

Course syllabus

Department of Civil Engineering, Indian Institute of Technology Madras

CE7024 - Rehabilitation of heritage structures

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

Course Type: Theory

Description: To develop an understanding of the mechanical and structural behavior of historical masonry under the action of different loads; - To identify the different scientific tools available for condition assessment and diagnosis of structural distress in historical constructions; and - To develop a framework to select appropriate repair or strengthening strategy for a distressed historical construction.

Course Content:

1. Introduction - Approach to structural conservation - Introduction to international principles of structural conservation
2. Mechanics of Historic Masonry/Timber - Types of structural components (walls, arches, vaults, domes); Types of load-bearing walls - Mechanics of masonry material; Static and dynamic behaviour of masonry: Behaviour under compression, tension, flexure, shear (in-plane damage/failure mechanisms), out-of-plane/local mechanisms; Behaviour of floor/roof diaphragms in timber
3. Diagnostic interventions and Numerical Analysis - Diagnostic interventions data collection and structural distress diagnosis (NDT, PDT and lab tests structural and geotechnical; material and component; static and dynamic); structural health monitoring - Numerical tools for structural analysis - Seismic analysis: Estimation of capacity of a structure; defining earthquake input
4. Strengthening interventions - Strengthening/consolidation interventions (component and system level interventions - walls, columns, arches, vaults, domes; ground/foundation interventions); - Temporary strengthening interventions; - Structural health monitoring; - Problems/Effects of unscientific or non-engineered interventions

Text Books

NIL

Reference Books

- Feilden, B.M., Conservation of Historic Buildings, Butterworth-Heinemann Ltd., 1994.
- Croci, G., The Conservation and Structural Restoration of Architectural Heritage, Computational Mechanics Publications, 1998.
- Tomaževic, M., Earthquake-resistant Design of Masonry Buildings, Imperial College Press, 1999.

Prerequisite: