

3/4 B.Tech. FIFTH SEMESTER

CE5T6

GEO TECHNICAL ENGINEERING – II

Credits: 3

Lecture: 3 periods/week

Internal assessment: 30 marks

Tutorial: 1 period /week

Semester end examination: 70 marks

Pre-requisites: Geo-Technology

Learning objectives:

- To know the soil exploration, field tests involved in assessing the quality of soils
- To calculate the earth pressures and check the stability of slopes and retaining walls.
- To calculate the Safe Bearing Capacity (SBC) of soils and to understand about the importance and suitability of pile and well foundations.

Course outcomes:

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

1. Determine collection of soil sample below ground surface disturbed and undisturbed the soil exploration and earth pressure theory
2. Apply principles and design of retaining walls & slope stability of soil
3. Design of various types shallow foundation and bearing capacity of soil
4. Understand allowable settlement analysis
5. Understand various types of files and design of well foundation

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; Plate load test; Penetrometer tests

LATERAL EARTH PRESSURE

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

UNIT – II

RETAINING WALLS

Types of retaining walls; Design considerations for retaining walls; Stability of retaining walls;

STABILITY OF SLOPES

Introduction; Infinite slopes and translational slides; Definitions of factor of safety; Finite slopes forms of slip surface; Method of slices; Location of most Critical Circle; Stability of Earth Dam Slopes; Friction Circle Method; Taylor's Stability Number

UNIT –III

BEARING CAPACITY OF SHALLOW FOUNDATION

Concept of foundations; Types of foundations and their applicability; General requirements of foundations; Location and Depth of foundation. Terminology relating to bearing capacity; Bearing Capacity of Shallow Foundations – Terzaghi's Bearing Capacity theory; Skempton's Bearing Capacity Analysis for Clay soils; IS-Code Recommendations for Bearing Capacity; Influence of water table on bearing capacity

UNIT – IV

SETTLEMENT ANALYSIS

Settlement of Shallow foundation – types; Methods to reduce differential settlements; Allowable Bearing Pressure; Immediate settlement –Terzaghi's Method; Allowable Bearing pressure of Granular Soils based on Standard Penetration Test Value – Terzaghi and IS methods

UNIT – V

PILE FOUNDATIONS

Introduction; Uses of Piles; Types of Piles; Cast- in-situ Pile construction; Selection of Pile type; Pile driving; Pile load carrying capacity in compression – Static Pile Load formula, Load tests, Dynamic Pile formulae; Correlations with Penetration test data; Group action of Piles – load carrying capacity and settlement; Negative skin friction

WELL FOUNDATIONS

Types of wells; Components of well foundation; Shapes of wells; Forces acting on well foundation; Construction and Sinking of wells;

Learning Resources:

Text books:

1. Basic and Applied Soil Mechanics – Gopal Ranjan and A.S.R.Rao, New Age International Publishers
2. Soil Mechanics and Foundation Engg. (7th edition) by Dr. Arora, K.R., Standard Publisher and distributors, Delhi, 2010.
3. A Text book of Soil Mechanics and Foundation Engineering – B.C.Punmia Laxmi Publications

Reference books:

1. Foundation Engineering by B. J. Kasmalkar; Pune Vidyarthi Griha Prakashan, Pune
Foundation Analysis & Design by Bowles, J.E., McGraw- Hill Book Company.
2. Foundations of Expansive Soils, F.H. Chen. Elsevier Publications.
3. Geotechnical Engineering by SK Gulati & Manoj Datta, Tata McGraw- Hill Publishing Company Limited.
4. Principles of Foundation Engineering(1999), B.M. Das., PWS Publishing Company, 4th edition, Singapore
5. Geotechnical Engineering, - Codutu, Pearson Education

e-learning resources:

NPTEL