, advantages of steel as structural material, design philosophies of Working Stress Method (WSM) and Limit State Method (LSM) Limit state method, limit state of strength and serviceability (deflection, vibration, durability, fatigue, fire), characteristics and design loads, Classification of cross section- plastic, compact, semi-compact and slender, limiting width to thickness ratio, partial safety factor for load and resistance, various design load combinations.

b) Types of Connections: Strength of bolted & welded Connections, Design of connections subjected to Axial Forces & Moments. Beam to beam & beam to column connection (framed connections)

.Unit II **Tension Members & Compression members** **(08 Hrs.)**

a) Tension member: Behaviour, Modes of failure – Yielding of cross-section, Rupture, block shear. Design of single and double angle sections with gusset plate with bolted and welded end connections.

b) Compression member: Behaviour – effective length, slenderness ratio, Modes of failure- failure with full strength, local buckling, torsional buckling. Classification of cross sections, Buckling curves, Design of compression members with bolted and welded connection using single and double angle sections.

Unit III **Design of built-up column & Roof Trusses** **(08 Hrs.)**

a) Design of built-up column: Built up Column. Design of lacing by bolts and welds. Introduction to battened column, design of connections.

b) Roof truss: Analysis of pin-jointed trusses under various loading cases, computation of design forces in members, design and detailing of connections

Unit-IV **Design of Flexural Member & Compound Beams** **(06 Hrs.)**

a) Flexural member- Laterally supported beams using single rolled steel section with and without flange plate, strength in flexure, low and high shear, check for deflection. Secondary and main beam arrangement for floor of a building, design of beam to beam and beam to column connections using bolt / weld. Design of purlin.

b) Compound beams: Design of compound beams, using flange plates, curtailment of flange plates,

Unit-V **Design of Column Bases & Welded Plate Girder** **(08 Hrs.)**

a) Column Bases: Design of column bases under axial load: design of slab base, gusseted base.

b) Design of welded plate girder: design of cross section, curtailment of flange plates, stiffeners and connections

Note:

a. **Use of IS: 800-2007, IS: 875 part III and steel table is permitted for theory examinations.**
b. **The Design shall be as per IS: 800 – 2007 by limit state method.**

Text Books:

1. S. S. Bhavikatti (2009), "Design of Steel Structures by Limit state method as per IS 800:2007", I K International Pvt. Ltd
2. Duggal S K (2010), "Limit State Design of Steel Structures", Tata McGrwaHill
3. Shiyekar M R (2010), "Limit State Design of Steel Structures", PHI Learning
4. Shah V. L. & Gore, Limit state design of Steel Structure, Structures Publication, Pune
5. Sai Ram K S (2010), "Design of Steel Structures", PHI Learning

6. Dr Ramachandra (2010), "Design Of Steel Structures Vol. II", Scientific Publishers-Jodhpur, ISBN 8172336446

Reference Books:

1. Anand S. Arya, J.L. Ajmani (1977), "Design of Steel Structures", Nem Chand & Bros., India, ISBN 0861861671
2. B. C. Punmia, Ashok Kumar Jain (2006), "Comprehensive Design of Steel Structures", Laxmi Publications, ISBN 8170080932,
3. Edwin H. Gaylord, Charles N. Gaylord, James E. Stallmeyer (1991), "Design Of Steel Structures", Tata McGraw-Hill, ISBN 0070230544
4. Charles G. Salmon, John E. Johnson, Faris A. Malhas (2008), "Steel Structures: Design and Behavior", Prentice Hall, ISBN 0131885561
5. Satinder Singh, Ic Syal (2007), "Design Of Steel Structures", Standard Publishers Distributors, ISBN 8186308646
6. N. Subramanian (2008), "Design Of Steel Structures", Oxford, ISBN 0195676815,
7. Pasala Dayaratnam (2014), "Design Of Steel Structures", S. Chand Publishing, ISBN 8121923204,

Design Codes:

1. IS 800 (2007), General Construction in Steel- Code of Practice, Ced 7: Structural Engineering and Structural Section, Published by Bureau of Indian Standard Manak Bhavan, New Delhi
2. IS 875- Part 1 (1987): Dead Loads, Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Published by Bureau of Indian Standard Manak Bhavan, New Delhi
3. IS 875- Part 2 (1987): Imposed Loads, Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Published by Bureau of Indian Standard Manak Bhavan, New Delhi
4. IS 875- Part 3 (2015): Wind Loads, Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Published by Bureau of Indian Standard Manak Bhavan, New Delhi.
5. IS 875- Part 4 (1987): Snow Loads, Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Published by Bureau of Indian Standard Manak Bhavan, New Delhi.
6. IS 875- Part 5 (1987): Special Loads and Combinations, Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Published by Bureau of Indian Standard Manak Bhavan, New Delhi

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each Term test paper is 1 hr.
3. Best of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1. Question Paper will be based on entire syllabus summing up to 65 marks
2. Total duration allotted for writing the paper is 3 Hrs.

Design of Steel Structures Laboratory (PCCE6020L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Prerequisite Course: Engineering Mechanics, Mechanics of Solids, Structural Analysis, Structural Mechanics

Course Objectives:

1. To introduce behavior and design of simple steel structures according to limit state design concept.
2. To have the basic knowledge about the design and failure mode of steel structural members.

