

Foundation Engineering BEG 362 CI

Year: III

Semester: II

Teaching Schedule Hours/week			Examination Scheme						Total Marks
			Final				Internal Assessments		
			Theory		Practical		Theory	Practical	
L	T	P	Duration	Marks	Duration	Marks			
3	3	-	3	80	-	-	20	-	100

Course objective:

The objective of this course is to provide the basic knowledge, concept and introduction of tools that can be used to determine soil structure interaction. This course includes a review of principles of soil mechanics and deal with a variety of foundations and retaining walls.

Course Contents:

1.0 Introduction (2 hrs)

- 1.1 Soil/foundation interaction
- 1.2 Function of foundation and its types
- 1.3 Factors influencing the choice of a foundation

2.0 Site Investigation (5 hrs)

- 2.1 Objectives, stages and methods of site investigation
- 2.2 Sampling of soils, samplers, sample area
- 2.3 Field measurement of consistency and relative density
- 2.4 Plate loads test and In-situ permeability test
- 2.5 Ground water observation
- 2.6 Bore Hole logs
- 2.7 Preservation, transportation and storage of samples
- 2.8 Laboratory tests on soils
- 2.9 Preparation of site investigation reports

3.0 Earth pressure and Retaining Structures (9 hrs)

- 3.1 Types of earth pressure
- 3.2 Steady state equilibrium and earth pressure at elastic and plastic equilibrium
- 3.3 Active and passive conditions
- 3.4 Modified failure envelope of line
- 3.5 Rankine state of plastic equilibrium
- 3.6 Strains associated with Rankine's states
- 3.7 Local state of plastic equilibrium, deformation and boundary conditions
- 3.8 Rankine's earth pressure theory
- 3.9 Active earth pressure on cohesion less backfill
- 3.10 Active and passive earth pressure on backfill
- 3.11 Active thrust by trial wedges and limitations of the method
- 3.12 Influence of wall friction
- 3.13 Coulomb's earth pressure theory and its graphical solution
- 3.14 Limitations of Coulomb's wedge theory
- 3.15 Selection of soil parameters for earth pressure computations
- 3.16 Stability analysis of an earth retaining structure

- 4.0 Bearing capacity and Settlement of Shallow Foundations (6 hrs)**
- 4.1 Types of failures
 - 4.2 Types of bearing capacity, and influencing factors
 - 4.3 Panker, Ranking and Bells theories
 - 4.4 Modes of foundation failure
 - 4.5 Pandlt's theory
 - 4.6 Terzaghi's general bearing capacity theory
 - 4.7 Extension of Terzaghi's theory
 - 4.8 Introduction to recent bearing capacity theories
 - 4.9 Ultimate bearing capacity of cohesion less and cohesive soils
 - 4.10 Effects of various factors on bearing capacity
 - 4.11 Types of settlement and relationship
 - 4.12 Limitations of the methods for predicting settlement
 - 4.13 Bearing capacity from In-situ tests
- 5.0 Design of Spread foundation (3 hrs)**
- 5.1 Common types of spread footings and their uses
 - 5.2 Depth of footings
 - 5.3 Design procedure
 - 5.4 Bearing capacity and settlement of spread footings
 - 5.5 Permissible settlement
 - 5.6 Proportioning of spread footing for uniform settlement
 - 5.7 Stresses on lower strata
 - 5.8 Design of spread footings on firm soil above soft layers
 - 5.9 Construction of spread footing
- 6.0 Mat Foundations (3 hrs)**
- 6.1 Types of mat foundation and their uses
 - 6.2 Bearing capacity and settlement of mat foundation
 - 6.3 Design of mat foundation in sand and clay
 - 6.4 Construction of mat foundations
- 7.0 Pile Foundation (6 hrs)**
- 7.1 Types of piles, advantages and disadvantages
 - 7.2 Classification of piles and their selection
 - 7.3 Soil-pile interaction
 - 7.4 Carrying capacity of piles in clay and sand
 - 7.5 Pile driving formulae
 - 7.6 Group action of pile
 - 7.7 Bearing capacity and settlement of pile group
 - 7.8 Negative skin friction
 - 7.9 Piles resisting uplift
 - 7.10 Piles resistance under the action of inclined loading
 - 7.11 Pile load test
 - 7.12 Construction of pile foundation
 - 7.13 Damage, alignment and effect of pile driving

8.0 Pier Foundations (2 hrs)

- 8.1 Function of piers and their types
- 8.2 Bearing capacity and settlement of piers
- 8.3 Skin friction on pier shafts
- 8.4 Design of piers in sand and clay
- 8.5 Construction of pier foundations

9.0 Well or caisson Foundation (2 hrs)

- 9.1 Use of caisson foundation and their types
- 9.2 Bearing capacity of caissons in sand and clay
- 9.3 Design of caissons
- 9.4 Sinking of caissons

10.0 Sheet piles and coffer Dams (5 hrs)

- 10.1 Common types of sheet piles and their uses
- 10.2 Classification of sheet piled walls
- 10.3 Design of Cantilever and Anchored sheet piled walls
- 10.4 Construction of sheet piled walls
- 10.5 Common types of coffer dams and their uses
- 10.6 Design of braced coffer dams
- 10.7 Construction of braced coffer dams

11.0 Geo-technical processes (2 hrs)

- 11.1 Ground water in excavation and methods of its control
- 11.2 Foundation stabilisation and underpinning

Field Visit:

One day local site visit based on site investigation.

References:

1. "Soil Mechanics and Foundation Engineering", K.R. Arora, CBS Publishers and Distributors, New Delhi, 1988.
2. "Soil Mechanics in Engineering practice", Terzaghi, K and Peck, R.B. John Wiley, 2nd Edition, New York, 1967.
3. "Foundation Engineering" B.M. Das.