

| Devi Ahilya University, Indore, India Institute of Engineering & Technology | | | |
|--|-------------|--------------|----------------|
| Subject code and name | Type | L-T-P | Credits |
| VLR6E1: Geotechnical Engineering – II | L | T | |
| | PE | 3-1-1 | 4+1 (P) |

Objective of the subject:

- Familiarize the students with a basic understanding of the essential steps involved in a geotechnical site investigation.
- Introduce to the students, the principal types of foundations and the factors governing the choice of the most suitable type of foundation for a given solution.
- Familiarize the student with the procedures used for: a) bearing capacity estimation, b) load carrying capacity of pile, c) determining earth pressure and e) concept on stability of slope.

Prerequisite(s): Geotechnical Engineering - I.

COURSE CONTENTS

Unit - I

Shallow Foundations : Type of foundations shallow and deep. Bearing capacity of foundation on cohesion less and cohesive soils. General and local shear failures. Factors effecting B.C. Theories of bearing capacity - Prandle, Terzaghi, Balla, Skempton, Meyerh of and Hansan. I.S. code on B.c. Determination of bearing capacity. Limits of total and differential settlements. Plate load test.

Unit - II

Deep Foundation : Pile foundation, Types of piles, estimation of individual and group capacity of piles in cohesion less and cohesive soils. Static and dynamic formulae.. Pile load test, Settlement of pile group, Negative skin friction, under- reamed piles and their design. Piles under tension, inclined and lateral load Caissons. Well foundation. Equilibrium of wells. Analysis for stability tilts and shifts, remedial measures.

Unit - III

Soil Improvement Techniques: Compaction. Field and laboratory methods, Proctor compaction tests, Factors affecting compaction. Properties of soil affected by compaction. Various equipment for field compaction and their suitability. Field compaction control. Lift thickness. Soil stabilization : Mechanical, Lime, Cement, Bitumen, Chemical, Thermal, Electrical stabilization and stabilization by grouting. Geo-synthetics, types, functions, materials and uses.

Unit - IV

Soil Exploration and Foundations on Expansive and Collapsible soils: Methods of soil exploration. Planning of exploration programme for buildings, highways and earth dams. Disturbed and undisturbed samples and samplers for collecting them. Characteristics of expansive and collapsible soils, their treatment, Construction techniques on expansive and collapsible soils. CNS layer.

Unit - V

Sheet piles/Bulkheads and Machine foundation: Classification of sheet piles/bulkheads. Cantilever and anchored sheet piles, Cofferdams, materials, types and applications. Modes of vibration. Mass-spring analogy, Natural frequency. Effect of vibration on soils. Vibration isolation. Criteria for design. Design of block foundation for impact type of machine.

REFERENCE

1. Punmia .B.C, “Soil Mechanics and Foundations Engineering”, Laxmi Publications Pvt.Ltd. New Delhi, 2005
2. Murthy V.N.S (2007): Soil Mechanics and Foundation Engineering – CBS publications, Delhi.
3. Das .B.M, “Principles of Foundation Engineering” (Fifth edition), Thomson Books, 2010.
4. Gopal Ranjan, Rao ASR (2000): Basic and applied soil mechanics – New age publication, Delhi.
5. Iqbal H Khan (2007): Geotechnical Engineering – Prentice Hall, Delhi.
6. Arora .K.R, “Soil Mechanics and Foundation Engineering”, Standard Publishers and Distributors, New Delhi, 2011.
7. Bowles .J.E, “Foundation analysis and design”, McGraw Hill, 2001.

Course Outcomes:

At the end of the course, the student will be able to:

- Determine the earth pressures on foundations and retaining structures
- Analyze shallow and deep foundations
- Calculate the bearing capacity of soils and foundation settlements
- Understand soil exploration methods
- Understand the behavior of machine foundation under vibrations