Course Outcomes (COs): After completion of this course students will be able to:

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Identify and compute the design loads on various steel structural systems	1	Remembering
CO2	Apply principles, procedure and relevant codal provisions for the analysis and design of various steel structural systems	3	Applying
CO3	Prepare detailed structural drawings based on design	5	Evaluating

Lab course work shall consist of detailed structural design and drawing of any one of the following steel structure along with necessary drawings.

1) Design of Roof Truss

a) Load analysis-Deal load, Live load, Wind load as per IS: 875 part I to III

b) Design of various components of roof truss by IS 800:2007

c) Detailing & drawing of roof truss.

Or

Design of an Industrial Building

a) Analysis of industrial building: Calculations of member forces.

b) Design of main beam & secondary beams, connections, columns, column bases.

c) Detailing & drawing of various components of industrial building.

Or

Design of Welded Plate Girder

a) Analysis of welded plate girder- Calculation of maximum shear force and maximum bending moment.

b) Design of web plate for shear, design of flange plate for bending moment, design of web stiffeners, design of intermediate stiffeners, and design of bearing stiffeners, curtailment of flange plate

2) A report on at least one site visit.

Text Books:

1. S. S. Bhavikatti (2009), "Design of Steel Structures by Limit state method as per IS 800:2007", I K International Pvt. Ltd
2. Duggal S K (2010), "Limit State Design of Steel Structures", Tata McGrwaHill
3. Shiyekar M R (2010), "Limit State Design of Steel Structures", PHI Learning
4. Shah V. L. & Gore, Limit state design of Steel Structure, Structures Publication, Pune
5. Sai Ram K S (2010), "Design of Steel Structures", PHI Learning
6. Dr Ramachandra (2010), "Design Of Steel Structures Vol. II", Scientific Publishers-Jodhpur, ISBN 8172336446

Reference Books:

1. Anand S. Arya, J.L. Ajmani (1977), "Design of Steel Structures", Nem Chand & Bros., India, ISBN 0861861671
2. B. C. Punmia, Ashok Kumar Jain (2006), "Comprehensive Design of Steel Structures", Laxmi Publications, ISBN 8170080932,
3. Edwin H. Gaylord, Charles N. Gaylord, James E. Stallmeyer (1991), "Design Of Steel Structures", Tata McGraw-Hill, ISBN 0070230544
4. Charles G. Salmon, John E. Johnson, Faris A. Malhas (2008), "Steel Structures: Design and Behavior", Prentice Hall, ISBN 0131885561
5. Satinder Singh, Ic Syal (2007), "Design Of Steel Structures", Standard Publishers Distributors, ISBN 8186308646
6. N. Subramanian (2008), "Design Of Steel Structures", Oxford, ISBN 0195676815,
7. Pasala Dayaratnam (2014), "Design Of Steel Structures", S. Chand Publishing, ISBN
    a. 8121923204,

Design Codes:

1. IS 800 (2007), General Construction in Steel- Code of Practice, Ced 7: Structural Engineering and Structural Section, Published by Bureau of Indian Standard Manak Bhavan, New Delhi
2. IS 875- Part 1 (1987): Dead Loads, Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Published by Bureau of Indian Standard Manak Bhavan, New Delhi
3. IS 875- Part 2 (1987): Imposed Loads, Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Published by Bureau of Indian Standard Manak Bhavan, New Delhi
4. IS 875- Part 3 (2015): Wind Loads, Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Published by Bureau of Indian Standard Manak Bhavan, New Delhi.
5. IS 875- Part 4 (1987): Snow Loads, Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Published by Bureau of Indian Standard Manak Bhavan, New Delhi.
6. IS 875- Part 5 (1987): Special Loads and Combinations, Indian Standard Code of Practice for Design Loads (Other than Earthquake) for Buildings and Structures, Published by Bureau of Indian Standard Manak Bhavan, New Delhi

Engineering Geology (PCCE6030T)

Teaching Scheme
Lectures : 02 Hrs./week
Tutorial : Nil Hr/week
Credit : 02

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives

1. To study and identify different types natural materials like rocks & minerals and soil.
2. To understand the various natural dynamic processes their influence on the surficial features, natural material and their consequences.
3. To know the physical properties of rocks & minerals,
   To know the importance of geological maps and language helpful for Civil Engineering projects.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students are able to understand the different geological structures and their impact on civil engineering structure	2	Understanding
CO2	Students are able to decide the suitable site selection for civil engineering structures	3	Applying
CO3	Students are able to know the different geological hazards and its mitigation	4	Analyzing
CO4	Students are able to understand the different method of geological exploration	2	Understanding
CO5	Students are able to identify the different rocks and minerals based on their property	3	Applying

Course Contents

Unit- I Physical Geology **06 Hrs.**

Introduction and scope of Geology and subdivision ,Internal structure of the earth, Weathering, erosion and denudations process on earth material and natural agencies, Geological work of wind, river underground water and glaciers. Earthquakes: Basics of earthquake, earthquake history, seismic activity, concept of intensity and magnitude of earthquake, causes of earthquake, influence on civil structures and engineering consideration, seismic zonation, Stratigraphy of INDIA-Introduction

Unit-II Mineralogy and Petrology **06 Hrs.**

Study of physical properties of mineral and study of common rock forming minerals & way of formation of minerals, Study of three types of rocks with reference to their formation, identification, textural and structural features Rocks and natural materials as a construction material

Unit-III Structural Geology **06 Hrs.**

Outcrop, stratification, dip and strike relation, Unconformity, joints their types and genesis Faults and folds with their types and causes, Engineering consideration of joints, folds and faults.

