**17CE41E2 – BRIDGE ENGINEERING**

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| **Course Category**  | Core Elective | **Credits**  | 3 |
| **Course Type**  | Theory | **Lecture - Tutorial - Practical**  | 3 - 0 - 0 |
| **Prerequisite**  | Structural Analysis – II RCC Structural Design – I | **Sessional Evaluation**  | 40 |
| **Semester End Exam Evaluation**  | 60 |
| **Total Marks**  | 100 |

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| **Course Objectives** | 1. To study about various categories of IRC loadings.
2. To illustrate railway bridge rules for detailed calculation of loadings.
3. To design the basic components of bridge structures like bridge deck slabs and box culvert.
4. To design plate girder bridges and composite bridges
5. To design piers and abutments.
6. To study various types of bridge bearings, joints.
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| **Course Outcomes** | CO1 | Understand the concept of bridge construction as per IRC Standards. |
| CO2 | Design box culvert and deck slab.  |
| CO3 | Design Reinforced Cement Concrete T- beam bridge using Pigeaud’s method. |
| CO4 | Design plate girder bridges and composite bridges. |
| CO5 | Design Pier and abutments. |
| CO6 | Understand the types and importance of bridge bearings. |
| **Course****Content** | **UNIT - I****INTRODUCTION:** General – Classification of bridges – Importance of site investigation in Bridge design – Site selection – Economical span – Location of piers and abutments – Subsoil exploration – Scour depth – Traffic projection – Choice of bridge type.**IRC STANDARDS:** Highway Bridge loading standards–Impact factor–Railway Bridge loading standards (B.G. ML Bridge) various loads in bridges. **UNIT – II****BOX CULVERT:** General aspects – Design loads, Design of Box culvert subjected to RC class AA tracked vehicle only. **DECK SLAB BRIDGE:** Introduction – Effective width method analysis– Design of deck Slab Bridge (Simply supported) subjected to class AA Tracked Vehicle only. **UNIT - III****BEAM & SLAB BRIDGE (T-BEAM BRIDGE):** General features – Design of interior panel of slab – Pigeaud’s method – Design of a T-beam bridge subjected to class AA tracked vehicle only. **UNIT - IV****PLATE GIRDER BRIDGE:** Introduction – elements of a plate girder and their design. Design of a Deck type welded plate girder – Bridge of single line B.G. **COMPOSITE BRIDGES:** Introduction – Advantages – Design of Composite Bridges consisting of RCC slabs over steel girders including shear connectors **UNIT - V****PIERS & ABUTMENTS:** General features – Bed Block – Materials for Piers & Abutments–Types of piers – Forces acting on piers – Stability analysis of piers – General features of Abutments – Forces acting on abutments – Stability analysis of abutments – Types of wing walls – Approaches – Types of Bridge foundations (excluding Design). **UNIT - VI****BRIDGE BEARINGS:** General features – Types of Bearings – Design principles of steel Rocker & Roller Bearings – Design of a steel Rocker Bearing – Design of Elastomeric pad bearing – Joints – Expansion joints. |
| **Textbooks****and****References** | **TEXTBOOKS:**1. Bridge Engineering by Ponnu Swamy, TATA Mcgraw Hill Company, New Delhi.
2. Design of Bridges by N.Krishna Raju, Oxford & IBH, Publishing Company Pvt.ltd. Delhi.
3. Bridge superstructure by N.Raja gopalan, Narosa Publishing House, New Delhi 2006.

**REFERENCE BOOKS:** 1. Design of Bridges Structure by D.J.Victor.
2. Design of Steel structures by Ramachandra.
3. Design of R.C.C. structures B.C. Punmia, Ashok Kumar Jain and Arun Kumar Jain.
4. Relevant – IRC & Railway bridge Codes.
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