

**Design of Prestressed Concrete Structures**
**01ST0302 (PSE)**

**Objective of the Course:** Objectives of introducing this subject at second year level in Masters of civil engineering are:

- To analyze the structure using Ultimate strength in flexure with code provisions.
- To apply Application in the design of prestressed pipes and prestressed concrete
- To understand of determining structural response and design of various structural elements like slab, column, beam-column

**Credit Earned: 4**

**Students learning outcomes:**

After successful completion of the course it is expected that student will be able to,

1. Find out losses in the prestressed concrete. Understand the basic aspects of prestressed concrete fundamentals, including pre and post-tensioning processes
2. Analyse prestressed concrete deck slab and beam/ girders.
3. Design prestressed concrete deck slab and beam/ girders. 4. Design of end blocks for prestressed members.

**Teaching and Examination Scheme**

Teaching Scheme (Hours)			Credits	Theory Marks			Tutorial/ Practical Marks		Total Marks
Theory	Tutorial	Practical		ESE (E)	IA (M)	CSE (I)	Viva (V)	Term Work (TW)	
03	02	0	04	50	30	20	25	25	150

**Detailed Syllabus**

Sr No.	Title of the unit	Number of hours
<b>1</b>	<b>Introduction to prestressed concrete</b>	
	Types of prestressing, systems and devices, materials, losses in prestress	03
	Analysis of PSC flexural members: basic concepts, stresses at transfer and service loads	03
	Ultimate strength in flexure, code provisions.	03
<b>2</b>	<b>Statically determinate PSC beams:</b>	

	Design for ultimate and serviceability limit states for flexure	<b>03</b>
	Analysis and design for shear and torsion	<b>03</b>
	Code provisions.	<b>02</b>
<b>3</b>	<b>Transmission of prestress</b>	
	Prestress Transmission in pre-tensioned members	<b>03</b>
	Anchorage zone stresses and design for post-tensioned members	<b>02</b>
<b>4</b>	<b>Statically indeterminate structures</b>	
	Analysis and design of continuous beams	<b>03</b>
	Choice of cable profile	<b>02</b>
	Linear transformation and concordance	<b>01</b>
<b>5</b>	<b>Design of structural elements</b>	
	Analysis and design of various structural elements like slab, column, beam-column	<b>05</b>
	Application in the design of prestressed pipes and prestressed concrete cylindrical water tanks.	<b>05</b>
<b>6</b>	<b>Composite construction: , ,</b>	
	Analysis and design of precast PSC beams and cast in-situ RC slab Creep and shrinkage effects.	<b>02</b>
	Partial prestressing - principles, analysis and design concepts	<b>03</b>
	Crack width calculations	<b>01</b>

### Suggested Theory Distribution

The suggested theory distribution as per Bloom's taxonomy is as per follows. This distribution serves as guidelines for teachers and students to achieve effective teaching-learning process

Distribution of Theory for course delivery and evaluation					
Remember	Understand	Apply	Analyze	Evaluate	Create
10%	15%	10%	35%	20%	10%

### Instructional Method and Pedagogy:

1. Use of Learning Management system like canvas
2. Demonstration through presentations on power point and videos and lectures
3. Brainstorming and group discussion sessions
4. Collaborative learning

### Recommended Study Material:

#### Reference Book:

1. Prestressed concrete - Krishna Raju
2. Design of Prestressed Concrete Structures - T.Y.Lin
3. Fundamentals of Prestressed Concrete - N.C.Sinha & S.K.Roy S.Chand & Co.
4. Prestressed Concrete- Design and Construction – Leonhardt F., Wilhelm Ernst and Shon, Berlin
5. Prestressed Concrete - Freyssinet
6. Prestressed Concrete, - Evans, R.H. and Bennett, E.W., Chapman and Hall

**Civil Engineering (Structure)**

7. Prestressed concrete - Rajgopalan
8. IS:1343-Code for Practice for Prestressed Concrete.
9. IS:3370-3 : Code of Practice Concrete structures for the storage of liquids, Part 3:  
Prestressed concrete structures

**Web Resources**

<http://nptel.ac.in>

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