

AMEV-08 SOIL MECHANICS AND FOUNDATION ENGINEERING

OBJECTIVES:

To understand the basic properties and strength nature of various soils and their settlement behaviour in foundations.

UNIT I SOIL PROPERTIES AND COMPACTION OF SOIL

Nature of Soil - Problems with soil - phase relation - particle size distribution - Atterberg limits - classification for engineering purposes - BIS Classification system - Soil compaction - factors affecting compaction - laboratory and field compaction methods and monitoring - Clay Mineralogy.

UNIT II SOIL MOISTURE - PERMEABILITY, STRESSES IN SOILS

Soil water - Various forms - Capillary rise - Suction - Effective stress concepts in soil - Total, neutral and effective stress distribution in soil - Permeability - Darcy's Law- Permeability measurement in the laboratory - quick sand condition - Stress distribution in soil media - Boussinesq's formula - stress due to line load, Circular and rectangular loaded area - approximate methods - Use of influence charts - Westerguard equation for point load.

UNIT III SHEAR STRENGTH AND SLOPE STABILITY

Shear strength of cohesive and cohesionless soil - Mohr, Coulomb failure theory - Measurement of shear strength - direct shear, Triaxial compression, UCC and Vane shear tests - Types of shear tests based on drainage and their applicability - Drained and undrained behaviour of clay and sand. Slope failure mechanisms - Modes - Infinite slopes - Finite slopes - Total and effective stress analysis - Stability analysis for purely cohesive and $C \Phi$ soils - Method of slices - Modified Bishop's method - Friction circle method - stability number.

UNIT IV SOIL EXPLORATION

Scope and objectives - Methods of exploration - averaging and boring - Wash boring and rotary drilling - Depth of boring - Spacing of bore hole - Sampling - Representative and undisturbed sampling - sampling techniques - Split spoon sampler, Thin tube sampler, Stationary piston sampler - Bore log report - Penetration tests (SPT and SCPT) - Data interpretation (Strength parameters and Liquefaction potential).

UNIT V FOUNDATION - BEARING CAPACITY AND SETTLEMENT

Introduction - Location and depth of foundation - Selection of foundation based on soil condition - codal provisions - bearing capacity of shallow foundation on homogeneous deposits - Terzaghi's formula and BIS formula - factors affecting bearing capacity - problems - Bearing Capacity from insitu tests (SPT, SCPT and plate load) - Allowable bearing pressure, Settlement - Components of settlement - Determination of settlement of foundations on granular and clay deposits - Allowable settlements - Codal provision - Methods of minimising settlement, differential settlement.

The students completing the course will

- have an insight into the structure and engineering properties of soil
- demonstrate an understanding of the processes leading to the formation of soils
- describe the properties of rocks and soils that affect their ability to support any imposed loads
- design simple foundation elements for varying soil conditions and carryout bearing capacity/settlement analysis

specify appropriate excavation and retaining methods for soils and rocks

TEXT BOOKS:

Punmia P.C, Soil Mechanics and Foundations, Laximi Publications Pvt. Ltd, New Delhi, 1--5.

Murthy, V.N.S, "Soil Mechanics and Foundation Engineering", UBS Publishers Distribution Ltd, New Delhi, 1---.

Purushothama Raj. P., "Soil Mechanics and Foundation Engineering", 2nd Edition, Pearson Education, 2013

REFERENCES:

1. Coduto, D.P, Geotechnical Engineering Principles and Practices, Prentice Hall of India Private Limited, New Delhi, 2002.

McCarthy D.F, Essentials of Soil Mechanics and Foundations Basic Geotechniques, Sixth Edition, Prentice-Hall, New Jersey, 2002.

Bowles J.E, "Foundation analysis and design", McGraw-Hill, 1--6.