

(CE513) ADVANCE FOUNDATION ENGINEERING

Objective of the Course:

The primary objective of this course is to equip the student with the knowledge of how to explore the soil, design the foundations for different conditions and check the stability of structures.

UNIT - I

Sub–Soil Investigation and Sampling

Introduction; Methods of exploration; Methods of Boring; Soil Samples; Soil samplers and Sampling; Number and disposition of trial pits and borings; Depth of exploration; Ground water observations; Field test, Laboratory tests; Plate load test; Penetrometer tests; Geophysical methods.

UNIT – II

Shallow Foundations

Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation, Bearing Capacity & Settlement Methods for bearing capacity estimation, total and differential settlements of footing and raft, code provisions. Design of individual footings, strip footing, combined footing.

UNIT – III

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

UNIT – IV

Lateral Earth Pressure & Retaining Walls:

Introduction; Effect of wall movement on Earth Pressure; Earth Pressure at rest; Rankine's theory of Earth pressure; Coulomb's theory of earth pressure; Culmann's graphical method for active earth pressure; Types of retaining walls, Design of cantilever retaining wall.

UNIT – V

Dynamic Soil Properties

Stresses in soil element; Determination of dynamic soil properties; Field tests; Laboratory tests; Model tests; Stress-strain behavior of cyclically loaded soils; Cyclic plate load test; Liquefaction.

Machine Foundations

Types of machines; Basic design criteria; Methods of analysis; Mass-Spring-Dashpot model; Elastic-Half-Space theory; Tschebotarioff's reduced natural frequency method; Types of foundations; Modes of vibrations; Vertical, sliding, torsional (yawing) and rocking (and pitching) modes of oscillations; Design guidelines as per codes; Typical design problems.

TEXT BOOKS:

1. ManojDatta, Shashi K Gulhati, "Geotechnical Engineering", Tata McGraw – Hill Education (2005)
2. K.R. Arora, "Soil Mechanics and Foundation Engineering", 7th ed., Standard Publishers and Distributors, Delhi, 2009.
3. B.C.Punmia, Ashok Kumar Jain and Arun Kumar Jain, "Soil Mechanics and Foundation", 16th ed., Laxmi Publications Pvt. Ltd., New Delhi, 2005.
4. Dass, B.M, "Principles of Geotechnical Engineering", 5th ed., Thompson books, Singapore, 2002.
5. P. Srinivasalu, C. V. Vaidyanathan "Handbook of Machine Foundations" 1st EditionTata McGraw - Hill Education (2004)

REFERENCE BOOKS:

1. B. J. Kasmalkar; "Foundation Engineering", 6th ed., Pune VidyarthiGrihaPrakashan, Pune, 1989.
2. Bowles, J.E., "Foundation Analysis and Design" 4th ed., McGraw-Hill Publishing company, Newyork, 1988.
3. P.PurushothamaRaj , "A Text book of Soil Mechanics