

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE4310 – Design of Concrete Structural Systems

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

Course Type: Theory

Description: To enable learning of the concepts of reinforced concrete (RC) structural systems, and the design principles of special RC members.

Course Content:

- Two-way slabs: wall/beam supported slabs - method based on moment coefficients; flat plates, flat slabs, waffle slabs - direct design method, equivalent frame method (brief)
- 2. Stairs: configurations, components, analysis of inclined members
- Columns: columns under biaxial bending, slender columns
- Foundations: combined footings, raft foundations, piles, pile caps
- Multistoreyed buildings : methods of analysis, basics of wind and earthquake analyses, seismic design and detailing, introduction to tall buildings
- Precast concrete buildings: structural systems, systems for lateral stability, floor and roof systems, connections
- Structural retaining walls: cantilever retaining walls, counterfort retaining walls
- Water tanks: rectangular and cylindrical tanks, staging of water tanks
- Special structures and components: deep beams, load bearing walls, shear walls, bunkers and silos, chimneys
- Introduction to prestressed concrete: prestressing systems and devices
- Introduction to bridge design: concrete slab decks, concrete beam-and-slab decks.

Text Books

- Pillai, S.U. and Menon D., Reinforced Concrete Design, 3rd Ed., McGraw Hill Education Private Limited, 2011.
- Subramanian, N., Design of Reinforced Concrete Structures, Oxford University Press, 2013.
- Varghese, P.C., Advanced Reinforced Concrete Design, 2nd Ed., Prentice-Hall of India Pvt. Ltd., 2008

Reference Books

- IS 456, IS 875, IS 1343, IS 1893, IS 2950, IS 3370, IS 4326, IS 4995, IS 4998, IS 11682, IS 13920, Bureau of Indian Standards.
- Smith, B.S. and Coull, A., Tall Building Structures: Analysis and Design, Wiley India Pvt. Ltd., 1991.
- Handbook on Precast Concrete for Buildings, Edited by Sarma, B.S., Indian Concrete Institute, 2016.

- Varghese, P.C., Design of Reinforced Concrete Foundations, Prentice-Hall of India Pvt. Limited, 2009.
- Krishna Raju, N., Advanced Reinforced Concrete Design, CBS Publishers & Distributors (P) Ltd., 2009
- Duggal, S. K., Earthquake Resistant Design of Structures, Oxford University Press, 2007.
- Muthu, K. U., Ibrahim, A., Janardhana, M. and Vijayanand, M., Prestressed Concrete, PHI Pvt. Ltd, 2016.
- Victor, D.J., Essentials of Bridge Engineering, 6th Ed., Oxford & IBH Publishing Co. Pvt. Ltd., 2007.

Prerequisite: NIL