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BT-5 / D–16
GEOTECHNOLOGY–I
Paper–CE-307 E

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *(i) Attempt five questions in all, selecting at least one question from each unit.*

(ii) Assume missing data, if any, suitably.

Unit–I

1. (a) What is the purpose of Sub-Soil exploration ? How is the depth and no. of bore-holes decided for Various Civil Engineering Projects ? 10

   (b) List the various sounding methods adopted in sub-soil exploration. Discuss briefly SCPT. 10

2. List the various methods of drainage and dewatering adopted for lowering water level in Foundation Trenches. Explain :

   Ditches and Sumps, Vacuum Method and Shallow well system of Drainage. 20

Unit–II

3. (a) Describe the three modes of Shear failure of Soils under loads. 10

   (b) Write Terzaghi's Ultimate Bearing Capacity equation for a Strip Footing. How is safe bearing capacity determined? 5

   (c) Discuss Skempton's formula for determining the Bearing capacity of clays. 5

4. Discuss briefly the following :

   (a) Settlement calculations – Elastic and Consolidation Settlements.

   (b) Depth of foundation.

   (c) Bearing capacity determination for Shallow foundations from Penetration Tests.

   (d) Floating Foundations. 5,5,5,5

Unit–III

5. (a) When are Pile foundations necessary to install rather than Shallow Foundations ? 4

   (b) Discuss Static analysis for the determination of allowable bearing capacity of a Pile in Sand. 8

   (c) Determine the allowable load on a Pile 9 m long of 40 cm uniform dia in a stiff clay with the following properties :

   Unit wt of soil = $2 g/cm^3$

   Undrained Cohesion, Cu = $0.5 kg/cm^2$,

   Nc = 9, Adhesion Coeff $\alpha = 0.6$ 8

6. Describe the following :

   (a) Under-reamed piles

   (b) Pile group capacity determination. 10,10

Unit–IV

7. (a) Explain with sketches the various types of drilled Piers and their construction procedure. 10

   (b) How is the depth of a well foundation in a river decided ? 10

8. Describe the following :

   (a) Rectification of Tilts and Shifts during sinking of a well foundation.

   (b) Various Types of Caissons with sketches. 10,10

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BT-5/D09 **8572**

GEOTECHNOLOGY-I

(2006-07)

Paper : CE-307(E)

Time : Three Hours] [Maximum Marks : 100

Note : (i) Attempt *five* questions in all, selecting at least *one* question from each Unit.

(ii) Assume any missing data suitably.

UNIT–I

1. (a) List the various methods employed for Boring and Drilling. Explain Wash boring technique? 10

   (b) What do you understand by the following sounding methods of exploration, SCPT, DCPT and SPT? 10

2. List the various methods of Dewatering for deep trenches and explain the following :

   (a) Ditches and Sumps.

   (b) Electro-osmosis method. 10,10

UNIT–II

3. Discuss briefly Terzaghi's theory of Ultimate bearing capacity, mentioning the various assumptions in the theory. How are the shape factor and water table factor considered in the equation? 20

4. What do you understand by Consolidation settlement? How is it determined for various types of saturated clays? How would you dercrmine allowable bearing pressure for a shallow footing based on settlement considerations? 20

UNIT–III

5. (a) Discuss 'Engineering News Formula' and Hiley's method for estimating allowable load on piles. 10

(b) A 400 mm diameter concrete pile is driven in a normally consolidated clay deposit 12 m thick. Estimate the allowable load. Assume c = 60 kN/m^2, α = 0.8 and factor of safety = 3. 10

6. What do you understand by Group action in piles? Describe various methods of finding allowable load on a group of piles. 20

UNIT–IV

7. (a) How is allowable bearing pressure of a Well foundation calculated? Write equation as given by Indian standard for determining allowable bearing pressure of a well foundation in cohesionless soils. 10

(b) How is bearing capacity of a Drilled pier determined? 10

8. Describe Terzaghi's analysis for checking lateral stability of Well foundations. 20

GEOTECHNOLOGY

Paper–CE-307-E

Time allowed : 3 hours] *[Maximum marks : 100*

Note : *(i) Attempt five questions in all, selecting at least one question from each unit.*

(ii) Assume any missing data suitably.

