DESIGN OF PRESTRESSED CONCRETE STRUCTURES

III Semester: ST								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
DCTD11	Fleating	L	Т	Р	С	CIA	SEE	Total
BSTB22	Elective	3	0	0	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil			ses: Nil	Tot	tal Classes	: 45

I. COURSE OVERVIEW:

Introduction to Prestressed concrete-prestressing concepts; pre-tensioning and post-tensioning; full and partial prestress; the need for prestress; advantages and disadvantages; methods of prestressing. Forces imposed by prestressing (straight, draped and kinked tendon profiles). Load balancing. Introductory examples. Design requirements: strength and serviceability. Material properties. Design for serviceability: stress limits; serviceability criteria; determination of prestress and eccentricity; cable profiles; cracked section analysis; decompression and cracking moment; effect of cracking at service loads; short-term deflection calculations; crack control; design for strength: limit state design. Rectangular stress block. Ultimate moment capacity. Effect of non-prestressed steel; ductility; transfer strength; design for shear-effect of prestress on shear; stirrup design. Special problems in prestressing: losses; effect of creep and shrinkage; end block design-bursting and spalling forces in post anchorages; transmission lengths in pre-tensioned members. Statically indeterminate beams: introduction to continuous prestressed concrete beams; secondary moments.

II. COURSE OBJECTIVES:

The course should enable the students to:

- I. Find out losses in the prestressed concrete.
- II. Understand the basic aspects of prestressed concrete fundamentals, including pre and post-tensioning processes.
- III. Analyze prestressed concrete deck slab and beam/ girders.
- IV. Design prestressed concrete deck slab and beam/ girders.

III. COURSE OUTCOMES:

After succ	cessful completion of the course, students should be able to:	
CO 1	Explain the concepts of stresses and strains developed within the structures subjected to different loads and their combinations for understanding the behavior of prestressed concrete structures.	Understand
CO 2	Elucidate the concept of methods of pre and post tensioning and the systems of prestressing for the designing of prestressed concrete structural elements	Understand
CO 3	Estimate the losses in the prestress and post tensioned members for the efficient design of prestressed concrete structures.	Analyze
CO 4	Design prestressed and post tensioned structural elements using Indian standard code method.	Apply
CO 5	Summarize the concepts of transfer of prestress in pre and post tensioned members by bond and transmission length using Indian standard code method.	Understand
CO 6	Design the composite prestressed concrete structural elements subjected to flexure and shear for designing multi storied structures.	Apply

UNIT-1 INTRODUCTION TO PRESTRESSED CONCRETE Classes: 09 Types of prestressing, systems and devices, materials, losses in prestress. Analysis of PSC Hexurt members: basic concepts, stresses at transfer and service loads, utimate strength in flexure, code provisions. Classes: 09 UNIT-11 STATICALLY DETERMINATE PSC BEAMS Classes: 09 Design for ultimate and serviceability limit states for flexure, analysis and design for shear and torsion, code provisions. Transmission of prestressing, pretensioned members; Anchorage zone stresses for post tensioned members. UNIT-111 STATICALLY INDETERMINATE STRUCTURES Classes: 09 Plane Truss - beterminacy and Analysis method, Structural Analysis - Plane truss and Space truss. Analysis and frames, choice of cable profile, linear transformation and concordancy. UNIT-1V COMPOSITE CONSTRUCTION Classes: 09 Composite construction with precast PSC beams and cast in-situ RC slab - Analysis and design, concepts, crack width calculations. Width precast PSC beams and cast in-situ RC slab - Analysis and design on prestressed concrete pipes, columns with moments Text Books: I. Lin T, "Design of Prestressed Concrete Structures", Asia Publishing House, 1955. Classes: 09 1. Lin T, "Design of Prestressed Concrete N, Applied Science Publishers, 197. I. Sis 1343- Code of Practice for Prestressed Concrete 1. Guyan T, "Limited State Design of Prestressed Concrete", Applied Science Publishers, 197. I. S	IV. SYLLAB	US						
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