Unit-IV Engineering Geology **6 Hrs.**

Basics of Engineering Geology, Importance of geological studies to Engineers and significance of geological Investigations for civil engineering projects, Geology for Site selection of Dam, Tunnel, Reservoir and Highways.

Unit-V **Hydrogeology** **6 Hrs.**

Ground water and occurrence, investigations, quality, artificial recharging, Hydrogeological cycle.

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Text Books:

1. Mukharjee, P.K., A text book of Geology, The World Press Pvt. Ltd.
2. Kesavulu, C., Textbook of Engineering Geology, Macmillan India Ltd, 1993, NewDelhi
3. Bangar, K.M, Principles of Engineering Geology, Standard Publishers Distributors, 1995, New Delhi
4. Billings, M.P., Structural Geology, Prentice-Hall India, 1974, New Delhi

Reference Books:

1. Gokhale, KVG.K and Rao, D.M., Experiments in Engineering Geology, Tata-McGraw Hill, 1981, New Delhi
2 Kesavulu, C. Textbook of Engineering Geology, Macmillan, India Ltd., 1993,New Delhi
3. Lilesand, T.M. and Ralph W. Keifer., Remote sensing and ImageInterpretation, John Wiley & Sons, 1987, New York.
4. Reddy, V. Engineering Geology for Civil Engineers; Oxford & IBH, 1997,New Delhi

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Average of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

11. Question Paper will be based on entire syllabus summing up to 65 marks.

Engineering Geology Laboratory (PCCE6030L)

Practical Scheme
Practical : 02 Hrs./week
Credit : 01

Examination Scheme
Teacher Assessment : 25 Marks
End Sem Exam : 25 Marks
Total : 50 Marks

Course Objectives

1. To study and identify different types natural materials like rocks & minerals and soil.
2. To understand the various natural dynamic processes their influence on the surficial features, natural material and their consequences.
3. To know the physical properties of rocks & minerals,
   To know the importance of geological maps and language helpful for Civil Engineering projects.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students are able to understand the different geological structures and their impact on civil engineering structure	2	Understanding
CO2	Students are able to decide the suitable site selection for civil engineering structures	4	Analyzing
CO3	Students are able to know the different geological hazards and its mitigation	3	Applying
CO4	Students are able to understand the different method of geological exploration	2	Understanding
CO5	Students are able to identify the different rocks and minerals based on their property	2	Understanding

List of Experiments

Term work shall consist of performing Min Five experimental sets from the list below.

1) Study of Physical Properties of Minerals
2) Identification of Minerals and Rock sample
3) Megascopic Study of Rock Forming Minerals (Hand Specimen Study)
4) Megascopic Study of Igneous Rocks
5) Megascopic Study of Sedimentary Rocks
6) Megascopic Study of Metamorphic Rocks
7) Introduction to Geological Maps for different structural features. Presentation of Beds Along Section and Construction of Geological History:

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 6 experiments and subject specific lab assignment/ Case study

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to Satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the Teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practical's performed During laboratory sessions.

Construction Management (PCCE6040T)

Teaching Scheme	Examination Scheme
Lectures : 02 Hrs./week	Term Test : 15 Marks
Tutorial : NIL Hr/week	Teacher Assessment: 20 Marks
Credit : 02	End Sem Exam : 65 Marks
	Total Marks : 100 Marks

Course Objectives

1. An ability to understand Construction activities.
2. To identify organization chart of various construction industries with their forms.
3. Analyze network techniques by using PERT, Bar charts, etc
4. Ability to understand Engineering economics; banking systems, profit and loss accounts concepts.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will able to learn the Construction Organization and various team members	2	Understand
CO2	Students will able to Analyze network technique	4	Analyzing
CO3	Students will able to understand the material management EOQ techniques	5	Evaluating
CO4	Ability to understand Engineering economics	2	Understand

Course Contents

Unit- I Construction Industry **06 Hrs.**

Construction industry, construction team, Construction activities, classification of construction, stages in construction, Need of management in construction, Job layout and value engineering. Leadership and its quality, Organization, meaning and function, forms of organization - line, line and staff, functional, Type A, Type B and Type C

Unit-II Network Technique **05 Hrs.**

Network Technique: - History, Advantages, Bar charts, S –Curve etc. various terms used in network technique, activity, event, critical path, duration etc Development of networks, network scheduling, to find various times and float, EST, EFT, TF etc Monitoring of Network, Three phases of network technique.

Unit-III Various Acts Related to Construction Industry **06 Hrs.**

Important acts and laws related to constructions Industry- factory act, the employees provident fund Act, minimum wage act, workman compensation act, Indian trade union act, arbitration act, Safety measures in handling of building materials, construction of elements of building, demolition of buildings, hot bituminous works, scaffolding, formwork etc.

Unit-IV Material Management **05 Hrs.**

Materials management, its aims and functions, inventory analysis, inventory models, ABC analysis, inventory management, buffer stock, lead time, EOQ, material requirement, planning, market research, system of purchase of materials, stock of material at site,
Engineering economics, its definition and importance, demand and supply, factors affecting demand and supply, cost concept.

