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10CV64

Sixth Semester B.E. Degree Examination, July/August 2022

Geotechnical Engineering – II

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. List the methods of soil exploration and explain seismic refraction method with neat sketch. **(07 Marks)**

b. List the methods of dewatering and explain electro osmosis method of dewatering in fine cohessive soil. **(07 Marks)**

c. Determine the area ratios for the following soil samples and comment on the nature of samples obtained in each of the samplers.

(i) Core cutter → 165 mm outer diameter → 150 mm (inner diameter)

(ii) Split barrel → 51 mm outer diameter → 35 mm (inner diameter)

(iii) Seamless tube → 51 mm outer diameter → 48 mm (inner diameter) **(06 Marks)**

2 a. Describe the assumptions and validity of Boussinesq's theory for concentrated load with equation. **(08 Marks)**

b. Explain the concept of pressure bulb in soil with a figure. **(08 Marks)**

c. A circular area on the surface of an elastic mass of great extent carries a UDL of 120 kN/m^2. The radius of the circle is 3m. Compute the intensity of vertical pressure at a point 5m beneath the center of the circle using Boussinesq's theory. **(04 Marks)**

3 a. Explain the assumptions and limitations of Laplace equation. **(06 Marks)**

b. Discuss the Quicksand phenomenon with neat sketches. **(06 Marks)**

c. Calculate the seepage through an earth dam resting on an impervious foundation the upstream slope is 2.75:1 (H:V) height of a dam is 60 m, downstream slope = 2.5:1 (H:V), free board = 2.5 m, crest width = 8 m, length of drainage blanket = 120 m, coefficient of permeability of the embankment materials in x - direction = 8×10^{-7} m/s; y - direction is 2×10^{-7} m/s. **(08 Marks)**

4 a. Differentiate active earth pressure, passive earth pressure and earth pressure at rest with coefficient. **(06 Marks)**

b. Explain the Rebhann's method of determining active earth pressure in cohension less soil. **(08 Marks)**

c. A retaining wall 4 m height, has a smooth vertical back, the backfill has a horizontal surface in level with the top of the wall there is UD surcharge load of 36 kN/m^2 intensity over the backfill, the unit weight of back fill is 18 kN/m^3 and angle of shearing resistance is 30° and cohension is zero . If water table rises behind the wall to an elevation 1.5 m below the top determine the total active pressure and its point of application. Take submerged weight of sand as 12 kN/m^3. Assume there is no change in angle of shearing resistance. **(06 Marks)**

PART – B

5 a. Explain the causes and type of slope failure. **(08 Marks)**

b. Discuss the determination of stability of finite slope by method of friction circle. **(06 Marks)**

c. A new canal is excavated to a depth of 5m below ground level, through a soil having the following characteristics: $C = 14\ kN/m^2$, $\phi = 15°$, $e = 0.8$ and $G = 2.7$. The slope of banks is 1 in 1. Calculate the factor of safety with respect to cohesion when the canal runs full. If it is suddenly and completely emptied. What will be the factor of safety? **(06 Marks)**

6 a. Define:
(i) Ultimate bearing capacity (ii) Net bearing capacity
(iii) Safe bearing capacity (iv) Allowable bearing capacity **(04 Marks)**

b. Describe the assumptions and limitations of Terzagh's theory. **(06 Marks)**

c. A strip footing 2 m wide carries a load intensity of $400\ kN/m^2$ at a depth of 1.2 m in sand. The saturated unit weight of sand is $19.5\ kN/m^3$ and unit weight above water table is $16.8\ kN/m^3$. The shear strength parameters are $C = 0$ and $\phi = 35°$. Determine factor of safety with respect to shear failure for the following cases of location of water table:
(i) Water table is 4 m below G.L. (ii) Water table is 1.2 m below G.L.
Assume $N_a = 41.4$ and $N_r = 42.4$. **(10 Marks)**

7 a. Explain immediate, consolidation and secondary settlements. **(06 Marks)**

b. Differentiate between total and differential settlements. **(06 Marks)**

c. The following data was obtained from a plate load test carried out on a 60 cm square plate at a depth of 2m below ground surface on a sandy soil which extends upto a large depth. Determine the settlement of a foundation 3m × 3m carrying a load of 110 t and located at a depth of 3m below ground surface water table is located at a large depth from the ground surface.
Load test data:

Load intensity t/m^2	5	10	15	20	25	30	35	40
Settlement, mm	2.0	4.0	7.5	11.0	16.3	23.5	34	45

(08 Marks)

8 a. Discuss the factors influencing the selection of depth of foundation. **(06 Marks)**

b. A square footing located at a depth 1.5 m from the ground surface carries a column load of 150 kN. The soil is submerged having an effective unit weight of $11\ kN/m^3$ and an angle of shearing resistance of 30°. Find the size of the footing using Terzagh's theory if $F_s = 3$ for 30°, $N_a = 10$ and $N_r = 6.0$, $C = 0$. **(06 Marks)**

c. Explain the classification of piles based on various parameters. **(08 Marks)**

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