	L	T	P	C
IV Year II Semester				
Code: 17CE833	**3**	**1**	**0**	**0**

EARTHQUAKE RESISTANT DESIGN

(Dept.Elective-III)

Course Learning Objectives

The objectives of this course are:

1. Familiarize Students with Engineering Seismology
2. Equip student with concepts of Structural Dynamics
3. Understand Concepts of Seismic Design
4. Familiarize with Design philosophies for Seismic loading
5. Familiarize students with various IS codal provisions for ductile design and detailing

Course Outcomes

At the end of this course the student will be able to

1. Explain fundamentals of Engineering Seismology
2. Acquaint with the principles Structural dynamics
3. Solve SDOF Systems and suggest ductile design
4. Compute equivalent lateral seismic loads
5. Carryout a seismic design as per IS codal provisions

SYLLABUS

UNIT-I

Engineering seismology – rebound theory – plate tectonics – seismic waves - Earthquake size and various scales –local site effects – Indian seismicity –seismic zones of India – theory of vibrations – near ground and far ground rotation and their effects.

UNIT-II

Introduction to Structural Dynamics: Fundamental objective of Dynamic analysis – Types of prescribed loadings Formulation of the Equations of Motion– Elements of a Vibratory system – Degrees of Freedom – Oscillatory motion – Simple Harmonic Motion – Free Vibrations of Single Degree of Freedom (SDOF) systems – Undamped and Damped – Critical damping – Logarithmic
decrement – Forced vibrations of SDOF systems – Harmonic excitation – Dynamic magnification factor.

UNIT-III

Seismic design concepts – EQ load on simple building – load path – floor and roof diaphragms – seismic resistant building architecture – plan configuration – vertical configuration – pounding effects – mass and stiffness irregularities – torsion in structural system- Provision of seismic code (IS 1893 & 13920) – Building system – frames – shear wall – braced frames – layout design of Moment Resisting Frames (MRF) – ductility of MRF – Infill wall – Nonstructural elements.

UNIT-IVCalculation of equivalent lateral force- Design Base Shear- Storey Shear, Estimation of Natural period of Structure, Computation of Response acceleration Coefficient- Zone factor- Seismic weight- Response reduction factors- Seismic Coefficient Method.

UNIT-V

Design and ductile detailing of Beams and columns of frames -Concept of strong column weak beams, Ductility criteria for earthquake resistant design, Ductile detailing of flexural members as per IS 13920- Longitudinal reinforcement, Shear reinforcement, Anchorage of reinforcement- Development length, Lap Splices.

UNIT-VI

Seismic Analysis and design of simple 2-storied RC Building frame – Equivalent static lateral force method and response spectrum method.

TEXT BOOKS:

1. 'Earthquake Resistant Design of Structures' -Pankaj Agarwal and Manish ShriKhande, Prentice – Hall of India, 2007, New Delhi.
2. 'Earthquake Resistant Design of Building Structures' by Vinod Hosur, Wiley India Ltd.
3. 'Reinforced Concrete Design'by A. K. Jain.

REFERENCES:

1. 'Introduction to the Theory of Seismology' by Bullen K.E., Great Britain at the University Printing houses, Cambridge University Press 1996.
2. Relevant code of practices.