

Course Type	Course Code	Name of Course	L	T	P	Credit
DP	NCEC541	Numerical Geotechnics-I	0	0	3	1.5

Course Objective

The course aims at imparting knowledge on computational aspect of geotechnical engineering

Learning Outcomes

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

- Learn the different numerical technics for solving various geotechnical problems

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
1	Determination of principal stresses, octahedral stresses and stress invariants at a point in soil mass.	3	Use of programming and determination of stresses
2	Computation of increase of vertical stress at different locations for construction of a dam/embankment.	3	Determination of increase in stress below ground
3	Determination of settlement due to uniformly loaded flexible circular area at certain depths below the ground considering layered soil profile.	3	Estimation of settlement in layered soil profile
4	Development of flow net and estimation on quantity of seepage in layered soil profile through finite difference scheme	3	Understanding on solution of seepage in layered soil profile
5	Determination of consolidation settlement in layered soil profile through finite difference scheme	3	Solution for consolidation problem in layered soil profile
6	Determination factor of safety for an unsaturated soil slope	3	Effects of unsaturated parameters on stability of slope
7	Estimation of lateral load carrying capacity of a single pile through Reese and Matlock method	3	Solution for lateral load carrying capacity
8	Newmark sliding block analysis for assessment of deformation associated with slope failure	3	Assessment of permanent deformation for slopes under seismic loading

Unit No.	Topics to be Covered	Contact Hours	Learning Outcome
9	Determination of seismic forces and deformation of gravity wall under different conditions	3	Seismic analysis of retaining walls.
10	Assessment of liquefaction potential by IS 1893 (Part 1): 2016	3	Evaluation of liquefaction potential
11	Analysis for earthquake strong motion: a) Evaluation of velocity and displacement time histories from acceleration time history b) Evaluation of response spectrum from earthquake acceleration history	3	Analyses and interpretation of strong ground motions
12	Performance of block type foundations under sinusoidal loading	3	Dynamic analysis of block foundations
13	Prediction of drained responses of soil through critical state mechanics	3	Application of critical state mechanics
14	Prediction of undrained responses of soil through critical state mechanics	3	Application of critical state mechanics
	Total Contact Hours	42	

Text Books:

1. Budhu, M. (2010). Soil Mechanics and Foundations, 3rd Edition, Wiley.
2. Das, B.M. (2013). Advanced Soil Mechanics, 4th Edition, CRC Press.

Reference Books

1. Respective Indian Standard/ International Standard Codes of Practices.