



Department of Civil Engineering
(Detailed Autonomous Syllabus)

M. Tech., 2nd Yr (3rd Semester)

Theory

Disaster Mitigation in Engineering (CE-301)

L-3, T-1, Credit-4

Prerequisite: Structural Dynamics and Seismology, Engineering Hydrology, Geotechnical and Foundation Engineering.

Module 1: Natural Hazards and Risk Assessment

Earthquake, flood, cyclone, landslide hazards; vulnerability analysis, HAZUS methodology, multi-hazard zoning maps, probabilistic seismic hazard assessment (PSHA), return period estimation and risk quantification.

Module 2: Disaster Preparedness and Emergency Planning

Disaster management cycle, National Disaster Management Authority (NDMA) guidelines, emergency response plans (ERP), risk mitigation matrix, early warning systems, community-based disaster management, evacuation modelling, and construction site-specific contingency plans.

Module 3: Disaster-Resilient Structural Consideration

Overview of seismic design as per IS 1893 and ductile detailing (IS 13920), Base isolation systems, energy dissipation devices (dampers), performance-based seismic design, flood-resistant foundations and elevated structures, wind load provisions (IS 875 Part 3) and wind tunnel testing.

Module 4: Construction Phase Disaster Management

Site safety during monsoons, temporary works stability, crane operations in high winds and site evacuation drills, business continuity planning, insurance coverage for natural perils, risk management during execution in hazard-prone areas.

Module 5: Post-Disaster Damage Assessment and Case Studies

Damage assessment protocols, rapid visual screening (RVS), Post-disaster reconnaissance and recovery planning, build-back-better principles, resilient reconstruction codes, Case studies in India

Course Outcomes (COs)

After successful completion of the course, students will be able to:

CO1: Explain natural hazards and risk assessment techniques for infrastructure systems.

CO2: Analyze disaster preparedness using emergency planning and mitigation frameworks.

CO3: Evaluate seismic, flood, and wind-resistant structural design considerations.

CO4: Apply disaster management practices during construction in hazard-prone areas.

CO5: Assess post-disaster damage using rapid screening and recovery methods.

CO6: Develop resilient reconstruction strategies following disaster management guidelines.

Reference Books

1. Disaster Management by G.K. Ghosh (AP Publications).
2. National Disaster Management Guidelines (NDMA, Government of India).
3. Earthquake Resistant Design of Structures by S.K. Duggal (Oxford University Press).
4. NDMA Guidelines: Construction Safety in Disasters.