BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI (RAJASTHAN)
HYDERABAD CAMPUS
INSTRUCTION DIVISION
FIRST SEMESTER 2016-2017
COURSE HANDOUT (PART-II)

Date: 01-08-2016

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 G616
Course Name : BRIDGE ENGINEERING
Instructor-in-charge : P N RAO

1. Scope and Objective of the Course:
Bridges are inseparable part of any communication network as they are the key elements in roadways and Highways network. This course intends to impart skills for planning and analysis & design of different types of bridge structures at basic as well as at advance level.

2. Course Description: Purpose of bridge; Classification of bridges; planning of bridges; Characteristics of different type of bridges**;** Loads stresses and their combinations; Design of R.C.C Slab culverts, Box-culverts, Tee-beam bridges; Design of Prestressed concrete bridges**;** steel girder bridges; composite bridges; box girder bridges**;** continuous spans bridges; design of bearings; Design of Bridge Substructures: piers and abutments and their foundations; Rigid frame bridges; arch bridges; Introduction to Long span bridges: Cable stayed bridges and suspension bridges;

3. Text Book (TB):
1. Johnson Victor, D. (2010), "Essentials of Bridge Engineering", 6th Edition, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

4. Reference Books (RB):
1. Bakht,B. and Jaegar, L.G.(1985),"Bridge Analysis Simplified," McGraw-Hill, New Delhi.
2. Raina, V. K. (1999), 'Concrete Bridges: Handbook', Galgotia Publication, New Delhi.
3. Krishna Raju, N, (2008) "Prestressed Concrete" Tata McGraw-Hill Pub. Co. Ltd., New Delhi.
4. Ponnuswamy, S, (2008) "Bridge Engineering", 2nd edition, Tata McGraw-Hill Pub. Co. Ltd., New Delhi.

5. Standard Specifications and code of Practice for Bridges:
1. IRC: 5-1998, "Standard Specifications and code of Practice for road bridges: section I-General features of Design", Indian Road Congress.
2. IRC: 6-2000, "Standard Specifications and code of Practice for road bridges: section II-Loads and Stresses", Indian Road Congress.
3. IRC: 21-2000, "Standard Specifications and code of Practice for road bridges: section III-Cement Concrete (Plain and Reinforced), Indian Road Congress.
4. IRC: 40-2002, "Standard Specifications and code of Practice for road bridges: section IV-Brick, and Stone and block Masonry, Indian Road Congress.
5. IRC: 24-2001, "Standard Specifications and code of Practice for road bridges: section V-Steel Road Bridges", Indian Road Congress.
6. IRC: 22-1986, "Standard Specifications and code of Practice for Road Bridges: section VI-Composite Construction, Indian Road Congress.
7. IRC:78-2000, "Standard Specifications and code of Practice for road bridges: section VII-Foundation and Substructures", Indian Road Congress
8. IRC:83-1999, "Standard Specifications and code of Practice for road bridges: section IX (Part I)-Metallic Bearings, (Part II)- Elastomeric Bearings and (Part III)-Pot, Pot-Cum-PTFE, Pin and metallic guide Bearings, Indian Road Congress
9. IRC:18-2000, "Design criteria for Prestressed Concrete road Bridges (post-tensioned concrete)", Indian Road Congress
10. IS1343-1990," Indian Standard code for Prestressed Concrete". BIS.

7. Course Plan:

S. No.	Topic	Learning Objectives	Lec. Nos.	Ref. to TB
1.	Introduction	Importance of Bridge, Components of bridges, Classification of bridges, Economical span	3	Ch-1
2.	Bridge Loading standards	Emphasis on IRC loadings, Impact factors, loading for Indian Railway bridges	3	Ch-3&4
3.	Design of culverts	Design of (i) slabs spanning in one direction (slab culverts), (ii) cantilever slabs (in T-beam bridges), and (c) slabs spanning in two-directions using Pigeaud's Method, Design of slab culverts, design of skew slabs	5	Ch-6
4.	RCC Bridges	Load distribution in longitudinal girders using Courbon's method, Guyon and Massonet method and Hendry-Jaegar method, Design of simply supported Tee-beam bridges	5	Ch-7
5.	Pre-stressed Concrete Bridges	Introduction to Pre-stressed concrete, analysis of pre-stressed section, design aspects of pre-stressed girders	5	Ch-8
6.	Steel Bridges	Design of stringers, Cross girders and main girders, Wind loads on truss bridges; Design of steel truss bridges, Effect of repeated loading	5	Ch-9
7.	substructure	Types of piers and abutments; Loads to be considered on piers and abutments; Stability analysis of pier and abutment, wing walls and approach slabs, features of wing walls	5	Ch-12
8.	Bridge Foundations	Types of Bridge foundations, design aspects of Pile and well foundations	4	Ch.- 13
9.	Bearings and joints	Necessity of bearings, types of bearings, design of steel bearings, designs of elastomeric bearings, necessity and types of expansion joints.	4	Ch-14

8. Evaluation Scheme:

Components	Duration	Weightage	Date	Venue	Remarks
Test-I	1hr	15	8/9, 10.00--11 AM		CB
Test-2	1hr	15	25/10, 10.00--11 AM		CB
Term Projects & Research topics & Seminars	continuous	40			OB
Compre. Exam.	3 hours	30	08/12 FN		CB

9. Chamber Consultation Hour: M-8th hr.

10. Notice: Notice if any concerning this course will be displayed on the Notice Board of Civil Engg. Dept.

11. Make up policy: make-up will be granted only to genuine cases. For cases related to illness, proper documentary evidence is essential. Prior permission is necessary if student is out of station on the test date.

Instructor-in-charge
CE G616