Unit–I

1. (a) What are various methods for boring and drilling ? Explain percussion drilling technique. 10

(b) What do you understand by Standard Penetration Test ? Describe its procedure. 10

2. Describe the following : 10,10

(a) Pressure-meter test

(b) Vacuum method of drainage.

Unit–II

3. Describe IS Code procedure for determination of Ultimate Bearing Capacity. How are the shape factors, depth factors, inclination factors and water table factor considered in the equation ? What are the modifications proposed to account for local shear failure and transition cases ? 20

4. What do you understand by consolidation settlement ? How is it determined for various types of saturated clays ? How would you determine allowable bearing pressure for a shallow footing based on settlement consideration ? 20

Unit–III

5. (a) Explain cyclic pile load test. How would you separate point bearing resistance from skin frictional resistance with the help of cyclic pile load test ? 10

(b) Calculate allowable load capacity of a pile, 30 cm square, 12 m long, installed in medium sand with following properties : $\gamma = 1.6$ gm/cc, $\phi = 36°$ ($N_q = 43$, $N_\gamma = 40$), $k_s = 0.75$, FOS = 3. 10

6. What do you understand by group action in piles ? Describe various methods of finding allowable load on a group of piles. 20

Unit–IV

7. (a) What are the various types of caissons ? Discuss their relative advantages and disadvantages. 12

(b) What are the various advantages of well foundations over pile foundations ? 8

8. Describe Terzaghi's analysis for checking lateral stability of well foundations. 20

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GEOTECHNOLOGY–I

CE-307-E

Time : Three Hours] [Maximum Marks : 100

Note : Attempt *Five* questions in all, selecting at least *one* question from each Unit. All questions carry equal marks. Assume any missing data suitably.

Unit I

1. (a) How would you decide the depth and lateral extent of exploration for various Civil Engineering structures ? 12

   (b) What do you understand by :

   Undisturbed sample, representative disturbed sample, non-representative sample and area ratio. 8

2. Explain with sketches : 20

   (a) Electro-osmosis method of drainage

   (b) Consolidation of soft saturated clays by sand piles.

P.T.O.

3. (a) Describe various modes of shear failure. 10

(b) Explain the following : 10

(i) Skempton's formula for bearing capacity.

(ii) Meyerhof's method to account for eccentricity of loading.

4. Explain plate load test. How would you interpret the results of plate load test for the design of shallow foundations ? What are the limitations of the test ? 20

Unit III

5. (a) Calculate ultimate load capacity of a pile, 45 cm diameter, 10 m long, installed in medium clay with c = 0.5 kg/cm^2 and adhesion factor (α) = 0.7. 12

(b) What is Negative Skin Friction ? Explain. 8

6. Describe any *two* of the following : 10+10

(a) Classification of piles

(b) Settlement analysis of pile group

(c) Lateral load capacity of a pile.

Unit IV

7. (a) How is the depth of well foundation decided ? **10**

(b) Explain Terzaghi's analysis of free rigid bulkhead for checking lateral stability of a light well. **10**

8. What are tilts and shifts as related to well foundations ? What are various causes and methods of rectification of tilts and shifts ? **20**

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BT-5/D-13

GEOTECHNOLOGY-I

Paper-CE-307-E

Time allowed : 3 hours] *[Maximum marks : 100*

Note : Attempt five questions in all, Selecting at least one question from each unit. Assume missing data, if any, suitably.