Unit-V **Contract** **05 Hrs.**

Contract, essentials, types, registration and law of contract, free consent, contract documents, performance of contract, breach of contract, advances to contractor, bills of contract and payments , subletting , inspection of works, tender, tender notice ,various terms used in tender notice such as SD, EMD, estimated cost, time period of work ,cost of tender form, invitation of tender, concept of e-tendering, time schedule of calling tender, tender documents two envelopes system, scrutiny and acceptance , revocation of tender, extra items , additions and alterations , defect liability , liquidated and un-liquidated damages , escalation of rates, work order

Text Books:

1) R.L.Peurifoy - Construction planning, Equipments and Methods.

2) Mahesh Verma - Construction equipments and its planning and application, Vikas publication

3) U.K. Shrivastava - Construction planning and Management, 3rd edition 2005 reprint 2013

4) S.V.Deodhar - Construction equipment and job planning,Khanna publishers,4th edition 2010 reprint2012.

5) Chitkara - Construction Project Management, TMH, New Delhi, 2009

Referance Books:

1. B.N.Dutta - Estimating and Costing, UBS Publishers

2. M.Chakroborty - Estimating and Costing, EWP

3. B.S.Patil - Estimating and Costing -Vol-1& 2, Orient Blackson

4. Seetharaman – Construction Engineering and Management, Umesh Publication.

5. P.S.Gahlot & B.M.Dhir – Construction Planning & Management-2010

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Best of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1. Question Paper will be based on entire syllabus summing up to 65 marks

Elective-II Traffic Engineering and Management (PECE 6050T)

Teaching Scheme
Lectures : 03 Hrs./week
Tutorial : 00 Hr/week
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives

1. To set a compact foundation in the field of traffic engineering, its management in order to achieve the safety to the road users.
2. To enable the students to apply the basic principles of traffic engineering in the design of traffic facilities based on traffic flow theory.
3. To have an overall knowledge of the traffic components and assess the traffic characteristics and related problems.
4. To develop a strong knowledge base of traffic planning and its management in any transportation area.
5. To provide knowledge of traffic control devices and its techniques in transportation interaction

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Determine the traffic flow parameters for traffic management to predict the future traffic demand for the urban and rural area.	5	Evaluate
CO2	Plan the parking plots as per the traffic availability in the urban area.	3,6	Apply, Create
CO3	Design the various types of intersection in the urban area.	4	Analyze
CO4	Propose the different types of traffic system management technique.	2, 3	Understand, Apply
CO5	Evaluate the capacity and level of service on the streets of rural and urban area.	5	Evaluate

Course Contents

Unit- I Basic traffic flow parameter and Traffic Surveys **08 Hrs.**

Introduction: Traffic engineering administration and functions, Organization of the traffic engineering department, Road user and vehicular characteristics.

Basic traffic flow parameter and Traffic Surveys: Definition – Flow, Volume, Speed, Space headway, Time headway, Density. Relationship between Flow, Speed and Density,

Traffic Surveys: Speed, Journey time and Delay surveys, classified volume count survey, Vehicle occupancy survey, Origin – Destination survey, Parking Survey, Use of photographic techniques in traffic survey.

Unit-II Light hill and Witham's Theory and Traffic Forecasting **08 Hrs.**

Lighthill and Witham's Theory: General, Assumption, Theory, Approach to signalized intersection, Bottleneck, Car following theory, Queuing theory concept

Traffic Forecasting: Need for traffic forecasting, Types of traffic, Forecasts based on past trends and extrapolation, period for forecasting.

Unit-III Parking Studies and Design of Intersection **09 Hrs.**

Parking studies: Traffic and parking problems, Ill effects of parking, Zoning and parking space requirement standards, Design standards for on street parking, Off street parking facilities, Peripheral parking system.

Design of Intersection: Design of at grade & grade separated intersection – rotary intersection – capacity of rotary intersection – Traffic signals, Advantages and disadvantages, Types of signals, Methods of setting signal timings, Warrants for signals, Coordinated control of signals, Necessity of signal coordination, Types of coordinated signal system.

Unit-IV Traffic Safety and Traffic System Management **06 Hrs.**

Traffic Accidents: Causes and prevention: Accident situation in India, Collection of accident data, Statistical methods for analysis of accident data, Road and it's effect on accidents, Skidding, Speed in relation of safety, Traffic management measures and their influence on accident prevention, Condition and collision diagram and its utility, Legislation, Enforcement, Education and Propaganda.

Traffic system management: Introduction, Travel demand management, Traffic management measures, Restrictions to turning movements – one way streets – tidal flow operations-Traffic segregation –Traffic calming- Exclusive bus lanes, conflict point diagram for various types of streets, Introduction to ITS in traffic management.

