IV Year I Semester	L	Т	Р	С
Code: 17CE703	3	1	0	3

PRESTRESSED CONCRETE

Course Learning Objectives

The objectives of this course are:

- 1. Familiarize Students with concepts of prestressing
- 2. Equip student with different systems and devices used in prestressing
- 3. Understand the different losses of prestress including short and long term losses
- 4. Familiarize students with the analysis and design of prestressed concrete members under flexure, shear and torsion.

Course Outcomes:

At the end of this course the student will be able to

- 1. Understand the basic concepts of prestressing and applications.
- 2. Understand the different methods of prestressing
- 3. Estimate effective prestress including the short and long term losses
- 4. Analyze and design prestressed concrete beams under flexure
- 5. Analyze and design prestressed concrete beams for flexures hear
- 6. Understand the relevant IS Codal provisions for prestressed concrete

SYLLABUS

UNIT-I

Basic concepts of Prestressing- Advantages and Applications of Prestressed Concretes, High Strength Concrete- Permissible Stresses, Shrinkage, Creep, Deformation Characteristics, High strength Steel- Types, Strength- Permissible Stresses- Relaxation of Stress, Cover Requirements.

UNIT-II

Prestressing Systems- Introduction, Tensioning devices, Pre-tensioning Systems, Post tensioning Systems, Basic Assumptions in Analysis of prestress and design, Analysis of prestress, Resultant Stresses at a section- pressure line- Concepts of load balancing- Stresses in Tendons, Cracking moment.

UNIT-III

Losses of Pre-stressing- Loss of Pre-stress in pre-tensioned and post tensioned members due to various causes -Elastic shortening of concrete, shrinkage of concrete, creep of concrete, Relaxation stress in steel, slip in anchorage, differential shrinkage- bending of members and frictional losses- Total losses allowed for design

UNIT-IV

Design for Flexural resistance- Types of flexural failure – Code procedures- Design of sections for flexure- Control of deflections- Factors influencing Deflection- Prediction of short term and long term deflections.

UNIT-V

Design for Shear and Torsion- Shear and Principal Stresses- Design of Shear reinforcements-Codal Provisions- Design for Torsion, Design for Combined bending, shear and torsion.

UNIT-VI

Transfer of Prestress in pre tensioned members- Transmission length- Bond stresses- end zone reinforcement- Codal provisions- Anchorage zone Stresses in Post tensioned members- Stress distribution in end block- Anchorage Zone reinforcement.

Text Books

- 1. Prestressed Concrete, N. Krishna Raju, Tata McGraw hill
- 2. Prestressed Concrete, S. Ramamrutham

References:

- 1. Prestressed Concrete, by P. Dayaratnam.
- 2. Prestressed Concrete, by T. Y. Lin & Burns, Wiley Publications.

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	2	1	1	1	1	1	1	1	1	1	1	2	2	-	1
CO2	2	1	1	1	1	1	1	1	1	1	1	2	2	1	1
CO3	3	3	3	2	2	1	1	1	1	1	1	3	2	1	1
CO4	3	3	3	3	2	1	1	1	1	1	1	3	2	-	1
CO5	3	3	3	3	1	1	1	1	1	1	1	3	2	-	1
CO6	3	3	3	3	1	1	1	1	1	1	1	3	2	-	2