

19CE4702A – PRESTRESSED CONCRETE

Course Category:	Program Elective	Credits:	3
Course Type:	Theory	Lecture-Tutorial-Practical:	3-0-0
Prerequisites:	19CE3503 – Design of Reinforced Concrete Structures	Continuous Evaluation:	30
		Semester End Evaluation:	70
		Total Marks:	100

Course Outcomes

Upon successful completion of the course, the student will be able to:

CO1	Explain the fundamental concepts of stress analysis and systems of prestressing	K2
CO2	Evaluate and analyze the stresses under various conditions.	K3
CO3	Estimate the various losses of prestress occurring in the pressed members.	K3
CO4	Design and detail the prestressed concrete members subjected to flexure	K6
CO5	Analyze and design of end block of prestressed concrete members	K4

Contribution of Course Outcomes towards achievement of Program Outcomes

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	2	2	3				2			2			3	
CO2	2	2	3				2			2			3	
CO3	2	2	3				2			2			3	
CO4	2	2	3				2			2			3	
CO5	2	2	3				2			2			3	
Avg.	2	2	3				2			2			3	

1- Low

2-Medium

3-High

Course Content

UNIT-1	<p>Introduction and Systems of prestressing Introduction: Basic concepts of prestressing, Historical Development, Need for high strength steel and concrete, Terminology, Advantages of prestressed concrete, Applications of prestressed concrete. Systems of prestressing : Classification of prestressed concrete. Pre tensioning techniques - long line system (Hoyer system), post - tensioning Techniques (a) Fressinet system and (b) Gifford Udall system.</p>	CO1
UNIT-2	<p>Analysis of prestress and Bending stresses Basic assumptions, Analysis of prestress, Resultant stresses at a section, Pressure line or thrust line and internal resisting couple, Concept of load balancing, Stresses in tendons, Cracking moment.</p>	CO2
UNIT-3	<p>Losses of Prestress Nature of losses of Prestress, Loss due to elastic deformation of concrete, Loss due to shrinkage of concrete, Loss of prestress due to creep of concrete, Loss of prestress due to relaxation of stress in steel, Loss of prestress due to friction, Loss due to Anchorage slip, Total losses allowed for in design.</p>	CO3
UNIT-4	<p>Design of prestressed concrete sections Allowable stresses -Elastic design of simple beams having rectangular and I-section for flexure -kern lines -cable profile and cable layout.</p>	CO4
UNIT-5	<p>Anchorage zone stresses in post-tensioned members Introduction, Stress distribution in end block, Investigations on anchorage zone stresses, comparative analysis, Anchorage zone reinforcement.</p>	CO5

Learning Resources

Text Books	3. N. Krishna Raju, Prestressed concrete, 4/e, Tata McGraw Hill, 2012. 4. G.S. Pandit, Prestressed concrete, CBS Publishers, 2014.
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Reference Books	1. P. Dayaratnam, Prestressed Concrete Structures, Oxford and IBH Publishing Company, 2014. 2. T.Y. Lin, and H. Ned, Burhns, Design of Prestressed Concrete Structures, 3/e, John Wiley and Sons, 2010. 3. H. Arthur, Nilson, Design of prestressed concrete, Wiley India Pvt.ltd, 2011. 4. J.R. Libby, Modern prestressed concrete, CBS Publishers, 2007.
e-Resources & other digital material	5. https://nptel.ac.in/courses/105/106/105106118/ 6. https://freevideolectures.com/course/94/prestressed-concrete-structures 7. http://www.nptelvideos.in/2012/11/prestressed-concrete-structures.html 8. http://www.nptelvideos.com/course.php?id=337--