Unit-V Highway Capacity **08 Hrs.**

Highway Capacity: Importance of 'Capacity' in Highway transportation studies, Capacity of uninterrupted flow conditions as per Indo-HCM, PCU in reference to Indo-HCM in urban and rural area, Determination of theoretical capacity, Level of service, Factors affecting capacity and level of service

Reference Books:

1. Martin Whol, Brian V Martin , Traffic system Analysis for Engineers and Planners, McGraw Hill, NY, 1967
2. HCM 2010 (3 volume set), TRB Publications, 2010
3. Kadiyali L. R. and Lal, N. B., Principles & Practice of Highway Engineering, Khanna Publishers, Delhi.
4. Chakraborty Partha, Das Animesh, Principles of Transportation Engineeirng Indo-Highway Capacity Manual, 2018
5. Martin Whol, Brian V Martin , Traffic system Analysis for Engineers and Planners, McGraw Hill, NY, 1967
6. IRC-SP -12 2015 Parking facilities in Urban Roads
7. IRC SP - 41 Guidelines for the Design of At-Grade Intersection
8. IRC 35 - 2015 Code of Practice for Road Markings – Second Revision
9. IRC 67 - 2001 Road Signs
10. IRC 108 - 2015 Guidelines for traffic forecast on Highways
11. IRC 119 - 2015 Guidelines for traffic safety Barriers
12. IRC 65 - 1976 Traffic Rotaries
13. IRC 93 - 1985 Design & Installation of Road Traffic Signals
14. NPTEL Course on Traffic Engineering and Management.

Text Books:

1. Kadiyali L.R. Traffic Engineering and Transport planning, Khanna Tech Publishers, 2011
2. Khanna O.P and Justo C.G; Highway Engineering, Nem Chand Publishers, 9e.
3. Donald Drew, Traffic Flow Theory Chapter 14 in Differential Equation Models, Springer, 1983
4. 2. Dr. Sharma S. K., Principles, Practice and Design of Highway Engineering (Including Airports), S. Chand & Company Ltd.
5. Chakraborty Partho, Das Animesh, Principles of Transportation Engineering, PHI
6. Bindra S.P., A course in Highway Engineering, Dhanpat Rai Publications

List of Traffic Survey:

1. Spot speed survey
2. Moving car method of survey for journey time
3. Delay studies survey
4. Classified volume count survey
5. Vehicle occupancy survey
6. Origin – Destination survey
7. Parking survey

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

4. Two term tests of 15 marks each will be conducted during the semester.
5. Total duration allotted for writing each of the paper is 1 hr.
6. Average of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

13. Question Paper will be based on entire syllabus summing up to 65 marks
14. Total duration allotted for writing the paper is 3 hr.

Elective-II Geographical Information System (PCCE60651T)

Teaching Scheme
Lectures : 03 Hrs./week
Tutorial : ----- Hr/week
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives

1. Understand the basic concept of GIS and its applications, know different types of data representation in GIS
2. Understand and Develop models for GIS spatial Analysis and will be able to know what the questions that GIS can answer are
3. Apply knowledge of GIS software and able to work with GIS software in various application fields
4. Illustrate spatial and non-spatial data features in GIS and understand the map projections and coordinates systems
5. Apply knowledge of GIS and understand the integration of Remote Sensing and GIS

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will able to understand GIS applications and learn different types of data representation in GIS	3	Learn
CO2	Students will able to develop models for GIS spatial Analysis	3	Analyze
CO3	Students will able to work with GIS software in various application fields	2	Understand
CO4	Students will able to understand the map projections and coordinates systems	2	Understand
CO5	Students will able to understand the integration of Remote Sensing and GIS	3	Learn

Course Contents

Unit- I Introduction to GIS **08 Hrs.**

Definition, sources of data, types of data, concept of space and time in GIS, spatial information theory, history of GIS, elements of GIS, objectives of GIS, hardware and software requirements of GIS, application of GIS.

Unit-II Data models of spatial information **08 Hrs.**

Layers and coverage, conceptual models of spatial information, representation of spatial data models in computer: raster and vector models, comparative overview between raster and vector models

Unit-III Data models of non-spatial information **06 Hrs.**

: Database management systems, hierarchical structure, network structure, relational structure

Unit-IV GIS Mpping and DEM **8 Hrs.**

Digitizing: manual, semiautomatic and automatic, editing: error detection and correction, tolerances, topology creation, attribute map generation

Digital Elevation Model: Need of DEM, Various structures of DEM: line, TIN, grid

Unit-V **Application of remote sensing and GIS** **10 Hrs**

Forest resource management, agriculture and soil management, water resource management, land use and land suitability, disaster management

Reference Books:

1. Geographic Information Systems and Science, Second Edition 2005: Longley, Paul A., Michael F. Goodchild, David J. Maguire, David W. Rhind, John Wiley & Sons, New York.
2. Modeling Our World: The ESRI Guide to Geodatabase Design: Zeiler, M. 1999. ESRI Press, Redlands, California
3. GIS, Spatial Analysis and Modeling: Maguire, D., M. Batty, and M. Goodchild. 2005, ESRI Press.
4. Introduction to geographic Information Systems: Kang-tsung Chang, Tata mcgraw Hill.
5. Advanced Surveying (Total Station, GIS and Remote Sensing) First Edition 2007: SatheeshGopi, R. Sathikumar, N. Madhu

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Best of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1. Question Paper will be based on entire syllabus summing up to 65 marks
2. Total duration allotted for writing the paper is 3 hr.

