Course Type	Course Code	Name of Course	L	T	P	Credit
DE	NCED505	Soil Dynamics	3	0	0	3

Course Objective

The course aims at imparting fundamental knowledge on response of ground during earthquakes incorporating the effect of liquefaction.

Learning Outcomes

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

- Distinguish between static and dynamic characteristics of soils and implement of cyclic soil models for practical purposes
- Assess seismic hazard for any project site
- Evaluate the potential of liquefaction for any site

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	**Introduction to Soil Dynamics:** Background and lessons learnt from damages in past earthquakes; Internal structures of earth; Plate tectonics; Size of earthquakes; Ground motion parameters; Introduction to dynamics of SDOF system.	8L	Basics of understanding of seismology and dynamics of SDOF system
2	**Wave Propagation:** Types of waves; Wave propagation in semi-infinite media; Material and radiation damping; Dispersion; Waves in a layered medium	6L	Knowledge on wave propagation through soil medium
3	**Dynamic Properties of Soil:** Measurement of dynamic properties of soils at low and high strains; Equivalent linear model; Cyclic nonlinear model; Hyperbolic and Ramberg-Osgood stress-strain models	8L	Knowledge on dynamic properties of soils and simplified soil models
4	**Seismic Hazard Analysis:** Identification of earthquake sources; Deterministic seismic hazard analysis; Probabilistic seismic hazard analysis	9L	Knowledge on evaluation of seismic hazard
5	**Liquefaction:** Liquefaction susceptibility; Initiation of liquefaction; Effects of liquefaction; Mitigation	11L	Understanding on mechanics of liquefaction, evaluation of liquefaction potential
	Total Contact Hours	**42L**	

Text Books:

1. Kramer, S.L. (1996). Geotechnical Earthquake Engineering, 1st Edition, Pearson India Education Services Pvt. Ltd., India.

Reference Books:

1. Towhata, I. (2008). Geotechnical Earthquake Engineering, 1st Edition, Springer-Verlag Berlin Heidelberg.
2. Srbulov, M. (2011). Practical Soil Dynamics, Springer Dordrecht Heidelberg London New York.
3. Das, B.M. and Ramana, G.V. (2014). Principles of Soil Dynamics, Cengage Learning, USA.