

IV B.Tech I Semester

15ACE54-EARTHQUAKE RESISTANT DESIGN OF STRUCTURES
(CBCC (DEPARTMENTSPECIFIC))

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Course objectives:

- *Select and apply the appropriate energy dissipation or base-isolation device for mitigating seismically induced damage to a building*
- *Predict damage to un-reinforced masonry buildings and identify the vulnerable features*
- *Assess existing building structures and provide plans for their effective retrofitting*
- *Assess seismic performance of non-structural components and building contents and identify effective measures to mitigate potential damage.*

UNIT – I

Earthquake Engineering : - Engineering Seismology –Earthquake phenomenon – Causes and effects of earthquakes – Faults –Structure of earth – Plate Tectonics – Elastic Rebound Theory – Earthquake Terminology – Source, Focus, Epicenteretc – Earthquake size – Magnitude and intensity of earthquakes – Classification of earthquakes – Seismic waves – Seismic zones – Seismic Zoning Map of India – Seismograms and Accelegrams.

UNIT – II

Introduction to Structural Dynamics: – Theory of vibrations – Lumped mass and continuous mass systems – Single Degree of Freedom (SDOF) Systems – Formulation of equations of motion – Undamped and damped free vibration – Damping – Response to harmonic excitation – Concept of response spectrum.

UNIT – III

Earthquake Analysis : - Introduction – Rigid baseexcitation – Formulation of equations of motion for SDOF System – Earthquake response analysis of single and multi-storied buildings – Use of response spectra.

Codal Design Provisions : - Review of the latest Indian seismic code IS:1893 – 2002 (Part-I) provisions for buildings –Earthquake design philosophy – Assumptions – Design by seismic coefficient and response spectrum methods – Displacements and drift requirements – Provisions for torsion.

UNIT – IV

Codal Detailing Provisions: - Review of the latest Indian Seismic codes IS:4326 and IS:13920 provisions for ductile detailing of R.C buildings – Beam, column and joints

Shear walls : - Types – Design of Shear walls as per IS:13920 – Detailing of reinforcements.



UNIT – V

Aseismic Planning : - Plan Configurations – Torsion Irregularities – Re-entrant corners – Non-parallel systems – Diaphragm Discontinuity – Vertical Discontinuities in load path – Irregularity in strength and stiffness – Mass Irregularities – Vertical Geometric Irregularity -Proximity of Adjacent Buildings.

Course outcomes:

- *Describe seismicity of the world and the role of plate tectonics*
- *Accurately interpret response spectra presented in the different formats including the Acceleration-Displacement Response Spectrum (ADRS) diagram for quantifying potential seismic hazards on infrastructure*
- *Students should know assess seismic performance of non-structural components and building contents and identify effective measures to mitigate potential damage.*

TEXT BOOKS:

1. Earthquake Resistant Design of Structures – Pankaj Agarwal & Manish Shrikhande – Printice Hall of India, New Delhi
2. Earthquake Resistant Design of Structures by S.K. Duggal, Oxford University press, New Delhi

REFERENCES:

1. Dynamics of Structures by A.K. Chopra – Pearson Education, Indian Branch, Delhi.
2. Earthquake Tips by C.V.R. Murty, I.I.T. Kanpur.
3. Structural Dynamics by Mario Paaz.
4. Earthquake Hazardous Mitigation by R. Ayothiraman and Hemanth Hazarika, K. International Publishing House Pvt. Ltd., New Delhi.
5. Dynamics of Structures – Clough & Penzien, McGraw Hill – International Edition

Codes/Tables:

IS Codes: IS:1893, IS:4326 and IS:13920 to be permitted into the examinations Hall.

