1151CE110 (VTUR15)	BASICS OF DYNAMICS AND ASESMIC DESIGN OF STRUCTURES	L	T	P	C
		2	2	0	3

Course Category: Programme Core

A. Preamble :

This course is useful for a detailed study of the techniques applied in dynamic loading and earthquake loading on the behavior of structures

B. Prerequisites

- Design of RC Elements

C. Link to other Courses:

- Minor Project
- Major Project

D. Course Educational Objective:

Students undergoing this course are expected to:

- Learn the basic concept of dynamic loading
- Determine the effect of earthquake loading on the behaviour of structures.
- Learn the codal provision to design the structure as earthquake resistant.

E. Course Outcome:

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Discuss the phenomena of earthquakes, the process, measurements and the factors that affect the design of structures in seismic areas.	K1
CO2	Analyze the response of various SDOF system	K3
CO3	Analyze the response of various MDOF system	K3
CO4	Describe the soil structure interaction and how it affects the stability of the structure.	K2
CO5	Identify the various codes for earthquake forces analysis and earthquake resistant design.	K2

F. Correlation of COs with POs

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M		M										M	
CO2	L	M												
CO3		H	L	L										
CO4				L			L							
CO5				M			L							

G. Course Content:

UNIT I SEISMOLOGY 6+6

Elements of Engineering Seismology - Characteristics of Earthquakes - Earthquake History - Indian Seismicity.

UNIT II SINGLE DEGREE OF FREEDOM SYSTEMS 6+6

Formulation of equation of motion - Free and forced vibrations – Damping - Types of Damping – Damped and undamped vibrations - Response to dynamic loading.

UNIT III MULTI DEGREE OF FREEDOM SYSTEMS 6+6

Free and forced vibration of undamped and damped MDOF systems - Equation of motions - Evaluation of natural frequencies and mode shapes - Eigen Values and Eigen Vectors

UNIT IV BEHAVIOUR OF STRUCTURES AND SOIL 6+6

Performance of structures during past earthquakes - Lessons learnt from past earthquakes – liquefaction – Resistance against liquefaction –Soil types and strength - Soil-Structure Interaction (SSI) effects.

UNIT V EARTHQUAKE RESISTANT DESIGN 6+6

Concept of Earthquake Resistant Design - Provisions of IS 1893 (Part I) : 2016, NBC of India, Euro Codes, ATC specifications - Response Spectrum - Design Spectrum, Design of Buildings - Reinforcement Detailing - Provisions of IS 13920:2016 - Calculation of design forces.

TOTAL 30 + 30 : 60 Periods

H. Learning Resources

a) TEXT BOOKS

1. Anil K.Chopra, Dynamics of Structures, Pearson Education, Third Edition,2007
2. Dhamodarasamy S.R, and Kavitha S, Basics of Structural Dynamics and Aseismic Design, PHI Learning Pvt. Ltd., 2009

b) REFERENCES

1. Clough R.W, and Penzien J, Dynamics of Structures, Second Edition, McGraw – Hill International Edition, 1993
2. Mario Paz, Structural Dynamics – Theory and Computations, Third Edition, CBS publishers, 1991.
3. Humar J L, Dynamics of Structures, Prentice Hall, 1990.
4. C V R Moorthy, Earthquake Tips, NICEE, IIT Kanpur, 2004
5. IS 1893: Part I: 2016 - Criteria for Earthquake Resistant Design of Structures – Part I – General Provisions and Buildings.
6. IS 13920:2016 – Ductile Design and Detailing of Reinforced Concrete Structures

c) ONLINE RESOURCES

1. http://nptel.ac.in/courses/105101004/3
2. http://nptel.ac.in/syllabus/105101006/
3. http://nptel.ac.in/courses/105101004/