[Total No. of Questions - 9] [Total No. of Printed Pages - 3]

May-25-0364

CE-503 (Geotechnical Engineering-II)

B.Tech. 5th (CBCS)

Time : 3 Hours **Max. Marks : 60**

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt Five questions in all, selecting one question each from section A, B, C and D. Section E is compulsory. Unless stated otherwise, the symbols have their usual meanings in context with the subject. Assume suitably and state, additional data required or missing, if any.

SECTION - A

1. (a) What is site investigation? Explain the different purposes of site investigations. (5)

   (b) What are the stages of sub-surface explorations? (5)

2. (a) What are the disturbed or undisturbed soil samples? Explain the factors that make undisturbed samples hard to obtain. (5)

   (b) Explain the Electrical Resistivity Method. (5)

SECTION - B

3. Construct Culmann's curve for passive earth pressure conditions. Also, illustrate the design steps for constructing the same. Comment on the difference in the shape of Culmann's curve for active and passive conditions. (2+5+3=10)

4. (a) A retaining wall 4.5 m high with a vertical back supports a horizontal fill weighing 18.60 kN/m^3 and having $\phi = 32°$, $\delta = 20°$, and $c = 0$. Determine the total active thrust on the wall by Culmann's graphical method. (5)

(b) Define earth pressure at rest. Show the earth pressure distribution on the retaining wall, assuming the soil is dry. (5)

SECTION - C

5. A strip footing 2.5 m wide carries a load intensity of 450 kN/ m^2 at a depth of 1.4 m in sand. The saturated unit weight of sand is 19.5 kN/m^3 and the unit weight above water table is 16.8 kN/m^3. The shear strength parameters are c= 0 and $\phi = 35°$ ($N_q = 41.4$, $N_\gamma = 42.4$). Determine factor of safety with respect to shear failure for the following cases of location of water table:

   (a) Water table is 0.6 m below the G.L.

   (b) Water table is 3.9 m below the G.L.

   (c) Water table is at G.L itself. (4+4+2=10)

6. (a) What happens if the plate load test is performed in non-homogeneous soil? Explain with an example. (5)

   (b) Why plate load test is not very relevant for clayey soils? (5)

SECTION - D

7. (a) A square group of 9 piles was driven into soft clay extending to a large depth. The diameter and length of the piles were 30 cm and 9 m respectively. If the cu = 45 kN/m^2, γ = 20 kN/m^2 and the pile spacing is 90cm from center to center, what is the capacity of the group? Assume a factor of safety of 2.5 and an adhesion factor of 0.75. (5)

   (b) Discuss how will you determine the settlement of a pile group in clay with a neat diagram. (5)

8. What are collapsible soils? How the collapsible soils can be identified? If the collapsible soils are susceptible to wetting to a depth greater than 1.5 m then what are the methods to be adopted to avoid foundation failure? Explain in detail. (10)

SECTION - E (Compulsory)

9. (a) Explain vibro-flotation technique.

(b) Explain the term swelling potential and swelling pressure.

(c) Differentiate net safe bearing capacity from net ultimate bearing capacity.

(d) Compute the area ratio of a thin-walled tube samples having an external diameter of 6 cm and a wall thickness of 2.25mm. Do you recommend the sampler for obtaining undisturbed soil samples and explain the reason in support?

(e) Explain any two types of retaining walls with diagrams.

(f) A SPT is conducted in fine sand below the water table and a value of 25 is obtained for N. Compute the corrected value of N.

(g) Derive the relationship between dry unit weight and liquid limit for collapsible soil.

(h) Recommend suitable values for angle of internal friction and relative density for local and general shear failure conditions.

(i) What is negative skin friction?

(j) What are the assumptions of Terzaghi's bearing capacity theory? (10×2=20)