



Birla Institute of Technology & Science, Pilani
Hyderabad Campus

FIRST SEMESTER 2019-2020

Course Handout Part II

Date: 02-08-2019 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 Title : Bridge Engineering
Instructor-in-Charge : P N Rao

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.

Textbook:

1. Johnson Victor, D. (2010), “Essentials of Bridge Engineering”, 6th Edition, Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Reference books:

1. Bakht, B. and Jaegar, L.G. (1985), “Bridge Analysis Simplified,” McGraw-Hill, New Delhi.
2. Raina, V. K. (2010), ‘Concrete Bridges: Handbook’, Galgotia Publication, New Delhi.
3. Krishna Raju, N, (2018) “Design of Bridges”. Oxford & IBH Publishing Co. Pvt, Ltd, New Delhi.
4. Ponnuswamy, S, (2017) “Bridge Engineering”, 3rd edition, McGraw-Hill Pub., New Delhi.
5. IRC: 5-2015, “Standard Specifications and code of Practice for road bridges: section I-General features of Design”, Indian Road Congress.
6. IRC: 6-2017, “Standard Specifications and code of Practice for road bridges: section II-Loads and Stresses”, Indian Road Congress.
7. IRC: 21-2000, “Standard Specifications and code of Practice for road bridges: section III-Cement Concrete (Plain and Reinforced), Indian Road Congress.
8. IRC: 40-2002, “Standard Specifications and code of Practice for road bridges: section IV-Brick, and Stone and block Masonry, Indian Road Congress.
9. IRC: 24-2015, “Standard Specifications and code of Practice for road bridges: section V-Steel Road Bridges”, Indian Road Congress.



10. IRC: 22-2015, “Standard Specifications and code of Practice for Road Bridges: section VI-Composite Construction, Indian Road Congress.
11. IRC:78-2017, “Standard Specifications and code of Practice for road bridges: section VII-Foundation and Substructures”, Indian Road Congress
12. IRC:83-2015, “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
13. IRC:18-2000, “Design criteria for Pre-stressed Concrete road Bridges (post-tensioned concrete)”, Indian Road Congress
14. IS1343-2012,” Indian Standard code for Pre-Stressed Concrete”. BIS.

Course Plan:

Lecture No.	Learning objectives	Topics to be covered	Chapter in the Text Book
1-3	Introduction	Importance of Bridge, Components of bridges, Classification of bridges, Economical span	Ch-1
4-6	Bridge Loading standards	Emphasis on IRC loadings, Impact factors, loading for Indian Railway bridges	Ch-3&4
7-13	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 twodirections using Pigeaud’s Method, Design of slab culverts, design of skew slabs	Ch-6
14-20	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	Ch-7
21-26	Pre-stressed Concrete Bridges	Introduction to Pre-stressed concrete, analysis of pre-stressed section, design aspects of prestressed girders	Ch-8
27-32	Steel Bridges	Design of stringers, Cross girders and main girders, Wind loads on truss bridges; Design of steel truss bridges, Effect of repeated loading	Ch-9
33-36	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	Ch-12
37-40	Bridge Foundations	Types of Bridge foundations, design aspects of Pile and well foundations	Ch.- 13
41-43	Bearings and joints	Necessity of bearings, types of bearings, design of steel bearings, designs of elastomeric	Ch-14



		bearings, necessity and types of expansion joints.	
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Evaluation Scheme:

Component	Duration	Weightage (%)	Date & Time	Nature of Component
Mid Semester Test	90 Min	25%	4/10; 3.30 to 5.00 PM	CB
Comprehensive Exam	180 Min	35%	12/12 AN	CB
Assignments	-	15%	-	OB
Project	-	25%		OB

Chamber Consultation Hour: To be announced in the class

Notices: Concerning this course will be displayed on CMS/ Notice Board of Civil Engineering Department

Make-up Policy: Make-up would be granted only for genuine cases with prior permission.

Academic Honesty and Integrity Policy: Academic honesty and integrity are to be maintained by all the students throughout the semester and no type of academic dishonesty is acceptable.

INSTRUCTOR-IN-CHARGE
CE G616