Elective-II Town & Urban Planning (PCCE60652T)

Teaching Scheme
Lectures : 03 Hrs./week
Tutorial : ----- Hr/week
Credit : 03

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives

1. Understand the basic concept of Town Planning.
2. To study the development phase of Town Planning
3. To study the importance of layout Patterns
4. Apply the Knowledge of Development control rules and building bylaws.
5. To study the MRTP acts and Land acquisition act.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will able to understand the Importance of Town Planning	3	Learn
CO2	Students will study the contribution of Modern Era Architect	3	Analyze
CO3	Students will able to work with development control rule and building bylaws	2	Understand
CO4	Students will able to understand the Importance of different Zones	2	Understand
CO5	Students will able to understand the Importance of Acts	3	Learn

Course Contents

Unit- I History of Town Planning **06 Hrs.**

Necessity and scope of Town Planning, Brief history, Greek and Roman Towns, Planning in ancient India – Indus Valley Civilization, Vedic Period, Buddhist Period, Medieval Period, Mogul Period, British Period, Post-Independence Period, Theories in urban and regional planning

Unit-II Town Planners in Modern Era **06 Hrs.**

Town Planners in Modern Era such as Sir Patrick Geddes, Sir Ebenezer Howard, Clarence stein, Sir Patrick Abercrombie, Le Corbusier, Present Status of Town Planning in India, Efficiency Measures, Planners skills, Integrated Area Planning in India.

Unit-III Layouts Patterns **06 Hrs.**

Layout of Residential Units, Neighborhood Unit Planning, Rad burn Plan, Grid Iron Pattern, Shoe String Development, Growth Pattern of Towns, Concentric Satellite, Ribbon Development, Scattered growth

Unit-IV Town Planning Zones **8 Hrs.**

Elements of Town, Various Zones, Development Control Rules and Building Bye Laws, Urban Roads: Objective, Classification, Road Networks, Data Collection Surveys, Analysis of data, Town aesthetics, Landscape Architecture, Suitability of Trees, Treatment of Traffic Islands, Open Spaces Walkways Public Sit-outs, Continuous Park System, Green ways.

Unit-V **M.R.T.P. Act** **8 Hrs.**

Town Planning works with reference to M.R.T.P. Act, Land Acquisition Act, Necessity and procedure of Acquisition

Reference Books:

1. Lewis Kuble, "Town and Country Planning"
2. Gallion, "The Urban Pattern", Eisner

Text Books:

1. Gandhi N.K., "Town and Country Planning",
2. RangawalaS.C., "Town Planning", Charotar Publications, Anand
3. Sundaram K.V., "Urban and Regional Planning in India", Vikash Publishing House Pvt. Ltd.
4. MRTP Act 1966
5. Land Acquisition Act - 1894
6. Misra S.N., "Rural Development Planning-Design and Method", Satvahan Publications, N. Delhi

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 15 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1 hr.
3. Best of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1. Question Paper will be based on entire syllabus summing up to 65 marks
2. Total duration allotted for writing the paper is 3 hr.

Elective –II Advanced Design of RC Structure (PECE6053)

Teaching Scheme
Lectures : 03 Hrs./week
Tutorial : 01 Hr/week
Credit : 04

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives

1. To introduce fundamentals of reinforced concrete and pre-stressed concrete structure.
2. To apply principles of pre-stressing for design of simply supported girders.
3. To introduce limit state of collapse compression and torsion.
4. To understand IS Code methods for design and analysis of heavy structures such as retaining wall and combined footing.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Students will be able to understand fundamentals of reinforced concrete and pre-stressed concrete structure.	2	Understand, Apply
CO2	Students will be able to do load calculation and design pre-stressed concrete structure.	3	Evaluate, Create
CO3	Students can able to do design and detailing of structures based on limit state of collapse compression and torsion.	2	Analyze
CO4	Students can able to calculate load and design heavy miscellaneous reinforced concrete structures such as retaining wall, combined footing.	3	Evaluate

Course Contents

Section-I - Pre-stressed Concrete Structure

Unit- I Introduction to Pre-stressed Concrete **09 Hrs.**

a) Introduction to pre-stressed concrete, methods of pre-stressing, general principal of pre-stressing, differentiation of pre-stressed concrete members and reinforced concrete members, types, systems.

b) Stress Analysis: Stress analysis of pre-stressed concrete member, load balancing concept, Losses in Pre-stressing for Pre-tensioned & Post tensioned members

Unit-II Post Tensioned flexural member **09 Hrs.**

Design of post tensioned flexural member– Cable profile, Design of flexural reinforcement, Design of shear reinforcement, Design of end block.

Section-II - Reinforced Concrete Structure

Unit-III Limit State of Collapse Compression and Torsion **09 Hrs.**

a) Limit State of Collapse (Compression)-Introduction, IS code specifications for limit state of collapse-compression, types of columns, criterions for design of columns, column interaction curve, design of uniaxially loaded column.

b) Limit State of Collapse (Torsion) – Introduction, IS code specifications for limit state of collapse-torsion, classification of torsion, design of sections subjected to combined bending and Torsion.

Unit-IV Miscellaneous R. C. Structures **09 Hrs.**

a) Introduction, types of retaining wall, detail design of cantilever retaining wall

b) Introduction, necessity, design of rectangular combined footing.

