Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE5010W - Introduction to Bridge Engineering

Credit Distribution: C:10 L:3 T:1 P:0 E:0 O:6 TH:0

Course Type: Theory

Description: To provide students with understanding of Forms of bridges suitable for the different loads acting on them, Planning & decision making on width, span arrangement, and foundation & deck types, Principles of structural analysis and structural design of bridges to meet functional demand and Impact of construction technology on analysis and design of bridges.

Course Content: Structural Systems Evolution of bridges, Types, Aesthetics, Planning and Construction Structural Analysis Materials, Loading - Characteristic Loads, Specifications and Combinations, Structural Modeling, Soil-Foundation-Bearings-Structure System, Natural Period, Bridge Vibration Units and Bridge Breathing Units, Methods of Analysis including Construction Stage Analysis Structural Design and Detailing Design Codes and Design Criteria, Deterministic Design - Conventional, Multi-Level and Deformability based, Probabilistic Design, Special Bridges - Balanced Cantilever, Extra-dosed, Cable-stayed and Suspension Bridges, Design Life Construction Project Planning and Management, Construction Methods, Technologies and Management, Construction Safety, Maintenance, Life-cycle cost of a bridge and Typical Construction Cycle.

Text Books: NIL

Reference Books:

- Chen,W.-F., and Duan,L., (Eds.), Bridge Engineering Handbook, Parts 1 to 5, CRC Press LLC, Florida, USA, 2000.
- Parke,G., and Hewson,N,(Eds.), ICE Manual of Bridge Engineering, Second Edition, Thomas Telford Limited, London, UK, 2008.
- Zhao,J.J., and Tonias,D.E., Bridge Engineering - Design, Rehabilitation and Maintenance of Modern Highway Bridges, Third Edition, McGraw Hill, New York, 2012.
- Hendy,C.R., and Smith,D.A., Designers Guide to EN 1992-2 - Eurocode 2 Design of Concrete Structures, Part 2 Concrete Bridges, Thomas Telford Limited, London, UK, 2010.
- Troyano,L.F., Bridge Engineering - A Global Perspective, Thomas Telford Limited, London, UK, 2003.
- Victor,D.J., Essentials of Bridge Engineering, 6th Edition, Oxford & IBH Publishing Company Private Limited, New Delhi, 2007.
- Krishna Raju,N., Design of Bridges, Oxford & IBH Publishing Company Private Limited, New Delhi, 2009.
- Ponnuswamy,S., Bridge Engineering, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1999.
- Raina,V.K., Concrete Bridge Practice - Analysis, Design and Economics, 2nd Edition, Tata McGraw-Hill Publishing Company Limited, New Delhi, 1994.
- Jagadeesh,T.R., and Jayaram,M.A., Design of Bridge Structure, PHI Learning Private Limited, New Delhi, 2009.

Prerequisite: NIL