



PRESTRESSED CONCRETE (SYLLABUS)

Course Code	23CE4701A	Year	IV	Semester	I
Course Category	Professional Elective-IV	Branch	CIVIL	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	A. Strength of Materials B. Concrete Technology C. DDRCS
Continuous Internal Evaluation	30	Semester End Evaluation	70	Total Marks:	100

Course Objectives:

The objective of this course is to:

- Understand the behavior of prestressed concrete members under flexure, shear, and torsion.
- Explain the principles involved in the analysis and design of continuous prestressed concrete beams.
- Analyze the behavior of end blocks and anchorage zones using standard methods.
- Apply the concepts of prestressing to statically indeterminate structures.
- Apply the principles of composite construction using prestressed concrete systems.

Course Outcomes:

Course will enable the student to:

CO	Statement	Blooms level
CO 1	Analyze and design prestressed concrete sections for flexure, axial tension, compression, shear, torsion, and bond.	L4
CO 2	Analyze continuous prestressed concrete beams and evaluate short-term and long-term deflections.	L4
CO 3	Analyze and design end blocks and anchorage zones using Guyon's and Magnel's methods.	L4
CO 4	Apply concepts to analyze and design statically indeterminate prestressed concrete structures including beams and portal frames.	L3
CO 5	Apply principles of composite construction in prestressed concrete including stress, deflection, and strength analysis.	L3

Course Articulation Matrix:

CO\PO/PSO	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PSO1	PSO2
CO1	3	3	3	2	2	–	1	–	–	1	1	3	2
CO2	3	3	3	2	2	–	–	–	1	1	1	3	3
CO3	3	3	2	3	2	–	–	–	1	1	1	3	3
CO4	3	3	3	2	2	–	1	–	1	1	1	3	3
CO5	3	3	3	2	2	–	1	–	1	1	1	3	3



Syllabus

Unit No.	Content	Mapped COs
I	Flexural, shear; Torsional resistance and design of Prestressed concrete section. Types of flexural failure– code procedures- shear and principal stresses, Prestressed concrete members in torsion, Design of sections for flexure, Axial Tension.	CO1
II	Analysis of continuous beams –Elastic theory- Linear transformation and Concordant tendons-Deflections of pre-stressed concrete beams: Importance of control of deflections- factors influencing deflections -short term deflections of un-cracked member–prediction of long term deflections-application to simple beams only.	CO2
III	Analysis of end blocks: By Guyon’s method and Magnel’s method, Anchorage zone stresses- Approximate method of design-anchorage zone reinforcement-transfer of prestresses- pretensioned members-Composite sections: Introduction Analysis for stresses- differential shrinkage- general design considerations-design procedure only.	CO3,CO5
IV	Statically Indeterminate Structures: Advantages of Continuous Members, Effect of Prestressing, Indeterminate Structures--Methods of Achieving Continuity. Definitions of Common Terms. Methods of Analysis of Secondary Moments, Concordant Cable Profile- Guyon’s Theorem, Effect of Axial Deformation and Tertiary Moments-Ultimate Load Analysis of Continuous Prestressed Members.	CO4
V	Composite Construction of Prestressed and in situ Concrete: Composite Structural Members, Types of Composite Construction, Analysis of Stresses, Differential Shrinkage, Deflection of Composite Members, Stresses at Serviceability Limit State, Flexural Strength of Composite Sections, Shear Strength of Composite Sections, Design procedure of Composite Sections.	CO5

Learning Resource(s)
Text Book(s)
1. Prestressed Concrete, by N. Krishna Raju, McGraw Hill 2. Prestressed Concrete by N. Rajagopalan, Narosa Publishing 3. Prestressed Concrete by S. Ramamrutham, Dhanpatrai Publishing Company References
Reference Book(s)
1. Prestressed Concrete Analysis and Design, Antone E.Naaman2e,TechnoPress3000 2. Design of Prestressed Concrete-T.Y.Lin, Ned H. Burns 3e,Wiley Publications
Web Materials:
1. Prestressed Concrete Structures: https://nptel.ac.in/courses/105106117