

BIRLA INSTITUTE OF TECHNOLOGY & SCIENCE, PILANI
HYDERABAD CAMPUS
INSTRUCTION DIVISION
FIRST SEMESTER 2016-2017
Course Handout (Part -II)

Date: 05/05/2016

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

Course No. : CE F311

Course Title: Design of Concrete Structures

Instructor-in-charge: Dr. Arkamitra Kar

Instructors : TBA

Scope & Objective of the Course

The course intends to impart adequate analysis and design skills pertinent to Civil Engineering Reinforced Concrete (RC) Structures as commonly found in practice, using the Limit State design method; however, an introduction will be given to working stress design method also. In addition to analysis and design of beams, slabs, columns this course will include the design of various staircase and foundations. Before going into the details of the design procedures, the course will provide the students with an introduction to concrete materials including cement, aggregates, and reinforcing steels. At the end of this course the students will be able to design the simple common reinforced concrete structures.

Text Book (TB)

J. N. Bandhopadhyay, “Design of Concrete Structures”, 2008, Prentice-Hall of India, New Delhi

Reference Books (RB)

1. IS 456:2000 “Code of practice for Plain and Reinforced concrete”, Bureau of Indian Standards, New Delhi.
2. Special Publication (SP)-16, Design aids for reinforced concrete to IS 456:1978, Bureau of Indian Standards, New Delhi.
3. P. C. Verghese, “Limit State Design of Concrete”, 2nd edition, PHI Pvt. Ltd., New Delhi, 2011.
4. S.U.Pillai and Devdas Menon, “Reinforced Concrete Design”, 3rd Edition, TMH, New Delhi, 2009.
5. Jain, A.K., Reinforced Concrete: Limit State Design”, 6th Edition, Nemchand & Bros, Roorkee, 2002.

Course Plan

Serial No.	Learning Objective	Topics Covered	Lecture No.	Reference to TB
1.	Objectives & Methods of Analysis & Design	Introduction, objectives, Methods of Design, Loads & Forces acting on structures	1-2	Ch 1
2.	Properties of Concrete	Stress-strain curve for concrete, Size effect, behavior of concrete in tension, Durability of concrete, properties of Steel, Stress-strain curve for steel	3-4	Ch 2
3.	Philosophies of Limit State Method	A review on various design Philosophies, Types of Limit States, partial safety factors for materials and loads	5-6	Ch 3
4.	Limit State of Collapse-Flexure and Singly reinforced Rectangular beam	Assumptions in Limit State Design, Analysis of singly reinforced rectangular, Design of Singly Reinforced Concrete Beam, Analysis of singly reinforced rectangular beams using SP-16 tables and Charts.	7-11	Ch 4
5.	Analysis & Design of Doubly Reinforced rectangular section Beams	Assumptions and basic principles, analysis and design of doubly reinforced concrete beams with Rectangular section	12 - 14	Ch 5
6.	Analysis & Design of Simply supported Flanged Sections	Effective Width, Analysis of Flanged sections for various cases, Design of simply supported Flanged beam Sections, Design of continuous beam Flanged sections	15 - 18	Ch 6
7.	Design for Bond, anchorage and development length	Design bond strength, development length, check for development length in tension, Anchoring of reinforcing bars, bearing stress at bonds, reinforcement splicing, Design for bond, Development length, Curtailment of reinforcement, Lap splice	19 -22	Ch 8

8.	Design of Beams for Shear	Modes of failure due to shear, shear strength of concrete, critical section for shear, enhanced shear strength near support, minimum shear reinforcement, Design of shear strength, check for shear at point of tension reinforcement curtailment	23 – 26	Ch 7
9.	Limit state of serviceability	short term deflection calculation for beams, deflection due to shrinkage and creep	27 - 28	Ch 9
10.	Design of beams for Torsion	Design of beams for combined bending, shear and torsion as per IS 456	29 - 30	Ch 8
11.	Design of one way and two way Slabs	Design shear strength of concrete in slabs, design consideration for slabs, design and reinforcement detailing of one way simply supported and continuous slabs, design and reinforcement detailing of two way slabs	31 – 36	Ch 10
12.	Design of Stair Cases	Types of stair cases, components of staircase, structural system of stair cases, effective span, Design of stair cases spanning transversely and longitudinally	37 - 40	Ch 11
13.	Design of Compression Members	Classification of columns based on slenderness ratio, reinforcement & loading, Design of rectangular and circular columns subjected to Axial load, (Axial load + uni-axial bending) and (Axial load + Bi-axial bending)	41 – 43	Ch 12

Evaluation Scheme

Ec. No.	Evaluation component	Duration	Weightage	Date, time	Nature of component
1.	Test I	1 hr.	10%		CB
2.	Test II	1 hr.	10%		CB
3.	Project/Assignments	-	25%		OB
4.	Lab record and lab quiz	-	15%		-
5.	Pop quizzes/surprise tests	15 mins	10%		CB, open notes
6.	Compre. Exam	3 hrs.	30%		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. Department.

Make up policy: Makeup will be given only to the genuine cases with prior permission.

Instructor-in-charge
CE F311