DESIGN OF PRESTRESSED CONCRETE STRUCTURES

III Semester: M.Tech (ST)

Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
BSTB22	Elective	3	-	-	3	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: Nil				Total Classes: 45		

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.

COURSE OUTCOMES (COs):

CO 1: Understand different types of prestressing, losses, analysis of PSC flexural members and codal provisions.
CO 2: Understand ultimate and serviceability limit states for flexure, design for shear, transmission force for pretensioning and post tensioning and anchorage zone stresses.
CO 3: Understand the determinacy of plane , space truss, analysis and design for plane , space truss, analysis and design of continuous beams and frames and cable profile linear transformation
CO 4: Understand composite construction with precast PSC beams, cast insitu R.C slab, analysis, design of composite beams, calculation of creep, shrinkage and crack width.
CO 5: Analysis and design of prestressed concrete pipes, columns with moments.

COURSE LEARNING OUTCOMES (CLOs):

1 Understand the concept of pre-stressing and the behaviour of concrete structures.
2. Recognize the general principles, methods of pre-stressing, and pre-stressing devices for pre-tensioning and post-tensioning.
3. Determine losses of pre-stress in pre-stressed concrete structures
4. Apply the provisions of IS-1343(1980) code to the design of pre-stressed concrete structures for flexure and shear
5 Understand the ultimate & serviceability limit states for flexure.
6 Design the shear reinforcements for pre-stressed concrete beams..
7 Understand the transmission force for pretensioning and posttensioning.
8 Understand Anchorage zone stresses for post tension members.
9 Understand the determinacy of plane and space trusses.
10 Understand the structural analysis for plane truss and space truss...
11 Understand the analysis and design of continuous beams and frames.
12 Understand the cable profile and linear transformation. Auditing.
13 Understand the method of composite construction with precast PSC beams and cast insitu RC slab.
14 Analysis and design of composite beams.
15 Calculate the effects creep and shrinkage and partial prestressing.
16 Able to calculate crack width.
17 Analysis of prestressed concrete pipes with moments.
18 Analysis of prestressed columns with moments.

19 Design of prestressed concrete pipes with moments. 20 Design of prestressed columns with moments.		
UNIT-I	**INTRODUCTION TO PRESTRESSED CONCRETE**	**Classes: 09**
Types of prestressing, systems and devices, materials, losses in prestress, Analysis of PSC flexural members ,basic concepts, stresses at transfer and service loads, ultimate strength in flexure , code provisions.		
UNIT -II	**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-III	**STATICALLY INDETERMINATE STRUCTURES**	**Classes: 09**
Plane truss-Determinacy and Analysis method, Structural Analysis-Plane truss and space truss. Analysis and design –continuous beams and frames, choice of cable profile, linear transformation and concordancy.		
UNIT-IV	**COMPOSITE CONSTRUCTION**	**Classes: 09**
Composite construction with precast PSC beams and cast in-situ RC slab-Analysis and design. Creep and shrinkage effects, Partial prestressing-principles, analysis and design concepts, crack width calculations.		
UNIT-V	**ANALYSIS AND DESIGN**	**Classes: 09**
Analysis and design of prestressed concrete pipes, columns with moments.		
Text Books:		
1 Lin T.Y."Design of Prestressed Concrete Structures".Asia Publishing House, 1955. 2. Krishnaraju N. "Prestressed Concrete". Tata McGraw Hill , New Delhi,1981..		
Reference Books:		
1. Guyan Y." Limited State Design of Prestressed Concrete ". Applied Science Publishers,1972. 2. IS:1343-Code of Practice for Prestressed Concrete. 3. IRC:112-Code for concrete road bridges		
Web References:		
1. http://nptel.ac.in/courses/105106117/		
E-Text Books:		
1. http://textofvideo.nptel.ac.in/105106118/lec17.pdf		