Reference Books:

1. N. Krishnaraju, "Prestressed Concrete"
2. T. Y. Lin, "Design of prestressed concrete structure".
3. S.R. Karve & V. L. Shah, "Limit State Analysis & Design of Reinforced Concrete",
4. Structures Publications R.C.C. Structures.
5. Punmia, Jain & Jain, "Comprehensive R.C.C. Design", Laxmi Publications.
6. S. K. Duggal, "Earthquake Resistant Design of Structures", Oxford University Press.
7. N. C. Sinha & S. K. Roy, "Fundamentals of Reinforced Concrete"
8. S. Unnikrishna Pillai, Devdas Menon, "Reinforced Concrete Design", Tata McGraw-Hill Publication.
9. S. Ramamrutham, "Design of Reinforced Concrete Design", Dhanpat Rai Publishing
10. Company.
11. B. C. Punmia, "Reinforced Concrete Structures", Laxmi Publication.

Reference IS Codes

IS 456-2000 Plain and Reinforced Concrete - Code of Practice.

IS 1343 Code of Practice for Pre-stressed Concrete?

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

1. Two term tests of 30 marks each will be conducted during the semester.
2. Total duration allotted for writing each of the paper is 1.15 hr.
3 Best of the marks scored in both the two tests will be considered for final grading.

End Semester Examination (C):

1. Question Paper will be based on entire syllabus summing up to 75 marks
2. Total duration allotted for writing the paper is 3 hr.

Project Stage –I (PJCE6060L)

Teaching Scheme
Practical : 02 Hr/week
Credit : 04

Examination Scheme
Teacher Assessment: 25 Marks
End Sem Exam : 25 Marks

Course Objectives

- To implement the solution as per the problem statement.
- To develop the team building, writing, logical reasoning and management skills.
- To provide the connections between the designs and concepts across different disciplinary Boundaries.
- To encourage students to become independent personnel, critical thinkers and lifelong learners

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Apply engineering knowledge to produce solution of a problem considering cultural, social, environmental, and economic factors using appropriate tool and method.	L4	Analyze
CO2	Demonstrate project based learning that allows students to transfer existing ideas into new applications.	L2	Understand
CO3	Develop an ability to work in teams and manage the conduct of the research study.	L3	Apply
CO4	Integrate different perspectives from relevant disciplines which help them to get internships, jobs and admission for higher studies.	L3	Apply
CO5	Present the research in the form of technical writing, understand what constitutes to plagiarism and how to use proper referencing styles.	L2	Understand

Syllabus:

Domain knowledge (any beyond) needed from the following areas for the effective implementation of The project

Experimental design / Theoretical Analysis/ software analysis / Fabrication of model, structural design, Hydraulic design , construction management , Environmental studies, sustainable development, Smart city planning , Advanced Transportation system, Structural audit, comparative study, case study, filed/ market survey, Smart material , Economical study etc.

Guidelines:

The main purpose of this activity is to improve the students' technical skills, communication skills by Integrating writing, presentation and teamwork opportunities.

- Each group will be reviewed twice in a semester and marks will be allotted based on the various
- Points mentioned in the evaluation scheme.
- In the first review of this semester, each group is expected to complete 30 % of project.
- In the second review of this semester, each group is expected to complete 50 % of project.
- Interaction with alumni mentor will also be appreciated for the improvement of project.

Assessment Criteria:

- At the end of the semester, after confirmation by the project guide, each project group will
- submit project completion report in prescribed format for assessment to the departmental committee (including project guide).
- Assessment of the project stage I (at the end of the semester) will be done by the departmental
- Committee (including project guide).
- Oral examination should be conducted by Internal and External examiners. Students have to
- Give presentation and demonstration based on their project.

Prescribed project report guidelines:

Size of report shall be of minimum 25 pages. Project Report should include appropriate content for:

- Introduction
- Literature Survey
- Related Theory
- Implementation details
- Project stage I Outcomes
- Conclusion
- References

Assessment criteria for the departmental committee (including project guide) for Continuous Assessment:

Assessment criteria for the departmental committee (including project guide) for End Semester Exam:

Each group will be reviewed twice in a semester by faculty guide and faculty coordinator based on the following criteria:

Project progress

- Documentation/Technical paper writing
- Key findings
- Validation of results

Each review consists of 25 marks. Average of the marks scored in both the two reviews will be Considered for final grading. The final certification and acceptance of TA ensures the satisfactory Performance on the above aspects.

Table -1 Log Book Format

S. No.	Week (Start date : End date	Work done	Sign of Guide	Sign of Coordinator
1				
2				

Table -2 Continuous Assessment Sheet

S. No.	Exam Seat	Name of Student	Student Attendance	Log book Maintain	Literature Review	Depth of Understanding	Report	Total
			5	5	5	5	5	25

Table -3 Evaluation Sheet

S. No.	Exam Seat	Name of Student	Project Selection	Design simulation/ Logic	Hardware programing/ Experimental work	Result verification	Presentation	Total
			5	5	5	5	5	25

Computer Aided Drawing in Civil Engineering (ESCE0670T)

Teaching Scheme
Lectures : 01 Hrs./week
Tutorial : Nil
Credit : 02

Examination Scheme
Term Test : 15 Marks
Teacher Assessment: 20 Marks
End Sem Exam : 65 Marks
Total Marks : 100 Marks

Course Objectives

1. To introduce the basic commands of Auto Cad.
2. Able to prepare a simple building drawing file using basic commands.
3. To Understand and demonstrate dimensioning concepts and techniques.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Demonstrate basic concepts of the AutoCAD software	2	Understand, Apply
CO2	Students will be able to draw various types of drawing using Auto cad software	3	Evaluate, Create
CO3	Students can able to do design 2D Detailed Building drawing.	2	Analyze

Course Contents

Unit- I Introduction to Auto Cad **03Hrs.**

a) Introduction to CAD, Introduction to drafting software.

b) Explanation to precision Drawing & Drawing tools, Geometric Shapes, Basic Printing, Editing Tools.

