

Sankalchand Patel University
Faculty of Engineering and Technology
First Year Master of Technology in Civil Engineering
(Computer Aided Structural Analysis and Design)
In Effect from Academic Year 2023-24

Branch Name:	Civil Engineering (Computer Aided Structural Analysis & Design)
Semester/Year:	Semester II/ First Year
Subject Title:	Prestressed Concrete
Subject Code:	2ET2060204T
Pre-requisite:	Mechanics of Solids, Structural Analysis and Engineering Mathematics

Credit	Teaching Scheme Hours per week				Evaluation Scheme (Marks)								Total (Marks)
					Theory (Marks)				Practical (Marks)				
	L	T	P	Total	SEE		CCA		SEE		CCA		
					Min.	Max.	Min.	Max.	Min.	Max.	Min.	Max.	
5	3	2	0	5	24	60	16	40	00	00	00	00	100

Course Objective:

1. Prestressed concrete is one of the most reliable, durable and widely used construction materials in building and bridge projects around the world.
2. It has made significant contributions to the construction industry, the precast manufacturing industry and the cement industry as a whole.
3. It has led to an enormous array of structural applications, including buildings, bridges, foundations, parking garages, water towers, nuclear reactors, TV towers and offshore drilling platforms due to its distinct advantages.

Subject Contents			
Sr. No	Topic	Total Hours	Weightage (%)
1	Introduction: Principles of prestressing - types and systems of prestressing, need for High Strength materials, Loading stages, Determination of losses, deflection (short-long term), camber, cable layouts.	05	10
2	Behavior under flexure - IS codal provisions, ultimate strength, Design of Flexural members including large span slabs and beams.	05	15
3	Design for Shear, bond and torsion. Design of End blocks	06	15
4	Design of tension members - application in the design of prestressed pipes and prestressed concrete cylindrical water tanks.	05	15
5	Design of compression members with and without flexure - its application in the design piles, flag masts and similar structures.	04	10
6	Composite beams - analysis and design, ultimate strength - their applications. Partial prestressing - its advantages and applications.	05	15
7	Application of prestressing in continuous beams, concept of linear transformation, Concordant cable profile and cap cables.	06	10
8	Introduction to the special prestressed structures like prestressed folded plates, Prestressed cylindrical shells, prestressed concrete poles.	06	10

List of Tutorials:

Minimum 15 problems Based on above mentioned.

List of Reference Books

1. Prestressed concrete - Krishna Raju
2. Design of Prestressed Concrete Structures - T.Y.Lin
3. Fundamentals of Prestressed Concrete - N.C.Sinha & S.K.Roy S.Chand & Co.,
4. Prestressed Concrete- Design and Construction – Leonhardt F., Wilhelm Ernst and Shon, Berlin
5. Prestressed Concrete - Freyssinet
6. Prestressed Concrete, - Evans, R.H. and Bennett, E.W., Chapman and Hall

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7. Prestressed concrete - Rajgopalan
8. IS: 1343-Code for Practice for Prestressed Concrete.
9. IS: 3370-3 (1967): Code of Practice Concrete structures for the storage of liquids, Part 3: Prestressed concrete structures.

Course Outcome:

After learning the course, the students should be able to:

1. Analyze and design for flexure shear, bond and torsion Skill Development
2. Design of tension members Skill Development
3. Design of compression members with and without flexure Skill Development
4. Analysis and design of composite beams Skill Development
5. Understand design principles of the special prestressed structures like prestressed folded plates, prestressed cylindrical shells, prestressed concrete poles. Employability

Open Ended Problems:

Apart from above tutorials/experiments a group of students has to undertake one open ended problem/design problem few examples of the same are given below:

1. Analysis and design of Prestressed structure like building, bridges etc. using pen-source / professional software or other suitable means.
2. Analysis and design of pipes and prestressed concrete cylindrical water tanks using pen- source /professional software or other suitable means.
3. Analysis and design of piles, flag masts and similar structures using pen-source / professional software or other suitable means.

List of Open Source Software/learning website:

<http://nptel.ac.in/>

Course Learning Outcomes (CLO): On completion of this course, the students will be able to:

CLO	Description	Bloom's Taxonomy Level
CLO1	Analyze and design for flexure shear, bond and torsion	L-3 and L-4
CLO2	Design of tension members	L-3 L-4 and L-5
CLO3	Design of compression members with and without flexure	L-5
CL04	Analysis and design of composite beams	L-3 and L-4
CL05	Understand design principles of the special prestressed structures like prestressed folded plates, prestressed cylindrical shells, prestressed concrete poles.	L-2 L-3 and L4

L1- Remember, L2- Understand, L3- Apply, L4- Analyze, L5- Evaluate, L6- Create

Mapping of CLOs with POs & PSOs

	Program Outcomes (POs)												Program Specific Outcomes (PSOs)		
Course Learning Outcomes	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO1 0	PO1 1	PO1 2	PSO 1	PSO 2	PSO 3
CLO1	M	M		M	M	M	M	M	M			M	M		M
CLO2	M	M	M	M	M	M		M	M			M	M		M
CLO3	M	M	M	M	H	M		M	M			H	M	H	M
CL04	M	M	M	M	H	M		M				M	M	M	M
CL05	M	M	M	M	H	M		M				M	M	M	M

H: High, M: Medium, L: Low