

**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:**

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| --- | --- | --- | --- |
| **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 bearings, necessity and types of expansion joints. | Ch-14 |

**Evaluation Scheme:**

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| --- | --- | --- | --- | --- |
| **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 ofCivil 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**