Unit-II Basic Sign and Conventions **02Hrs.**

Different Materials symbols, Architectural, Structural, Electrical and Plumbing symbols. Drawing symbols, dimensioning standards

Unit-II 2D Building Drawing **03 Hrs.**

Terms, Elements of planning building drawing, Methods of making line drawing and detailed drawing. Site plan, floor plan, elevation and section drawing of small residential and public building drawing.

Unit-IV Introduction to 3D Drawing **04 Hrs.**

Introduction to 3D Drawing Terms, Elements required for drawing. Draw the basic Object, Residential building drawing.

Reference Books:

1. Subhash C Sharma & Gurucharan Singh (2005), "Civil Engineering Drawing",Standard Publishers
2. Ajeet Singh (2002), "Working with AUTOCAD 2000 with updates on AUTOCAD 200I", Tata- Mc Graw-Hill Company Limited, New Delhi
3. Sham Tickoo Swapna D (2009), "AUTOCAD for Engineers and Designers", Pearson Education,
4. Venugopal (2007), "Engineering Drawing AUTOCAD", New Age International Pvt. Ltd.

Evaluation Scheme:

Continuous Assessment (A):

Subject teacher will declare Teacher Assessment criteria at the start of Semester.

Continuous Assessment (B):

16. Two term tests of 30 marks each will be conducted during the semester.

End Semester Examination (C):

Computer Aided Drawing in Civil Engineering Lab (ESCE6070L)

Teaching Scheme
Lectures : 0 Hrs./week
Practical : Nil
Credit : 02

Examination Scheme
Term Test : Nil
Teacher Assessment: 20 Marks
End Sem Exam : Nil
Total Marks : 100 Marks

Course Objectives

1) To introduce the basic commands of Auto Cad.
2) Able to prepare a simple building drawing file using basic commands.
3) To Understand and demonstrate dimensioning concepts and techniques.

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Demonstrate basic concepts of the AutoCAD software	2	Understand, Apply
CO2	Students will be able to draw various types of drawing using Auto cad software	3	Evaluate, Create
CO3	Students can able to do design 2D Detailed Building drawing.	2	Analyze

List of Experiments

Term work shall consist of performing Min Five experimental sets from the list below.

1) To Study the basic commands and Initial settings of AutoCAD drawing files.
2) To draw the basic shapes of 2D and Line Plan of Residential/Public building drawing.
3) To draw the detailed drawing Plan of Residential building
4) To draw the above plan Elevation, section, site plan schedules of opening etc.
5) To draw the 3D drawing of basic shapes
6) To developed the 3D views of building

Evaluation Scheme:

Continuous Assessment (A):

Laboratory work shall consist of minimum 5 experiments and subject specific lab assignment/ Case study

The distribution of marks shall be as follows:

1. Performance in Experiments: 05 Marks
2. Journal Submission: 05 Marks
3. Viva-voce: 05 Marks
4. Subject Specific Lab Assignment/Case Study: 10 Marks

The final certification and acceptance of laboratory journal/manual/report will be subject to Satisfactory performance of laboratory work and upon fulfilling minimum passing criteria in the Teacher assessment.

End Semester Examination (C):

Oral / Practical examination will be based on the entire syllabus including, the practical's performed During laboratory sessions.

Environmental Engineering (MCCE6080T)

Teaching Scheme
Lectures : 01 Hrs./week
Tutorial : Nil
Credit : Audit

Examination Scheme
Term Test : NIL
Teacher Assessment: NIL
End Sem Exam : NIL
Total Marks 0 NIL

Course Objectives

1) Understand environmental issues such as depleting resources, pollution, ecological problems and the renewable energy scenario.
2) Familiarize environment related legislation.
3) Understand and compare solar energy

COs	Course Outcomes	Blooms Level	Blooms Description
CO1	Understand how human activities affect environment	2	Understand, Apply
CO2	Understand the various technology options that can make a difference	3	Evaluate,
CO3	Identify the advantages of solar energy over other forms of energy	2	Analyze

Course Contents

Unit- I Social issues and Environment **04Hrs.**

a) Ecological footprint and Carrying Capacity

b) Depleting nature of Environmental resources such as soil, water minerals and forests

c) Carbon emissions and Global Warming.

Unit-II Technological growth for Sustainable Development **04Hrs.**

a) Social, Economic and Environmental aspects of Sustainable Development

b) Renewable Energy Harvesting

c) Concept of Carbon credit, Green Building

d) Power and functions of Central Pollution Control Board and State Pollution Control Board.

Unit-II Solar Energy **05 Hrs.**

a) Basic concept of Solar Radiation

b) Study of Solar panels

c) Comparative study of solar energy with other energy sources

Books Recommended:

Text books:

1. Environmental Studies From Crisis to Cure, R. Rajagopalan, 2012

2. Textbook of Environmental Studies For Undergraduate Courses, Erach Bharucha

3. Solar Engineering, Sukhatme

Evaluation Scheme:

Continuous Assessment (A):

Assignments based on each unit.

End Semester Examination (C): Nil