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Question Paper Code: 1035340

B.E. / B.Tech. DEGREE EXAMINATIONS, NOV/ DEC 2024

Fifth Semester

Civil Engineering

U20CE505 – GEOTECHNICAL ENGINEERING - II

(Regulation 2020)

Time: Three Hours

Maximum: 100 Marks

Answer ALL questions

PART – A

(10 x 2 = 20 Marks)

1. Find out the area ratio of a soil sampler with 51mm and 48mm outer and inner diameters respectively.
2. Summarize the uses of a bore log report.
3. Compare safe bearing capacity and ultimate bearing capacity.
4. List out the different methods used for minimizing settlement.
5. What is spread footing?
6. Draw the contact pressure distribution diagram below rigid footing resting on clay and sand.
7. Outline the factors governing the selection of piles.
8. State Feld's rule for determining the group capacity of pile groups.
9. Compare active and passive earth pressure.
10. How do you check the stability of the retaining wall?

PART – B

(5 x 16 = 80 Marks)

11. (a) (i) Define site exploration. Write a note on geophysical methods of site exploration with a neat sketch. (8)  
(ii) List out the different types of soil samplers and explain any two types of soil samplers. (8)

(OR)

- (b) (i) Why SPT 'N' values recorded in sand at different depths are corrected for overburden and submergence? How are the corrections applied? (10)  
(ii) Write a detailed note on the selection of foundation based on soil condition. (6)

12. (a) A strip footing 2m wide carries a load intensity of 400 kN/m<sup>2</sup> at a depth of 1.2m in sand. The saturated unit weight of sand is 19.5 kN/m<sup>3</sup> and the unit weight above the water table is 16.8 kN/m<sup>3</sup>. The shear strength parameters are  $c = 0$  and  $\phi = 35^\circ$ . Calculate the factor of safety concerning shear failure for the following cases of the location of the water table. (1) Water table is 4m below G.L. (2) Water table is 1.2m below G.L. (3) Water table is 2.5m below G.L. (16)

(OR)

- (b) (i) Develop the procedure of plate load test to determine the bearing capacity of soil. (10)  
(ii) Construct the causes of total and differential settlement. (6)

13. (a) Discuss briefly the various types of shallow foundation with simple sketches and under what circumstances these foundation types are preferred? (16)

(OR)

- (b) Proportion a strap footing for the following data. The allowable pressure is 150 kN/m<sup>2</sup> for DL + reduced LL and 225 kN/m<sup>2</sup> for DL + LL. Proportion the footing for uniform pressure under DL + reduced LL. Distance of C/C of column = 5.4m; projection beyond column A not to exceed 0.5m. The column loads are given below. (16)

Column Loads	Column A	Column B
DL	500 kN	600 kN
LL	450 kN	800 kN

14. (a) Categorize the different types of piles based on the function and material composition with neat sketches. (16)

(OR)

- (b) A square group of 25 piles extends between depth of 2m and 12m in a deposit of 20m thick clay overlying rock. The piles are 0.5m in diameter and are spaced at 1m centre to centre in the group. The undrained shear strength of the clay at the pile base level is 180 kPa and the average value of the undrained shear strength over the depth of the pile is 110 kPa. The adhesion coefficient ( $\alpha$ ) is 0.45. Analyze the capacity of the pile group considering an overall factor of safety equal to 3 against shear failure.  $N_c$  corresponding to  $\phi_u = 0$  is 9. (16)

15. (a) (i) Determine the intensities of active and passive earth pressure at a depth of 8 metres in dry cohesionless sand with an angle of internal friction  $30^\circ$  and a unit weight of  $18 \text{ kN/m}^3$ . What will be the intensities of active and passive earth pressure if the water level rises to the ground level? Take the saturated unit weight of sand as  $22 \text{ kN/m}^3$ . (8)
- (ii) Examine the Coulomb's wedge theory with a neat sketch. (8)

(OR)

- (b) Analyze the procedure of Culmann's graphical method for determining the lateral earth pressure with a neat diagram. (16)

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