

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE7021 - Gian 151003I11: Advanced bridge design and construction

Credit Distribution: C:6 L:2 T:0 P:0 E:0 O:4 TH:0

Course Type: Theory

Description: To enhance the competency in bridge engineering as practised in the country. To expose students to the state-of-the-art practices in the international level

Course Content: 1. Introduction: Review of basic bridge design principles and specifications 2. Simply Supported and Continuous Decks: Structural analysis 3. Framed Bridges: Structural analysis; Effects of type of support, prestressing and temperature variation 4. Arch Bridges: Structural analysis 5. Cable-stayed and Extra-dosed Bridges: Structural analysis; Effect of placement of live load 6. Slab Decks, Prestressed Girder Decks and Box-girder Decks: Structural behaviour and analysis 7. Methods of Construction of Superstructure: Precast girders, span-by-span, complete scaffolding, incremental launching, balanced cantilever method; Impact on design 8. Methods of Construction of Substructure: Bridge piers, abutments, well foundations 9. Durability Based Design: Effect of corrosion in post-tensioned girders, methods of testing 10. Wind Analysis of Long-span Bridges: Dynamic behaviour; Wind tunnel testing 11. Earthquake Resistant Design of Bridges: Effects of earthquake; Analysis, design and detailing for earthquake 12. Special Topics: Use of high performance concrete, inspection and maintenance of bridges

Text Books: NIL

Reference Books

- Victor, D.J., Essentials of Bridge Engineering, 6th Ed., Oxford & IBH Publishing Co. Pvt. Ltd., 2007.
- AASHTO LRFD Bridge Design Specifications, 7th Ed., American Association of State and Highway Transportation Officials, 2014
- Barker, R.M. and Puckett, J.A.: Highway Bridges, 3rd Ed., John Wiley and Sons, 2013.
- Chen, W-F. and Duan, L.: Bridge Engineering Handbook, CRC Press, 2000
- Hambly, E.C.: Bridge Deck Behavior, 2nd Ed., Chapman and Hall, 1991.
- ICE Manual of Bridge Engineering, 2nd Ed., Institution of Civil Engineers, UK, 2008.
- Leonhardt, F.: Bridges: Aesthetics and Design, The MIT Press, 1984.
- Menn, C.: Prestressed Concrete Bridges, Birkhaser (Basilea), 1990.
- Tonias, D.E. and Zhao, J.J.: Bridge Engineering, 2nd Ed., McGraw-Hill, 2007.
- Xanthakos, P.: Bridge Sub-structure and Foundation Design, Prentice Hall, 1995.

Prerequisite: NIL