SCHEME OF COURSE WORK

Course Details:

Course Title:	**Pre-stressed Concrete Design**		
Course Code:	**15CE2202**	**L P C**	**4 0 3**
Program:	**M. Tech.**		
Branch:	**Structural Engineering**		
Semester:	**I**		
Prerequisites:	**Design of Reinforced Concrete Structures, Concrete Technology.**		
Courses to which it is a prerequisite:	**Advanced Reinforced Concrete Design**		

Course Outcomes (COs):
At the end of the course, the student will be able to:

1	Discuss various prestressing methods and related basic issues
2	Analyse and design the beams for a given prestressing force
3	Apply the principles to design beams for shear, bond and bearing
4	Compute deflection in prestressed concrete beams
5	Apply the concepts underlying design principles of various miscellaneous PSC structural members

Program Outcomes (POs):
Post graduates will be able to:

1	Synthesize existing and new knowledge in various sub areas of structural engineering
2	Analyse complex engineering problems critically with adequate theoretical background for practical applications.
3	Evaluate a wide range of feasible and optimal solutions after considering safety and environmental factors.
4	Demonstrate the ability to pursue research by conducting experiments and extract the relevant information through literature surveys.
5	Use state –of- the- art of modern tools for interpreting the behaviour and modeling of complex engineering structures.
6	Attain the capability to work in multi-disciplinary teams to achieve common goals.
7	Demonstrate the knowledge to perform the projects efficiently in multi-disciplinary environments after consideration of economical and financial matters.
8	Communicate effectively on complex engineering activities to prepare reports and make presentations.
9	Engage in life-long learning independently to improve knowledge.
10	Understand the responsibility of carrying out professional practices ethically for sustainable development of society.
11	Examine critically and independently one's actions and take corrective measures by learning from mistakes.

Course Outcome versus Program Outcomes:

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
CO-1	S	M		M	M		M				
CO-2	S	S		M	M		M				
CO-3	S	M		M	M		M				
CO-4	S	M		M	M		M				
CO-5	S	M		M	M		M				

S - Strongly correlated, M - Moderately correlated, *Blank - No correlation*

Assessment Methods:	Assignment / Seminar / Mid-Test / End Exam

Teaching-Learning and Evaluation

Week No.	TOPIC / CONTENTS	Course Outcomes	Sample questions	TEACHING-LEARNING STRATEGY	Assessment Method & Schedule
1	Introduction to the basic concept and materials of prestressed concrete.	CO-1	1. What is the need of high strength concrete and high tensile steel in prestressed concrete members?	◊ Lecture/LCD projector	
2	Methods and systems of pre-stressing for pre-tensioning and post-tensioning.	CO-1	1. Mention what are the different systems in post-tensioning. 2. Explain briefly Hoyer system.	◊ Lecture/LCD projector	
3	Losses of pre-stress in pre-tensioned and post-tensioned members. Loss of pre-stress due to various causes elastic shortening, slip in anchorage and frictional losses.	CO-2	1. List out the various types of losses of pre-stress. 2. Estimate the percentage loss of stress in steel due to elastic deformation of concrete in the given PSC beam.	◊ Lecture ◊ Problem solving	Assignment
4	Loss of pre-stress due to various causes shrinkage, creep of concrete, relaxation of steel. Determine the total losses of pre-stress in beams.	CO-2	1. What is the relaxation of steel in steel? 2. Calculate the total percentage loss of stress in wires if the beam is pre-tensioned.	◊ Lecture ◊ Problem solving	
5	End anchorages in prestressed concrete members	CO-2	1. Design the anchorage reinforcement for the End block.	◊ Lecture ◊ Problem solving	Assignment
6	Introduction to the Analysis of sections for flexure.	CO-2	1. Analyse the given PSC beam section for the stresses produced at mid span due to eccentric tendon.	◊ Lecture/LCD Projector ◊ Problem solving	

7	Design of sections for flexure (Simply supported beam)	CO-2	1. Calculate the minimum depth required for the beam and also calculate the minimum prestressing force required for the section provided.	◊ Lecture ◊ Problem solving	Assignment
8	Design of sections for flexure (Continuous beam)	CO-2	1. What are the two general critical combinations of pre-stressing force and moments?	◊ Lecture ◊ Problem solving	
9	**MID TEST – I**				
10	Principal stress - Design for shear in beams	CO-3	1. Compare the magnitude of the principal tension developed in the beam with and without the axial pre- stress.	◊ Lecture ◊ Problem solving	Assignment
11	Design for bond and bearing	CO-3	1. Design for bearing	◊ Lecture ◊ Problem solving	
12	Importance of control of deflections – factors influencing deflections. Cable layouts, Determination of short term deflections	CO-4	1. List the various factors influencing the deflections of PSC members.	◊ Lecture ◊ Problem solving	
13	Determination of short – term and long-term deflections of uncracked pre-stressed concrete beams	CO-4	1. Determine the long term deflection of a given beam by using Lin`s simplified method.	◊ Lecture ◊ Problem solving	Assignment
14	Design of one way slab	CO-5	1. Design one way slab	◊ Lecture ◊ Problem solving	
15	Design of tension members, Design of circular prestressing,	CO-5	1. Design non-cylindrical pipe	◊ Lecture ◊ Problem solving	
16	Design of circular prestressing, compression members	CO-5	1. Design cylindrical pipe	◊ Lecture ◊ Problem solving	Assignment
17	**MID TEST – II**				
18	**END EXAM**				