Code: 9A01703 **R09**

B.Tech IV Year I Semester (R09) Supplementary Examinations June 2016

GEOTECHNICAL ENGINEERING – II

(Civil Engineering)

Time: 3 hours Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) List the different methods of soil exploration. Explain any one method with a neat sketch.
(b) Define Area ratio, recovery ratio, inside clearance and outside clearance. What should be the values of these parameters for getting an undistributed sample of soil?

2 (a) Derive the formula for factor of safety against failure of an infinite slope in a cohesive soil under steady seepage condition.
(b) Determine the factor of safety of a soil of height 7 m, with a 1:1 slope, given the soil properties C = 15 kPa, $\phi = 0\ and\ \gamma = 17.5\ kN/m^3$. The critical slip circle passes through the toe and its centre is located using Felleneous angles $\alpha = 35°\ and\ \beta = 26°$.

3 (a) Derive the formulae for the various Rankine's coefficients of earth pressure for a sandy backfill in terms of angle of internal friction.
(b) A retaining wall is 7.5 meter in height with back surface inclined at $12°$ w.r.t vertical. The surface of backfill is inclined at 5° w.r.t horizontal. If the backfill soil has $\phi = 20°,\ \delta = 10°\ and\ \gamma = 16.5\ kN/m^3$, calculate the total active earth pressure on the wall using Culmann's graphical method. Show its point of action and direction with a small sketch.

4 (a) How do you check the stability of a retaining wall? If it is not safe, what are the corrective measures you should adopt to make it safe?
(b) Check the stability of the retaining wall mentioned in Q.3b, if the top width of the wall is 600 mm and base width is 2 m. The base of retaining wall is 1.5 m below ground level. The wall is made of stone masonry with $\gamma = 19.5\ kN/m^3$.

5 (a) Differentiate between local shear failure and general shear failure of foundations with neat sketches.
(b) Calculate the safety of a rectangular footing 1.5 m × 2 m which has to support a load of 1800 kN at a depth of footing = 1.2 m in a clayey soil with C = 10 kPa, $\phi = 35°\ and\ \gamma = 17\ kN/m^3$. The B.C factors are 57.8, 41.1 and 42.4. If it is having F < 2, redesign the footing.

6 (a) Explain the method of determining the safe bearing capacity of a sandy soil and the expected settlement of a 2 m square footing using the plate load test results where 45 cm plate is used.
(b) A square footing of sides 1.5 m is located at a depth of 1.5 m below ground level. The soil above the base of footing is sandy with $\gamma = 16\ kN/m^3$, the soil below the base is saturated clay with C_C = 0.24, e_0 = 0.78 up to 4 m below ground level. If the column load is 800 kN, calculate the expected consolidation settlement.

7 (a) With a neat sketch, explain briefly the cyclic pile load test.
(b) Calculate the total safe load that can be carried by a 6-pile group in a sandy soil with the following data: Pile diameter is 400 mm, 10 m long and spacing of piles is 2.5d. The surrounding soil has $\phi = 20°,\ \delta = 15°\ and\ \gamma = 16\ kN/m^3$. Use lateral earth pressure coefficient K = 1.5.

8 (a) What are the various forces to be considered while designing a well foundation?
(b) Write the formulae used for calculating the thickness of steining and bottom plug thickness.
(c) How do you calculate the bearing capacity of a well foundation: (i) in sands. (ii) in clays.

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