Unit-I

1. What do you understand by SPT ? Discuss in detail the method of Conducting the test and the various Corrections applied to observed SPT value. Also discuss the various applications of SPT value. 20

2. List the various methods of Drainage and Dewatering of Foundation Trenches and also describe the following methods :

   (a) Ditches and sumps

   (b) Well Point system

   (c) Electro-Osmosis 20

Unit-II

3. (a) Explain the following terms :

   (i) Ultimate Bearing capacity

   (ii) Net Ultimate Bearing Capacity

   (iii) Net safe bearing capacity

   (iv) Allowable bearing pressure. 10

(b) A Square footing of size 3 m × 3m rests at a depth of 2.0 m. The water table is at a depth of 3.0 m below ground level. $C = 4T/m^2$, $\phi = 35°$, unit weight of soil is 1.8 T/m^3. Determine the net allowable bearing capacity. Assume a Factor of safety = 2.5

(For $\phi = 35°$, assume Nc = 46, Nq = 33 and Nr = 48) 10

4. (a) What are the various causes of settlement ? How would you estimate the consolidation settlement of a shallow foundation on cohesive soil ? 12

(b) Write an explanatory note on Footings on slopes. 8

Unit-III

5. (a) How is Load capacity of piles determined based on Dynamic Tests ? Also discuss the limitations of these tests. 10

(b) A 30 cm dia, 10 m long pile is driven in a deposit of loose sand. Tests indicate the angle of interval friction of sand as 30° and unit weight = 1.65 T/m^3. Compute the ultimate Bearing Capacity of the Pile. Take Nq = 30, K = 0.5 and $\delta = 20°$. 10

6. Describe the following :

(a) Negative Skin Friction of a Pile Group. 10

(b) Settlement Analysis of a Pile Group in sands and clays. 10

Unit-IV

7. Discuss the various types of Drilled piers with sketches. How is Bearing capacity of Drilled Piers in cohesive and Non-Cohesive Soils determined ? 8,12

8. How is Depth of well Foundation determined ? Describe one method of analysing the lateral stability of a well foundation. 8,12

Printed Pages : 3

BT–5/D12

GEOTECHNOLOGY–I

Paper–CE-307-E

Time allowed : 3 hours] *[Maximum marks : 100*

Note : Attempt five questions in all selecting at least one question from each unit. Assume missing data, if any, suitably.

Unit–I

1. (a) For soil exploration purposes, what are the guide lines for depth and spacing of bore holes for various Civil Engineering Structures ? 12

   (b) What do you understand by the following :

   (i) Representative and Non-representative disturbed soil samples.

   (ii) Undisturbed Soil Samples. 8

2. How is Drainage and Dewatering of sub-soils carried out ? Discuss the various methods of drainage and the depth upto which the water table can be carried out by each method. 20

Unit–II

3. (a) Discuss the assumptions made by Terzaghi in deriving the equation for ultimate Bearing Capacity of a Strip Footing. Evaluate the Gross and Net Safe

bearing capacity of a soil with the following data :

Size of Foundation = 1.5 m × 1.5 m (square)

Depth of Foundation = 1.2 m

Unit Weight of Soil = 1.8 g/cm^3

Undrained Cohesion of Soil = 0.8 kg/cm^2

Assume $\phi_u = 0$ 15

(b) Discuss the effect of water table on bearing capacity. 5

4. (a) Describe a Plate load Test. Discuss the various interpretations from the Plate load test, leading to the determination of allowable bearing pressure from settlement considerations for sands and clays. 10

(b) How is depth of foundation decided ? Discuss the various factors affecting the depth of foundation. 10

Unit–III

5. (a) How would you estimate the load carrying capacity of a pile in cohesionless soils by using static method ? 12

(b) Discuss briefly the following :

(i) Necessity of Pile Foundation.

(ii) Negative Skin Friction. 8

6. How is Pile Group capacity in clays and sands determined ? 20

Unit–IV

7. What is a Drilled Pier ? Discuss the advantages of Drilled Piers over other types of foundations. How is the Bearing capacity of a Drilled Pier in Cohesive Soils determined ? Also discuss one method of constructing a Drilled Pier. 20

8. Describe the following with sketches :

   (a) Components of a Well Foundation.

