Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NCEC527	Earthquake Resistant Design of Structures	3	1	0	4

Course Objective
The course aims at design of structures for their safety against seismic forces.
Learning Outcomes
After studying this course, students should be able to: • Understand the earthquake resistant design philosophy • Aware about different codal provisions regarding seismic design of structures.

Unit No.	Topics to be Covered	Contact Hours	Learning Outcomes
1	**Concepts of Seismology and Introduction to Earthquake Resistant Design:** Basics of Seismology, Seismic input characteristics, Behavior of structure under earthquake loading, Methods of seismic analysis.	**5 L + 3 T**	Broad concept of engineering seismology and structural behavior under seismic loading.
2	**Computation of Seismic Forces:** Equivalent static method, Dynamic analysis method.	**4 L + 4 T**	Code based design procedure for estimation of seismic forces.
3	**Inelastic Dynamic Analysis of Structures:** Force-based method, Displacement-based method.	**5 L + 2 T**	Knowledge on inelastic analysis of structures.
4	**Performance Based Design:** Capacity spectrum, Pushover analysis, Back-bone curve, P-Delta Analysis, Provisions of FEMA guidelines.	**5 L + 3 T**	Understanding the advanced concept of performance-based design.
5	**Provisions of Ductile Detailing:** Different guidelines as per Indian Standards.	**5 L**	Exposure towards ductile detailing guidelines.
6	**Hydrodynamic Effect on Liquid Container:** Modelling and analysis of liquid container, hydrostatic and hydrodynamic effects, earthquake resistant provisions.	**4 L + 2 T**	Behaviour of liquid retaining structures subjected to dynamic loading.
7	**Seismic Instrumentation:** Laboratory and field	**2 L**	Different types of instrumentation for assessing seismic response of structures.
8	**Performance of Structures in Past Earthquakes:** Performance of engineered and non-engineered structures.	**4 L**	Lessons learnt from past earthquakes.

9	**Seismic Evaluation of Existing Structures:** Vulnerability Assessment for Earthquake; Rapid Visual Screening (RVS); Simplified Vulnerability Assessment (SVA); Detailed Vulnerability Assessment (DVA).	**4 L**	Assessing seismic vulnerability of existing structures.
10	**Emergency Response and Seismic Insurance:** Awareness, preparedness, emergency response plan, humanitarian logistics and seismic insurance of structures.	**4 L**	Preparedness towards disaster response.
	Total Contact Hours	**42 L + 14 T**	

Text Books:

1. Paulay, T. and Priestley, M.J.N. "Seismic Design of Reinforced Concrete and Masonry Buildings," John Wiley & Sons.
2. Reddy, G.R., Muruva, H. P. and Verma, A. K. "Textbook of Seismic Design", Springer

References Books:

1. Villaverde, R., "Fundamental Concepts of Earthquake Engineering", Taylor & Francis.
2. George G. Penelis and Andreas J. Kappos, "Earthquake Resistant Concrete Structures," E & FN Spon.