

CE 302: Geotechnical Engineering-II (3-0-0: 3)

Course objectives: To emphasize the importance of soil investigations including destructive and nondestructive methods

To explain how earth pressure theory is important in retaining structure design; To explain the concept of bearing capacity and how to estimate the safe bearing capacity for various foundation system including settlement consideration; To explain how do select a suitable shallow foundation system for various site conditions and also analysis of different foundation system; To explain in what circumstances pile is needed and how do analysis the pile and pile group under various soil conditions

Soil Exploration and Site Investigation

Planning of subsurface exploration, methods, sampling and samplers, In situ tests – plate load test, standard penetration test, static and dynamic cone test, Vane shear test, Sub soil investigation report.

Shallow Foundations

Bearing Capacity, Terzaghi, Meyerhoff, IS code methods for determination of bearing capacity, Effect of depth of water table, eccentricity and inclination of load. Bearing capacity in slopes and layered soil. Bearing capacity from in situ tests. Immediate and consolidation settlement. Correction for pore pressure, depth and rigidity. Settlement from field tests.

Stresses in Soil

Bossiness Equation, Newmark's Chart, computation of stresses in horizontal direction as well as in vertical direction.

Deep Foundations

Pile load capacity, group action, settlement, negative skin friction, lateral load capacity, pile load tests.

Cassion Foundations

Types and selection, forces and moments, fitting of caisson, depth determination.

Ground Improvement Techniques

Methods, compaction stabilisation using Admixtures, stone columns, sand drains, grouting.

Soil Dynamics and Machine Foundation

Concept of modulus of sub grade reaction, elastic half space theory, dynamic soil parameters, Design Criteria for machine foundation, natural frequency determination.

Text Books:

1. *Ranjan, G. and Rao, A.S.R., "Basic and Applied Soil Mechanics", New Age International.*
2. *Terzaghi K., Peck R. B. and Mesri G., "Soil Mechanics in Engineering Practice", John Wiley & Sons*

References:

1. *Kaniraj S.R., "Design Aids in Soil Mechanics & Foundation Engineering", Tata McGraw Hill.*
2. *Lambe, T.W and Whitman R.V., "Soil Mechanics", John Wiley & Sons.*
3. *Punmia B.C., "Soil Mechanic and Foundation Engineering", Laxmi Publication Pvt. Ltd.*
4. *Braja M. Das., "Fundamental of Foundation Engineering", Thomson Asia Pvt. Ltd, Singapore.*

Expected Outcomes: On completion of the course, the students will be able to: carry out soil investigation for any civil engineering construction analyse earth retaining structures for any kind of soil medium; estimate the bearing

capacity using IS code methods; design proper foundations for any kind of shallow foundation system ; estimate pile and pile group capacity for any kind of soil including group efficiency and negative friction
