

CE 519: ADVANCED FOUNDATION DESIGN (3-0-0:3)

INTRODUCTION

Introduction, Subsurface Exploration: Boring, Sampling, SPT, CPT, Geophysical methods, Bore log and soil report, analysis and interpretation of soil exploration data, estimation of soil parameters for foundation design. Need of Foundation Engineering, Responsibility of Foundation Engineer, Classification, selection of type of foundation.

SHALLOW FOUNDATIONS

Methods for bearing capacity estimation, total and differential settlements of footing and raft, code provisions. Design of individual footings, strip footing, combined footing, rigid and flexible mat, buoyancy raft, basement raft, underpinning. Terzaghi's, Meyerhoff, Hansens bearing capacity theories, based on SPT, layered soils, eccentric and inclined loads. Bearing capacity on slopes, Foundation settlements.

PILE FOUNDATIONS

Estimation load carrying capacity of single and pile group under various loading conditions. Pile load testing (static, dynamic methods and data interpretation), settlement of pile foundation, code provisions, design of single pile and pile groups, and pile caps. Load transfer mechanism, Pile capacity in various soil types, negative skin friction, group action, settlements, laterally loaded vertical piles.

WELL FOUNDATIONS

Types, components, construction methods, design methods (Terzaghi, IS and IRC approaches), check for stability, base pressure, side pressure and deflection.

RETAINING WALLS

Types (types of flexible and rigid earth retention systems: counter fort, gravity, diaphragm walls, sheet pile walls, soldier piles and lagging). Support systems for flexible retaining walls (struts, anchoring), construction methods, stability calculations, design of flexible and rigid retaining walls, design of cantilever and anchored sheet pile walls.

MACHINE FOUNDATIONS

Free and forced vibration with and without damping, Elastic half space for rigid footings. Vibration analysis of foundations subjected to vertical, sliding and rocking modes, Design criteria for m/c foundations.

REINFORCED EARTH

Geotechnical properties of reinforced soil, shallow foundation on soil with reinforcement, retaining walls with reinforcements, design considerations.

Text Books and References:

1. Bowles, J.E., Foundation Analysis and Design, Fifth Edition, McGraw Hill, New York, 1995.
2. Robert Wade Brown, Practical Foundation Engineering Handbook, McGraw Hill, New York, 1996.
3. Tomlinson, M.J. Foundation Engineering, ELBS, Long man Group, UK Ltd., England, 1995.
4. Swami Saran, Soil Dynamics and Machine Foundation, Galgottia Publications Pvt. Ltd., New Delhi-110002, 1999.
5. Braja M. Das, Principles of Foundation Engineering, Cenage Learning. 2007.
6. Coduto, D., Foundation Design: Principles and Practices. 2nd Edition. Prentice Hall.
7. H. G. Poulos, E. H. Davis, Pile foundation analysis and design, Wiley, 1980
8. ShamsherPrakash, Vijay Kumar Puri, Foundations for machines: analysis and design, Wiley, 1988.