



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES								
III Semester: ST								
Course Code	Category	Hours / Week			Credits	Maximum Marks		
		L	T	P		C	CIA	SEE
BSTD29	Elective	3	0	0	3	40	60	100
		Contact Classes: 48		Total Tutorials: Nil		Total Practical Classes: Nil		Total Classes: 48
Prerequisite: Structural Dynamics								

I. COURSE OVERVIEW:

This course aims to broaden the intellectual capacity of students in understanding the natural causes of earthquakes and their consequences on the built environment; to introduce them to the basic principles of dynamic structural behavior and seismic design procedures. The course deals with causes of earthquakes, characteristics of earthquake ground motions, earthquake magnitude and intensity measurements. Seismic response analysis of simple structures. Derivation of elastic response spectra and earthquake design spectra. Earthquake design criteria. Free and forced vibration analysis of frame structures. Modal spectral analysis and equivalent static lateral force method. Design codes, design applications.

II. COURSE OBJECTIVES:

The student will try to learn:

- I. The causes of earthquake and potential consequences of strong earthquakes on structures and civil infrastructure.
- II. Design, construct and maintain structures to perform at earthquake exposure up to the expectations and in compliance with building codes
- III. Single degree of freedom systems subjected to free and forced vibrations

III. COURSE OUTCOMES:

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

- CO 1 Summarize engineering seismology and discuss the causes and effects of earthquakes by using seismic design parameters.
- CO 2 Interpret the requirements of building codes of practice on seismic detailing of reinforced concrete building structures.
- CO 3 Explain the seismic analysis and design lateral loads for the modeling of RCC structures.
- CO 4 Analyze in detail the multi-storeyed structures using I.S Codes by seismic coefficient and response spectrum methods.
- CO 5 Design multi-storey building and shear walls using I.S:13920 code.
- CO 6 Design earthquake-resistant masonry buildings by using lateral load analysis.

IV. COURSE CONTENT:

MODULE-I: EARTHQUAKE GROUND MOTION AND STRUCTURAL DYNAMICS (10)

Engineering seismology, seismic zoning map of India, strong motion studies in India, strong motion Characteristics, evaluation of seismic design parameters. Initiation into structural dynamics, dynamics of SDOF systems, theory of seismic pickup, numerical evaluation of dynamic response, response spectra, dynamics of MDOF systems.

MODULE-II: CONCEPTS OF EARTHQUAKE RESISTANT DESIGN OF RCC STRUCTURES (10)

Basic elements of earthquake resistant design, identification of seismic damages in RCC buildings, effect of structural irregularities on performance of RCC buildings during earthquakes, earthquake resistant building architecture.

MODULE-III: SEISMIC ANALYSIS AND MODELING OF RCC STRUCTURES (10)

Code based procedure for determination of design lateral loads, infill walls, seismic analysis procedure as per IS 1893 code.

Equivalent static force method, response spectrum method, time history analysis, mathematical modeling of multi-storey RCC buildings.

MODULE-IV: EARTHQUAKE RESISTANT DESIGN OF RCC STRUCTURES (09)

Ductility considerations, earthquake resistant design of multi-storey RCC buildings and shear walls based on IS 13920 code, capacity based design

MODULE-V: EARTHQUAKE RESISTANT DESIGN OF MASONRY STRUCTURES (10)

Identification of damages and non-damages in masonry buildings, elastic properties of structural masonry, lateral load analysis of masonry buildings, seismic analysis and design of one-storey and two-storey masonry buildings.

V. TEXT BOOKS:

1. S. K. Duggal, "Earthquake Resistant Design of Structures", Oxford University Press, 2009.
2. Pankaj Agarwal and Manish Shrikhande, "Earthquake Resistant Design of Structures", Prentice Hall of India Pvt. Ltd, 2001.
3. T. Paulay and M.J.N. Priestly, "Seismic Design of Reinforced Concrete and Masonry Building", John Wiley & Sons, 2009.

VI. REFERENCE BOOKS:

1. Anil K. Chopra, "Dynamics of Structures – Theory and Applications to Earthquake Engineering, Prentice-Hall India Pvt Ltd, 2nd Edition, 2001.
2. Anand S.Arya, Nemchand & Bros, "Masonry and Timber Structures including Earthquake Resistant Design, 1995.
3. MihaTomazevic, "Earthquake Resistant Design of Masonry Building, Imperial college Press, 1992.
4. C.V.R. Murty, "Earthquake tips – Learning Earthquake Design and Construction, 2004.

VII. ELECTRONICS RESOURCES:

1. http://www.nicee.org/iaee/E_Chapter3.pdf
2. http://www.iitk.ac.in/nicee/wcee/article/vol.3_session4_1917.pdf
3. https://c.ymcdn.com/sites/www.nibs.org/resource/resmgr/BSSC/FEMA_P-749.pdf

VIII. MATERIALS ONLINE:

1. Course Template
2. Tutorial Question Bank
3. Assignments
4. Model Question Paper – I
5. Model Question Paper - II
6. Lecture Notes
7. Power point presentation