   (b) Rectification of Tiles and Shifts in a well foundation. 10,10

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CE - 307 - E / 2/2 : Geo Technology - I

Time : Three Hours | Maximum Marks : 100

Note:- Attempt Five questions in all, selecting at least one question from each unit. Assume any missing Data suitably.

UNIT - I

Q.1. a) List the various Geophysical methods used for soil exploration. Describe seismic method. 16

b) A Sampler has an area ratio of 7.5% while another has 14%. Which of these samples would you prefer for undisturbed sampling and why? 4

Q.2 Describe the following methods of Dewatering of Excavations below water table:

a) Well Point system.

b) Electro-Osmosis 20

UNIT - II

Q.3 (a) Discuss the effect of the following on Bearing capacity of shallow Foundations:

i) Ground water Table and

ii) Eccentric Load.

(b) What is the safe bearing capacity of a square footing 1.2m x 1.2m resting on ground surface (Saturated clay) clay has q_u = 2.2kg/cm², r = 1.8 g/cm³ (Assume ϕ =0)

Contd.

Q.4 a) What is the object of conducting a plate load test? Describe the procedure of determining the Ultimate bearing capacity of soil for a shallow foundation by using plate load test. 12

b) Describe briefly as to how the depth of a shallow footing decided. 8

UNIT - III

Q.5 How is Load carrying capacity of a single pile in Non-cohesive soil determine?

(a) By static formula

(b) By pile driving formula for determing allowable bearing capacity. 20

Q.6 or Explain the following in details:

(a) Group action in piles.

(b) Negative skin friction of pile group.

UNIT – IV

Q.7 (a) Discuss the various considerations for deciding the depth of well foundation. 10

(b) How is Bearing capacity of a well foundation determined? Discuss IS code method for determining allowable Bearing pressure in cohesionless soil. 10

Q.8 Write short notes on:-

(a) Rectification of Tilts & shifts in a well foundation.

(b) Lateral stability analysis of a well foundation. 10+10

BT-5/DX

GEO TECHNOLOGY–I (2006-07)

Paper : CE-307(E)

Time : Three Hours] [Maximum Marks : 100

Note : (i) Attempt *five* questions in all, selecting at least *one* question from each unit. All questions carry equal marks.

(ii) Assume any missing data suitably.

UNIT–I

1. (a) How is the depth and lateral extent of exploration decided for various Civil Engineering structures? 12

   (b) What do you understand by :

   Undisturbed sample, representative disturbed sample, non-representative sample and area ratio. 8

2. Explain with sketches :

   (a) Vacuum method of drainage.

   (b) Consolidation of soft saturated clays by sand piles. 20

UNIT–II

3. (a) Describe with sketches various modes of shear failure. 10

   (b) Explain :

   (i) Skempton's formula and in what type of soils is it recommended?

   (ii) Effect of eccentricity on bearing capacity. 10

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4. (a) How is the plate load test conducted to find the allowable bearing pressure for a shallow foundation? Discuss the limitations of the test. 12

(b) How is the depth of foundation decided? 8

UNIT–III

5. (a) A 300 mm square pile 12 m long is driven in a deposit of sand with $\phi = 35°$ (For $\phi = 35°$, assume $N_q = 40$, $N_\gamma = 32$). The unit weight of sand is 16 kN/m^2. What is the allowable load, assuming a factor of safety = 3 and lateral earth pressure co-efficient = 0.6. 15

(b) What is Negative skin friction? Explain. 5

6. Describe any *two* of the following :

(a) Design of pile caps.

(b) Uplift resistance of pile groups.

(c) Allowable bearing pressure of pile group. 10,10

UNIT–IV

7. (a) How is the depth of Well foundation decided? 10

(b) Describe one method of analyzing lateral stability of well foundations. 10

8. What are the precautions to be cared for during sinking of wells? How are tilts and shifts of wells rectified? Discuss various methods. 20