

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE5011 - Design of Masonry Structures

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

Course Type: Theory

Description: To enable learning of theories on mechanical behaviour of masonry assemblages. To present working stress and limit states approaches to analysis and design unreinforced, reinforced and confined masonry structures, for vertical and lateral loads, including earthquake loads. To review procedures for structural assessment and strengthening of existing masonry structures.

Course Content: Introduction: Overview of masonry in ancient and modern times, Methods of design, codes and standards, Structural-functional requirements of masonry buildings, Classification of masonry construction and Loads. Masonry materials and properties: Properties and experimental testing of components (masonry units, mortars, grout, reinforcement). Strength and behaviour of masonry: Axial compression, eccentric compression, direct and flexural tension, shear and compression, biaxial state of stresses, P-M interaction and Deformation characteristics. Design of reinforced masonry: Basic principles and methods of reinforcing, Working stress and limit states design, Serviceability limit states (deflection, cracking), Design for combined out-of-plane bending and axial compression, Design for in-plane flexure, Design of shear walls, Detailing requirements, International design standards and Multi-storey building design. Confined masonry: Development and application, Configuration, Response under seismic loads, Seismic resistance verification, Practical aspects and normative provisions. Infill masonry: Behaviour, Modelling and Design. Assessment and Strengthening of Existing Masonry Structure.

Text Books:

- Drysdale, R.G., Hamid, A.A., and Baker, L.R., Masonry Structures: Behaviour and Design, Prentice Hall, 1994.

Reference Books:

- Taly, N., Design of Reinforced Masonry Structures, Mc-Graw Hill Companies Inc., 2010.
- Klingner, R E, Masonry Structural Design, McGraw-Hill Companies, Inc., 2010.
- TomaÅžević, M., Earthquake-resistant Design of Masonry Buildings, Imperial College Press, 1999.
- Priestley, M.J.N. and Paulay, T., Seismic Design and Assessment of Reinforced Concrete and Masonry Buildings, John Wiley and Sons, 1997.
- Handbook on Seismic Retrofit of Buildings, Central Public Works Department and Indian Buildings Congress, Edited by Chakrabarti, A., Menon D. Sengupta, A.K., Narosa Publishing House Pvt. Ltd., 2008.
- IS 1905 Code of Practice for Structural use of Unreinforced Masonry, Bureau of Indian Standards.
- SP 20: 1981 Explanatory Handbook on Masonry Code, Bureau of Indian Standards.
- Other relevant Indian and international standards.

Prerequisite: NIL