CE801 SEISMIC HAZARD AND VULNERABILITY ANALYSIS 3-0-0-3

Introduction to earthquake hazards: strong ground motions, tsunamis, landslides, liquefaction; Overview of plate tectonics and Earthquake source mechanisms; Concepts of seismic magnitudes and intensity; A seismic station: sensors and data loggers, Interpretation of Seismic Records - acceleration, velocity and displacement; Earthquake fault rupture, Fundamentals of vibration; ground motion parameters,

Theory of wave propagation: Body waves and Surface waves, Characteristics of rock motion, Predictions of rock motions for design purposes, Attenuation relationships; Simulation of Strong Ground Motion, Acceleration and velocity levels, Response spectra.

Identification and Evaluation of Earthquake Sources, Historical Seismicity, Instrumental Seismicity, Seismic Hazard Analysis - Deterministic and Probabilistic hazard analysis. Logic tree methods, Seismic Zonation - scales, Macro and Micro, Site characterization - different methods and experiments. Local site effects: ground motion amplifications, Development of response/design spectrum. Liquefaction hazard assessments.

Risk and Vulnerability Studies, Seismic Vulnerability, Vulnerability assessment of dwelling buildings, Damage probability matrices and Vulnerability functions, Rapid visual screening (RVS), Levels of Vulnerability Assessment, Seismic Risk Assessment, Integration of hazard parameters on GIS Platform; Final zonation map for hazard and risk, Regional seismicity, earthquakes in India, seismic codes, Earthquake Preparedness efforts in India.

TEXT BOOKS/ REFERENCES:

1. Steven L. Kramer, '*Geotechnical Earthquake Engineering' Prentice* Hall, 2003.
2. McGuire, R.K. *'Seismic Hazard and Risk Analysis Earthquake Engineering*' Earthquake Engineering Research Institute, 2004.
3. Amr S. Elnashai and Luigi Di Sarno *'Fundamentals of Earthquake Engineering: From Source to Fragility*', Wiley Press, 2015
4. Towhata, Ikuo *'Geotechnical Earthquake Engineering'*, Springer, 2008.
5. Roberto Villaverde, *'Fundamental Concepts of Earthquake Engineering*', CRC Press Taylor & Francis Group, 2009.
6. Max Wyss and John F. Shroder *'Earthquake Hazard, Risk and Disasters*', Academic Press, 2014
7. Sitharam T G and Kolathayar S, '*Preparing to face an Earthquake: Lessons for India'*, Indian Society of Earthquake Technology, IIT Roorkee, 2015