EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Course Code: 13CE2210

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Course Educational Objectives:

1. To impart the knowledge on causes and effects of earthquakes.
2. To familiarize with Seismic codal and detailing provisions.
3. To create a strong understanding on application of retrofitting techniques of RC buildings.

Course Outcomes:

1. Student acquire the ability to analyze multi-degrees of freedom system for structures.
2. The student will demonstrate the ability to design earthquake-resistant structures.
3. Students acquire knowledge in Seismic codal and detailing provisions.

UNIT – I

Engineering Seismology: Introduction, causes and effects of earth quakes faults, structure of earth, plate tectonics, elastic rebound theory, earth quake terminology- source, focus, epicentre, hypocenter, Earthquake size, magnitude & intensity, Seismic waves, Seismic zones, Seismic zoning map of India, seismo grams and accelerograms.

UNIT – II

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. Analysis of multi storeyed building using Seismic coefficient method.

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

UNIT – III

A Seismic Planning: Plan configurations, Torsion irregularities, re-entrant corners, non-parallel systems, diaphragm discontinuity, vertical discontinuity in load path, irregularities in strength and stiffness, Mass irregularities, Vertical geometric irregularity, Proximity of adjacent buildings.

Shear Walls: Introduction, types of shear walls, description of building, determination of lateral forces in buildings, design of shear walls as per Indian Standard Code : 13920, detailing of reinforcement of shear walls.

UNIT – IV

Retrofitting Techniques: Introduction, consideration in retrofitting of structures, classification of retrofitting techniques, retrofitting strategies of R.C. buildings like structural level and member level.

UNIT – V

Masonry Buildings : Introduction, determination of design lateral load, determination of wall rigidities, determination of Torsional forces, determination of pier loads, moments and shear, design of shear walls for shear, structural details.

TEXT BOOKS

1. Agarwal pankaj & shrikhande Manish *" Earthquake Resistant Design of Structures",* 2nd Edition, Eswar Press, 2010.

2. JaiKrishna and Chandrasekharan, *"Elements of Earthquake Engineering",* 3rd Edition, Saritha Prakasham, Meerut, 2009.

REFERENCES

1. Anil K. Chopra, *"Dynamics of Structures, Theory and Applications to Earthquake Engineering"*, 3rd Edition, Prentice Hall of India, 2009.

2. Duggal S.K., *"Earthquake Resistant Design of Structures"* 2nd Edition, Oxford University Press, 2008.

3. Relevant Indian Standard Codes: IS-875, IS-1893, IS -4326, IS-13920.