

**BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI**  
**INSTRUCTION DIVISION**  
**SECOND SEMESTER 2015-2016**

**Course Handout (Part II)**

Date: 13/1/2016

In addition to part-I (General Handout for all courses appended to the timetable) this portion gives further specific details regarding the course.

**Course No. : CE G614**  
**Course Title : Prestressed Concrete Structures**  
**Instructor-in-charge : MANOJ KUMAR**

**Course Description**

This course deals with the study of various prestressing techniques, cable profiles, and materials used in the construction of Prestressed Concrete Structures. This comprises of design of determinate and indeterminate prestressed concrete structures. Moreover, the course aims at determining the nominal and design load carrying capacities of different types of prestressed concrete structural elements and their serviceability with functional requirements.

**Scope & Objective of the Course**

Prestressed concrete design is an advance design technique of structural systems. The clear understanding of solid mechanics, R.C.C. design, and steel design courses is prerequisite for this course. The primary objective of the course is to make students grasp the thorough concepts of the prestressed concrete design principles for structural elements using conventional steel and/ or innovative Fiber Reinforced Polymeric (FRP) strands. At end of the course, students will have the basic concepts of analysis and design of prestressed concrete structural elements required for supporting heavy loads and sustaining higher level of deformations.

**Text Book :**

1. N. Krishna Raju –“Prestressed Concrete” 4<sup>th</sup> edition. Tata Mc-Graw-Hill, New Delhi.

**Reference Books**

1. Lin T.Y., Design of Prestressed Concrete Structures”, Third Edition. John Wiley & Sons. New York, USA
2. Collins M. P. and Mitchel D. “Prestressed Concrete Structures” Prentice Hall New Delhi.
3. IS 1343:1980, Indian Standard Code of Practice for Prestressed Concrete, BIS, 1981.

**Course Plan :**

No. of Lects.	Learning objective	Topics to be covered	Reference to Text Book Chapters
1	Introduction	Philosophy of prestressed concrete and RCC, Applications of pre-stressed concrete	Ch. 1
2	Materials For Prestressed concrete	Properties of high strength concrete and high strength steel used in Prestressed structures	Ch. 2
2	Prestressing systems	Pre-tensioning and post-tensioning systems	Ch. 3
4	Analysis of Pre-stressed sections	Analysis of Prestressed sections, pressure line and thrust line, load balancing concept, variation of tensile stress in tendons	Ch. 4
3	Losses of Prestress	Various Losses of Prestress in steel and concrete	Ch. 5
3	Deflection of PSC members	Short-term and long-term deflections, codal requirements for deflection	Ch. 6

5	Flexural strength of PSC sections	Flexural Failure types, Flexural strength using strain compatibility method and codal procedure IS and BS code provisions for flexural strength	Ch. 7
4	Shear and torsional resistance of PSC members	Shear and torsional capacity of PSC members, Design for shear as per IS codal provisions	Ch. 8
3	Transfer of prestress in Prestressed members	Transmission length, bond stresses, anchorage zones, transverse tensile stresses, codal provisions	Ch. 9
3	Anchorage zone stresses in Prestressed members	Stresses in end block, methods of analysis, reinforcement details in end block	Ch10
4	Limit state Design criteria for PSC members	Design loads and strengths for LSD, LSD of PSC members, crack width,	Ch. 11
4	Design of PSC sections	Design of sections for flexure, compression and bending, shear and torsion	Ch12 & 13

### Evaluation Scheme

Ec. No.	Evaluation component	Duration	Weightage	Date	Nature of component
1.	Test	11:00 AM – 12:30 PM	30%	16/3 11:00 - 12:30 PM	CB
2.	Assignments/ Projects/ quizzes	-	30%	-	-
3.	Comprehensive Examination	3 Hrs	40%	7/5 AN	OB Plus CB

**Chamber Consultation Hour:** To be announced in the class.

**Notices:** All Notice concerning to the course will be displayed on **Notice Board** of Civil Engg. Dept..

**Make up policy:** Make-up will be granted only to genuine cases such as illness. Prior permission is necessary if student is out of station on the date of test.

**Instructor-in-charge**  
**CE G614**