

Course Code	Course Title	L	T	P	C
20SE012	ADVANCED PRESTRESSED CONCRETE	3	0	0	3

PREQUISITE COURSES COURSES: PRESTRESSED CONCRETE

COURSE OBJECTIVES:

The main objective of this course is to learn advancements in Prestressed Concrete. Familiarize students with concept of pre stressing & analysis of prestress. Understand the different losses of pre stress including short and long term losses. To carry out the complete design for flexure & deflection. To study about shear, torsion & bond stresses in prestressed concrete. Student must be able to design tension & compression members.

COURSE OUTCOMES:

At the end of the course student will be able to

CO's	Course Outcomes	PO's
1	To understand the basic concepts about prestressed concrete & analysis of prestress	1, 2
2	Estimate the effective losses in prestress.	2
3	Analyze the effect of prestressing force on the behavior of beams in flexure.	2
4	To design shear, torsion & transmission length in prestressed concrete members.	3
5	Design of compression and tension members as per Codes of Practice.	3

SKILLS:

- ✓ Design and analysis of pre tensioned and post tensioned concrete members
- ✓ Determination of deflections of prestressed members
- ✓ Calculation of losses of prestress, creep and shrinkage.

UNIT-I:

BASIC CONCEPT OF PRESTRESSING & ANALYSIS OF PRESTRESS: Basic concepts of pre-stressing; Historical development; Advantages and Types of Prestressing, Pre-tensioning Systems and Devices, Post-tensioning Systems and Devices, Need for High strength steel and High strength concrete; 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-II:

LOSSES OF PRESTRESS: Losses of Prestress: Nature of losses of pre-stress; Loss due to elastic deformation of concrete, shrinkage of concrete, creep of concrete, relaxation of stress in steel, friction and anchorage slip; Total losses allowed for in design.

UNIT-III:

DESIGN FOR FLEXURE AND DEFLECTION: Design for Flexural resistance- Types of flexural failure; Code procedures- Design of sections for flexure of beams (rectangular, I & T Sections); Introduction-Factors influencing deflections Control of deflections- Factors influencing- Prediction of short term and long term deflections.

UNIT-IV:

SHEAR, TORSION & TRANSMISSION LENGTH: 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. Transmission length- Bond stresses- end zone reinforcement Codal provisions; Anchorage zone Stresses in Post tensioned members- Stress distribution in end block- Anchorage Zone reinforcement.

UNIT-V:

DESIGN OF TENSION & COMPRESSION MEMBERS: Design of tension members - application in the design of prestressed pipes and prestressed concrete cylindrical water tanks - Design of compression members with and without flexure – its application in the design piles, flag masts and similar structures.

TEXT BOOKS:

1. Krishna Raju, N. "Prestressed Concrete", Tata Mc Graw - Hill Publishing Company Limited, New Delhi.4th edition, 01- Dec -2006.
2. Lin, T.Y. & Ned H. Burns, "Design of Prestressed Concrete Structures", John Wiley & Sons, 3rd edition, 1981.

REFERENCE BOOKS:

1. Rajagopalan, N. "Prestressed concrete", Narosa Publishing House.2nd edition, 2005.
2. Nilson, A. "Design of Prestressed Concrete", John Willey & Sons.2nd edition, 1987.
3. Arthur H. Nilson, "Design of Prestressed Concrete", John Wiley and Sons Inc, New York, 2004.
4. Lin. T. Y and Burns. H "Design of Prestressed Concrete Structures", John Wiley and Sons Inc, New York, 2009.
5. Sinha. N. C. and Roy. S. K, "Fundamentals of Prestressed Concrete", S. Chand and Co., 1998.