EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Course Code: 15CE2210

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Course Outcomes: At the end of the course, the student will be able to:

CO1: Summarise Engineering Seismology and discuss the causes and effects of Earthquakes.

CO2: Analyse and detail the multi-storeyed structures using I.S Codes by Response Spectrum methods.

CO3: Discuss various types of irregularities of structures.

CO4: Design and detail Shear walls using I.S: 13920.

CO5: Discuss various retrofitting techniques for R.C buildings.

UNIT – I (10-Lectures)

Engineering Seismology: Introduction, causes and effects of earthquakes, faults, structure of earth, plate tectonics, elastic rebound theory, earthquake terminology.

Mathematical modeling of physical systems, free vibrations of un-damped and viscously damped systems, Coulomb damping.

UNIT – II (10-Lectures)

Codal Design Provisions: Review of the latest Indian Seismic code IS: 1893 – 2002 (Part- I) provisions for buildings, earthquake design philosophy, assumptions, displacements and drift requirements. Analysis of multi-storeyed building using response spectrum method and 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 (10-Lectures)

Aseismic 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.

UNIT – IV (10-Lectures)

Shear Walls: Introduction, types of shear walls, determination of lateral forces in buildings, design of shear walls as per Indian Standard Code: 13920, detailing of reinforcement of shear walls, boundary elements – coupling beams.

UNIT – V (10-Lectures)

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

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"*, 3rdEdition, 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.