

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE6710 - Bridge Engineering

Credit Distribution: C:9 L:3 T:0 P:0 E:0 O:6 TH:0

Course Type: Theory

Description: The course provides an overview of structural design of bridges.

Course Content: 1. Introduction: Components of bridges, Classification of bridges, History of bridges, Planning of bridges. 2. Loading and Design Specifications: Indian Roads Congress (IRC) and Indian Railway Standards (IRS) Specifications. 3. Concrete Slab Decks: Effective width method, Grillage analysis, Introduction to plate theory, Design curves, Design specifications, Voided decks, Skew decks, Curved decks. 4. Concrete Beam-and-Slab Decks: Load distribution on beams: Courbon's method, Morrice and Little method, Design specifications. 5. Box Girder Decks: Structural actions, Simple beam theory, Simplified frame analysis, Design specifications. 6. Steel Truss Bridges and Composite Decks: Design specifications. 7. Introduction to Balanced Cantilever, Continuous, Integral and Arch Bridges. 8. Introduction to Cable Stayed and Suspension Bridges. 9. Bridge Bearings and Expansion Joints. 10. Introduction to Substructure: Bridge Piers, Abutments, Well Foundations. 11. Special Topics: Construction of Bridges, Construction Stage Analysis, Seismic Design, Foot Bridges.

Text Books

- Victor, D.J., Essentials of Bridge Engineering, 6th Ed., Oxford & IBH Publishing Co. Pvt. Ltd., 2007.
- Rajagopalan, N., Bridge Superstructure, Narosa Publishing House Pvt. Ltd., 2006.
- Krishna Raju, N., Design of Bridges, Oxford & IBH Publishing Co. Pvt. Ltd., 1998.

Reference Books

- IRC 5, IRC 6, IRC 112, Indian Roads Congress
- IRS Bridge Rules, IRS Concrete Bridge Code, Research Designs and Standards Organization, Indian Railways
- Ponnuswamy, S., Bridge Engineering, Tata McGraw-Hill Publishing Company Limited, 1986.
- Raina, V.K., Concrete Bridge Practice – Analysis, Design and Economics, 2nd Ed., Tata McGraw-Hill Pub., 1994.
- Surana, C.S. and Agarwal, R., Grillage Analogy in Bridge Deck Analysis, Narosa Publishing House Pvt. Ltd., 1998.
- Hambly, E.C., Bridge Deck Behaviour, 2nd Ed., E & FN Spon (Chapman & Hall), 1991.

Prerequisite: NIL