



CBCS SCHEME

17CV53

Fifth Semester B.E. Degree Examination, Dec.2023/Jan.2024 Applied Geotechnical Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What is subsurface exploration? What are the objectives of soil exploration? (10 Marks)
- b. The inner diameter of a sampling tube and that of a cutting edge are 70mm and 68mm respectively, their outer diameters are 72mm and 74mm respectively. Determine the inside clearance, outside clearance and area ratio of the sampler. (10 Marks)

OR

- 2 a. Explain with sketch, electrical resistivity method of soil exploration. (10 Marks)
- b. What are the methods available for dewatering? Explain dewatering by well point system. (10 Marks)

Module-2

- 3 a. Compare Boussinesq's theory with Westergaard's theory with logical graph analysis. (10 Marks)
- b. A load of 1200kN acts as a point load at the surface of a soil mass. Determine the stress at a point 4m below and 3m away from the point of action of the load by Boussinesq's formula. Compare the value with the result from Westergaard's theory. Taking $m = 0$. (10 Marks)

OR

- 4 a. What are the types of settlement? Explain them with equations. (10 Marks)
- b. A layer of soft clay is 6m thick and lies under a newly constructed building. The weight of sand overlying the clay layer produces a pressure 260kN/m^2 and the new construction increases the pressure by 100kN/m^2 . If the compression index is 0.5, compute the settlement. Water content is 40% and specific gravity of grains is 2.65. (10 Marks)

Module-3

- 5 a. Define with a neat sketch at rest, active and passive earth pressure. (10 Marks)
- b. Explain Rebhan's graphical earth pressure theory with a neat sketch. (10 Marks)

OR

- 6 a. Explain the causes of slope failure and also list the type of modes of slope failure. (10 Marks)
- b. A canal is to be excavated to a depth of 6m below ground level through a soil having the following characteristics. $C = 15\text{kN/m}^2$, $\phi = 20^\circ$, $e = 0.9$ and $G = 2.67$. The slope of the banks is 1 in 1. Determine the factor of safety with respect to cohesion when the canal runs full. What will be the factor of safety if the canal is rapidly emptied completely? (10 Marks)

Module-4

- 7 a. Explain the method of determining bearing capacity of soil by using plate load test as per (IS : 6403) guidelines. (10 Marks)
- b. A circular footing is resting on a stiff saturated clay with $q_u = 250\text{kN/m}^2$. The depth of foundation is 2m. Determine the diameter of the footing if the column load is 600kN. Assume a factor of safety of 2.5. The bulk unit weight of soil is 20kN/m^3 and cohesion, $C = 20\text{kN/m}^2$, $N_c = 5.7$, $N_r = 1.0$, $N_r = 0$, $N_r = 0$. (10 Marks)

OR

- 8 a. Define safe bearing capacity, safe bearing pressure and allowable bearing pressure also write expressions for the same. (10 Marks)
- b. Determine the net ultimate bearing capacity of foundation is 1.0m. Use terzaghi theory and assume general shear failure. Take $\gamma = 18\text{kN/m}^3$, $\phi = 35^\circ$ and $C = 15\text{kN/m}^2$, $N_\gamma = 42.4$, $N_c = 57.8$, $N_q = 41.4$. (10 Marks)

CMRIT LIBRARY
BANGALORE - 560 037

Module-5

- 9 a. Classify the various type of piles based on material and function. (10 Marks)
- b. A group of 16 piles is arranged with a centre to centre spacing of 1.0m. The diameter and length of each pile are 0.5m and 9m respectively and the piles are embedded in soft clay with cohesion 30kN/m^2 . Bearing resistance at the tip of the piles may be neglected and taking adhesion factor, $\alpha = 0.6$, determine the ultimate load capacity of the pile group. (10 Marks)

OR

- 10 a. With a neat sketch, explain pile groups and efficiency of pile groups. (10 Marks)
- b. Justify with a neat sketch, how static formula summarize the load transfer mechanism in pile foundation. (10 Marks)

* * * * *