**QUESTION BANK**

**Semester** : VI sem. (Civil Engg.)

**Subject** : Geotechnical Engineering – II

**UNIT-I :- Geotechnical Exploration**

Q.1. What is the importance and objectives of field exploration? (05)

Q.2. Enlist type of soil sample. (03)

Q.4. Mention the requirement of good sampler with respect to its Area ratio,

Inside clearance and recovery ratio. (05)

Q.5. Explain various methods of BORING methods. Explain any one with a

neat sketch. (07)

Q.6. Explain Geophysical method of soil exploration. And its limitations. (07)

Q.7. Explain ‘split spoon sampler’ and its use (05)

Q.8. Explain in brief SPT with its correction. (05)

Q.9. List out the current method of soil exploration as per I.S. code. (07)

Q.10. Explain the following terms:-

Representative and non representative samples, disturbed and un-disturbed

Sample. (07)

**UNIT – II :- Stability of slopes**

Q.1. What are the types and causes of slope failure. (06)

Q.2. Explain the method of FELLINIOUS method for locating critical slip

Circle. (07)

Q.3. Derive the relation for factor of safety of an infinite slope made of cohesion

less soil subjected to seepage parallel to the slope. (07)

Q.4. Write a short note on Taylor’s Stability Number. (05)

Q.5. Explain friction circle method of slope stability analysis. (07)

Q.6. Write a short note on methods of improving stability if slope. (06)

Q.7. Find the factor of safety of a slope of infinite extend having C’ = 30kN/m2

’ =200 , e = 0.65, G = 2.7. under the following conditions

1. When soil is dry
2. When slope is submerged

The angle of slope α =250 (07)

Q.8. Determine the FOS of an embankment by method of slices. If the slope is

(1.5 : 1) (H:V) and the height is 12m. The value of C and are 40kN/m2 and 250 resp. and r = 19kN/m3. Assume αA = 260 and αB = 350

Q.9. Earth dam is as shown in fig. Find factor of safety against sliding

H

i

i = 45o

H = 12m

C’ = 26.80 kN/m2

’ = 200

rb = 10.8 kN/m3

Sn = 0.11 for m = 100

Sn = 0.105 for m = 110

Sn = 0.10 for m = 120

**UNIT – IV: (Earth Pressure Theories)**

Q.1. A soil is having properties: -

Cohesion (C) = 9 kN/m2

Angle of Internal friction (Ø) = 200

Unit weight (γ) = 18 kN/m3

Calculate the critical depth of vertical excavation that can be made in the soil without any lateral support. The ground carries a surcharge load of 3 kN/m2  (06)

Q.2 (a) Explain:-

(1) Active Earth Pressure,

(2) Passive Earth Pressure,

(3) Earth Pressure at rest

Q.3 Derive Ball’s equation for calculation active Earth pressure For a cohesive

soil. (06)

Q.3. A retaining wall has the following Data:-

1. Height of wall = 8m,

ii) Wall friction = 100

iii) Surchrge Angle = 100

iv) +ve Batter Angle of wall = 80

v) Angle of internal friction = 300

vi) Unit weight of Backfill = 19kN/m3

Using REBHAN’s method, find the total active Earth pressure per meter. (06)

Q.4. State the assumptions made in Ranking and Coulomb’s earth pressure. (06)

Q.5. Explain in brief Rebhann’s method for active pressure when β ≠ Ø. (07)

Q.6. Give the critical comparison of coulomb and Rankine earth pressure

Theory, mentioning the assumptions in both the theories. (06)

Q.7. A two layer cohesive horizontal backfill is supported by a 10m high

Vertical smooth wall. Determine the Rankine active force per meter

Length of the wall before and after tensile crack occure in top layer.

Also determine the line of action of resultant in both cases.

The details of soil layer are given below:-

0-5 m Top layer

C1 =12km/m2

Ф1 = 00

γ1 =19 km/m3.

5-10m Bottom layer

C2 = 32kN/m2

Ф2  = 100

γ2 = 20 kN/m3.

Q.8. A 5m high masonry retaining wall has to retain a backfill of sandy soil

Having unit weight 18·2 kN/m3 and ф = 320. The surface of the backfill

Is inclined at an angle of 100 to the horizontal. Determine the magnitude

and point of application of the active thrust. (06)

Q.9. Describe Culmanns Graphical method for determine active earth pressure.

