7CE155 Advanced Foundation Engineering

L-T-P-Cr: 3-0-0-3

Prerequisite: A Pass grade or having attended at least 75% of the classes conducted or at least 60 % attendance and a minimum of 40% marks in the course (s) Geotechnical Engineering –II, CE 118.

Objective: To impart advanced knowledge and skill for of different types of foundations.

Theory: 1. Types of foundation; criteria for choosing a foundation based on in-situ soil condition; overview of different laboratory tests conducted on soil; interpretation of data; criteria for foundation design. 3 Lectures

2. Shallow foundation; Terzaghi's theory for bearing capacity analysis for shallow foundation; Meyerhof's theory for bearing capacity analysis for shallow foundation; difference between Terzaghi's and Meyerhof's theory; Skempton's bearing capacity equation; IS 6403-1981 method for bearing capacity determination (as suggested by Vesic); effect of water table on bearing capacity; bearing capacity of eccentrically loaded footing, bearing capacity from SPT (N) values; bearing capacity determination from plate load test; design examples. 9 Lectures

3. Mat/Raft footing; Buoyancy raft foundation; Design examples. 4 Lectures

4. Deep foundation; Static and dynamic formulae for determination of pile load capacity; skin friction in sand and clay; design of pile group; negative skin friction; under reamed piles; pile load test; batter piles; pile subjected to horizontal loads; Reese and Matlock theory; anchor piles and determination of pull out resistance; design examples. 12 Lectures

5. Deep open cuts; coffer dams; Well foundations; Terzaghi's method; IRC method; 7 Lectures 6. Soil structure interaction; interaction problems based on the theory of subgrade reaction such as beams, footing; use of finite difference and finite element method in determination of specific problems related to foundation engineering, use of FEM for calculation of bearing capacity of soil. 7 Lectures

Text Books: 1. Analytical and computer methods in Foundation, J.E., Bowles, McGraw-Hill Book Co., New York. 2. Numerical Methods in Geotechnical Engineering, Eds., C.S. Desai and J.T. Christian, McGraw-Hill Book Co., New York. 3. Soil Mechanics and Foundation Engineering (Geotechnical Engineering) by K. R. Arora. Standard Publishers and Distributors. 4. Introduction to soil mechanics and foundation engineering by Prof. V. N. S. Murthy, UBS publishers. 5. Programming the finite element method by I. M. Smith and G. V. Griffiths. (4th ed), Wiley International. Reference Books: 1. Soil Mechanics by T. William Lambe and Robert V. Whitman. 2. Soil Mechanics in Engineering Practice by Karl Terzaghi, John Wiley & Sons (1996). 3. Pile Design and Construction Practices by M. J. Tomlinson and John Woodward. Expected Outcome: The students would be able to design different types of foundations subjected to given loading conditions.