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10CV64

Sixth Semester B.E. Degree Examination, June/July 2018
Geo - Technical Engineering - II

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, selecting atleast TWO questions from each part.

PART - A

- 1 a. Define Representative and Undisturbed samples. Also explain area ratio with its recommended values. (06 Marks)
- b. What are the objectives of soil exploration? List and explain any one indirect method of soil exploration. (08 Marks)
- c. Estimate the position of ground water table from the following data obtained from the field. Depth upto which water is boiled out is 10.67m. Rise in water levels :
On first day 64cm , Second day 57.9cm and Third day 51.8cm. (06 Marks)
- 2 a. Write a note on : i) Isobar ii) Contact pressure iii) Newmark's chart. (09 Marks)
- b. Differentiate between Boussenesq's and Westergards theory of stresses in soils. (04 Marks)
- c. Plot the vertical pressure at a point center 1m, 2m 4m horizontally away from the axis of loading at a depth of 3m, for a point load of 25kN. Use Boussinesq's equation. (07 Marks)
- 3 a. What is Flownet? List the characteristics and use of flownets. (06 Marks)
- b. For a homogeneous earthen dam 52m height and 2m free board. The flownet has 22 potential lines and 5 flow channels. Calculate discharge per meter length of dam. The coefficient of permeability in X and Y directions are 8×10^{-5} m/s and 3.6×10^{-5} m/s respectively for earthen embankment. (04 Marks)
- c. An earthen dam has the following details. Top width 8m upstream slope 2.75H:1V and downstream slope 2.5 H:1V. Total height of dam 60m. The height of water stored 57.5m. Downstream filter 120m long. K for dam material 4×10^{-7} m/sec. Draw the phonic line and calculate the discharge through the dam. (10 Marks)
- 4 a. List the assumptions made in Rankine's earth pressure theory and explain active earth pressure and passive earth pressure. (06 Marks)
- b. Explain Cullman's graphical method of finding out the active earth pressure. (06 Marks)
- c. For retaining wall 8m height supports sandy back fill with $e = 0.6$, $G = 2.65$, $\phi = 30^{\circ}$. Water table is at a depth of 2m from ground surface. Draw active earth pressure diagram and find magnitude and point of application of total earth pressure. Assume soil above water table has a degree of saturation of 50%. (08 Marks)

PART - B

- 5 a. Define Finite Slope. What are the causes for failure of slopes? List various types of failure of slopes with sketches. (06 Marks)
- b. Explain the method of slice to determine the factor of safety against failure of finite slope. (08 Marks)
- c. An embankment is to be constructed with $C = 20\text{kN/m}^2$, $\phi = 20^{\circ}$, $\gamma = 18\text{kN/m}^3$, $F_s = 1.25$ and $H = 10\text{m}$. Estimate side slope required. Taylor's stability numbers are as follows for the slope number. (06 Marks)

Slope angle	60°	45°	30°	20°
Sn	0.097	0.062	0.025	0.005

Also determine factor of safety if side slope changes to IV : 2H.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.



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- 6 a. Write a note on : i) General shear failure ii) Local shear failure iii) Effect of water table on bearing capacity. (09 Marks)
- b. What are the assumptions made on Terzaghi's theory? Write the expressions for ultimate bearing capacity of strip footing, square and circular footing. (05 Marks)
- c. Compute the safe bearing capacity of a square footing $1.5\text{m} \times 1.5\text{m}$ located at a depth of 1m below the ground level in a sandy soil of average density 20kN/m^3 , $\phi = 20^\circ$, $N_c = 17.7$, $N_q = 7.4$, $\gamma = 5$. Take factor of safety = 3 and that the water table is very deep. Also compute the reduction in safe bearing capacity of the footing if the water table rise to the ground level. (06 Marks)
- 7 a. What is the importance of settlement analysis? List remedial measures to be taken against harmful settlement. (06 Marks)
- b. Estimate the immediate settlement of a footing of size $2 \times 3\text{m}$ resting at a depth of 1.5m in a sandy soil whose compression modulus is 10N/mm^2 . Footing transmits a pressure of 200kN/m^2 . Take $\mu = 0.3$ and influence factor as 1.06. (06 Marks)
- c. A soft normally consolidated clay layer is 18m thick. The natural water content is 45%. The saturated unit weight is 18kN/m^3 ; The grain specific gravity is 2.70 and liquid limit is 63%. The vertical stress increment at the centre of the layer due to the foundation load is 9kN/m^2 . The ground water level is at the surface of the clay layer. Determine the settlement of the foundation. (08 Marks)
- 8 a. What are the different types of foundation? And list the factors influencing the choice of foundation. (08 Marks)
- b. Enumerate the factors influencing the selection of depth of foundation. (06 Marks)
- c. With a neat sketch, explain the types of piles classified based on its function. (06 Marks)