Q.10. A retaining wall, 8m high with a smooth vertical back, with C’= 15 kN/m2,

Ø’ = 150 and γ = 18 kN/m3. Calculate the total active thrust on the wall

Assuming that tension cracks may develop to full theoretical depth. (07)

**UNIT- IV :- (Ground Improvement Technique)**

Q.1 Explain the basic concepts of reinforced earth. (07)

Q.2 Explain the vibraflotation method for ground improvement. (07)

Q.3. Explain pre-loading. (06)

Q.4. Explain geosynthetic materials and its application in Civil Engineering. (06)

Q.5. Explain the term mechanical and chemical stabilization. (06)

Q.6. Explain with suitable sketch, sand drain and their uses. (06)

**UNIT- IV:- (Bearing Capacity)**

Q.1 Enlist the assumptions of Terzaghi’s bearing capacity equation and

Comment on it’s limitation (06)

Q.2. Explain :-

i) Local shear failure

ii) General shear failure

What are the points used to differentiate between them? (07)

Q.3. Explain plate load test with limitations. (06)

Q.4. Explain effect of water table on bearing capacity of soil (05)

Q.5. Discuss the various modes of shear failure of a shallow foundation (05)

Q.6. Differentiate between local and general shear failure in foundation soils. (07)

Q.7 A square footing 1.3 m X 1.3 m is to be founded at a depth 1.2 m below

G.L. The soil properties are :-

C = 20 kN/m2 , Ø = 220 , γ = 18 kN/ m3, γsat = 20 kN/ m3

Local shear failure is expected to occure at the site. Determine :

1. Net ultimate B.C. without water table effect.
2. Change in the net ultimate B.C. if the water table rises 0.5m above foundation level.

The Bearing capacity factors are:-

|  |  |  |  |
| --- | --- | --- | --- |
| Ø | Nc | Nq | N γ |
| 10 | 9.6 | 2.7 | 1.2 |
| 15 | 12.9 | 4.4 | 2.5 |
| 20 | 17.7 | 7.4 | 5.0 |
| 25 | 25.1 | 12.7 | 9.7 |

Q.8. Following data is obtained from plate load test carried out on a silty sand

stratum with a plate of 30cm X 30cm size:

|  |  |
| --- | --- |
| Load Intensity (kN/m2) | Settlement (mm) |
| 40 | 2 |
| 80 | 5 |
| 120 | 9 |
| 160 | 14 |
| 200 | 20 |
| 240 | 30 |

Plot the ‘load settlement’ Curve and answer the following :-

1. Type of shear failure of foundation soil,
2. Ultimate bearing capacity,
3. Safe bearing capacity with FOS as 3,
4. Settlement of foundation (square footing of 1.2m X 1.2m size)

At safe bearing capacity. (13)

Q.9. A square plate of size 30cm X 30cm settled by 8mm in a plate test

conducted at a site of silty sand and the load intensity of 160kN/m2.

Estimate the settlement of the square footing at size 1.5m X 1.5m Under

the same load intensity. (05)

**UNIT –VI:- (Pile Foundation)**

Q.1 Discuss the various method of classification of piles (06)

Q.2. Explain with neat sketch under reamed pile and their uses

Q.3. Explain the limitations of ‘Dynamic Formulae’.

Q.4. Explain group action of piles. (03)

Q.5 Explain plate load test and its limitations. (06)

Q.6. What are the various causes of negative skin friction ? How it can be

Estimated. (06)

Q.7. Write short note on :

i) Compaction pile.

ii) Group efficiency of pile.

iii) Under reamed pile foundation.

iv) Causes of settlements.

Q.8. On a project a pile was subjected to various load increments. Load and

settlement data was observed and given below :-

|  |  |
| --- | --- |
| Load (kN) | Settlement (mm) |
| 0 | 0 |
| 300 | 4.5 |
| 550 | 5.5 |
| 800 | 9.5 |
| 1050 | 14 |
| 1300 | 21.3 |
| 1550 | 30.0 |

The desired pile load was 600kN. Determine the adequacy of the test pile.

Also mention the criteria adopted to specify the adequacy. (05)

Q.9. A concrete pile of diameter 200mm is to be constructed in a cohesive soil

of stiff consistency with UCS of 180 kN/m2. Determine the length of pile

to carry the safe load of 100kN with a F.O.S. of 2. Adhesion factor = 0.5 (05)

Q.10. A n-pile group has to be proportioned in a uniform pattern in a soft clay

with equal spacing in all directions. Assuming any value of cohesion,

Determine the optimum value of spacing of pile in the group. Take n = 25

And mm = 0.7 (07)

Q.11. A concrete pile 40 cm X 40 cm section and 20m long is driven by drop

hammer having a weight of 40 kN and falling through a height of 1.2m.

The average penetration under last 10 blows equal to 6mm per blow. The efficiency of hammer = 100%, the coefficient of restitution is 0.4 the total

elastic compression 25mm. Using Hilley’s formula determine :

1. Ultimate load on pile (Qf)
2. The set to which the pile should be driven under the above condition

if Qf desired 1600 kN. (06)

Q.12. 200mm diameter, 8m long pile are used for foundation a uniform deposit

of medium clay having qu = 100 kN/m2. The spacing between piles is

500mm. There are q piles in a square pattern.. Calculate ultimate pile load

capacity of group. Assume adhesion factor as 0.9 (08)