

**SRM UNIVERSITY**  
**FACULTY OF ENGINEERING AND TECHNOLOGY**  
**DEPARTMENT OF CIVIL ENGINEERING**

**LESSON PLAN**

**B.Tech Civil Engineering VIII semester 2015-16 (Elective Subject)**

<b>Course Code</b>	CE-EST5
<b>Course Name</b>	PRESTRESSED CONCRETE STRUCTURES
<b>Prerequisites</b>	Should have studied CE0201, CE0202, CE0301, CE0302, CE0204, CE0303, CE0304
<b>Category</b>	(Structural Engineering)-P- Professional subject

**Instructional objectives**

<b>Instructional objectives no.</b>	<b>Instructional objectives</b>
1	Prestressing methods, principles and concepts are essential for the basic concept of the subject. Analysis of prestress and the resultant stresses using different concepts
2	Determination of losses in concrete & Anchorage zone stresses in end block can be brought out using IS method
3	Determination of shear strength and ultimate shear resistance capacity as per IS code
4	Design of prestresses concrete section, stresses at transfer, service load, limit state of collapse in flexure and shear
5	Design of prestressed concrete slab

**Student outcomes**

<b>Student outcome as per ABET</b>	<b>Student outcome</b>
a	an ability to apply knowledge of mathematics, science, and engineering
c	an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
e	an ability to identify, formulate, and solve engineering problems
h	the broad education necessary to understand the impact of engineering solutions in a global, economic, environmental, and societal context
i	a recognition of the need for, and an ability to engage in life-long learning
J	a knowledge of contemporary issues

## Section Lesson Plan

Lecture No	Topic	Instructional objectives	Student outcome	Reference
<b>INTRODUCTION AND ANALYSIS FOR STRESS</b>				
1-2	Introduction - Basic concepts - terminology - system of prestressing - pretensioning - post tensioning - principle of prestressing - types of prestressing. Assumptions.	1	a,c,e	1-6
3 -4	Concentric & eccentric tendon - resultant stresses - rectangle - Isection (symmetrical only) -concepts of prestressing - stress concept	1	a,c,e	1-3
5 - 6	Analysis of prestress	1	a,c,e	1-3
7 -8	Analysis of prestress (Stress ) – Force concept	1	a,c,e	1-3
9 -10	Strength concept – analysis	1	a,c,e	1-3
11 -12	Load balancing concept Tutorial – Problems	1	a,c,e	1-3
<b>CYCLE TEST –I (One period)</b>				
<b>LOSSES OF PRESTRESS</b>				
13 -14	Losses of prestress - types - losses due to elastic deformation of concrete.	2	h,i,j	1-3
15 -16	Loss due to shrinkage of concrete - creep of concrete - friction - anchorage slip.	2	h,i,j	1-3
17 -18	Stress distribution in end block - investigations on anchorage zone stresses - Indian code provision only.	2	a,c,h,i,j	1-5
19 -20	Investigations on anchorage zone stresses – Indian code provision only.	2	a,c,h,i,j	1-5
<b>SHEAR STRENGTH</b>				
21 -22	Shear strength - principal stresses - Ultimate shear resistance - Indian Standard code provision.	3	a,c,e,h,i,j	1-3, 6
23 - 24	Determination of shear strength	3	a,c,e,h,i,j	1-3, 6
<b>FLEXURAL DESIGN</b>				
25 - 26	Design of sections for flexure - stress condition - minimum section modulus - stresses at transfer - service loads -	4	a,c,e,h,i,j	1-3, 6
27 -28	Design of section	4	a,c,e	1-3, 6
29 -30	Prestressing force - eccentricity - check for stresses - initial and final conditions.	4	a,c,e	1-3, 6
<b>CYCLE TEST –II</b>				
31 -32	Check for stresses	4	a,c,e	1-3, 6
33 -34	Limit state of collapse in flexure - shear. (Rectangular Section only)	4	a,c,e	1-3, 6
35 -36	Design of section	4	a,c,e	1-3, 6

<b>SLABS</b>				
37 -38	Types of prestressed concrete slab - design of one-way slab	5	a,c,e,h,i,j	1-3, 6
39- 40	Design of two-way slab	5	a,c,e,h,i,j	1-3, 6
41- 42	Design of two-way slab	5	a,c,e,h,i,j	1-3, 6
43 -45	Design of simple flat slab.	5	a,c,e,h,i,j	1-3, 6
<b>MODEL EXAMINATION (Three hours)</b>				

**Text Books**

1. Krishna Raju. N, Prestressed Concrete 4th edition Tata McGraw Hill Company, New Delhi – 1998.
2. N.C. Sinha and S.K.Roy, Fundamentals of prestressed Concrete, S. Chand and Co., 1985.
3. N.Rajagopalan, Prestressed Concrete, Narosa Publishing House, New Delhi-2002

**Reference Books**

4. T.Y.Lin Design of, Prestressed Concrete Structures, Asia Publishing House, Bombay 1995
5. Guyon. V., Limit State Design of Prestressed Concrete, Vol.I & II Applied Science Publishers, London, 1992
6. Dayarathnam.P, Prestressed Concrete Structures, Tata McGraw Hill Company, New Delhi, 1999

**Faculty handling:**

Dr. K. Gunasekaran

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