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10CV64

Sixth Semester B.E. Degree Examination, Aug./Sept.2020
Geotechnical Engineering - II

Time: 3 hrs.

Max. Marks:100

Note:1. Answer any FIVE full questions, selecting atleast TWO questions from each part.
2. Assume any missing data suitably.

PART - A

- 1 a. Differentiate between : i) Area ratio and recovery ratio. (06 Marks)
 ii) Disturbed and undisturbed samples.
 iii) Thin walled and thick walled samplers. (06 Marks)
- b. List the methods of lowering ground water table. Explain any one method in detail. (06 Marks)
- c. A seismic refraction study of an area gave the following :

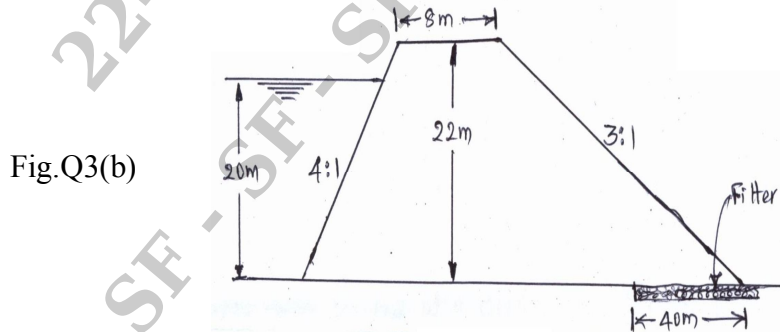
Distance from impact to Geophone (m)	15	30	60	90	120
Time of receiving wave signals (secs)	0.025	0.05	0.1	0.11	0.12

Determine the seismic velocity for the surface and underlying layer. Also find the thickness of the upper layer. (08 Marks)

- 2 a. Compare and contrast the assumption of Boussinesq's and Westergaard's theory of stresses in soils. (06 Marks)
- b. State the principle of construction of Newmark's chart. (04 Marks)
- c. A rectangular area $4m \times 2m$ is uniformly loaded with an intensity of $80kN/m^2$, at the ground surface. Calculate the vertical pressure at a point $3m$ below one of its corners using :
 i) Equivalent – area method and ii) By Newmark's table given below :

Newmark's Influence Factor K		
m	n	
	0.5	1.0
1.0	0.1202	0.1752
2.0	0.135	0.1999

- 3 a. What are Flownets? What are their characteristics and uses? (08 Marks)
- b. For the earth dam of homogeneous section with horizontal filter as shown in fig. Q3(b), draw the phreatic line. If the coefficient of permeability of the soil used in the dam is $3 \times 10^{-4} cm/sec.$, find the seepage flow per unit length of the dam. (12 Marks)



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.



- 4 a. Distinguish between active and passive earth pressure. (04 Marks)
b. Explain Culmann's graphical construction for determination of active thrust. (08 Marks)
c. Vertical wall 6m high, back fill horizontal, carries a uniform surcharge of 45kN/m^2 , $\phi_1 = 36^\circ$ for top 3m and $\phi_2 = 32^\circ$ for bottom 3m, $r_1 = 19.8\text{ kN/m}^3$ for top 3m and $r_2 = 19\text{kN/m}^3$ for bottom 3m. Determine total active thrust and its point of application. (08 Marks)

PART - B

- 5 a. What are different types of slopes? List and explain types of slope failures. (06 Marks)
b. An embankment of height 10m is to be constructed with soil having $\phi = 20^\circ$, $C = 20\text{kN/m}^2$, $\gamma = 17.5\text{ kN/m}^3$. i) What is the side slope required, if $FS = 1.5$?
ii) If the slope is $IV = 1.54$, what is the F.S? (08 Marks)

Slope angle in degrees	90	75	60	45	30
Taylor's stability No. (S_n)	0.182	0.134	0.097	0.062	0.025

- c. Calculate the critical height of an infinite slope of slope angle $= 30^\circ$. The soil properties are $\phi = 20^\circ$, $C = 20\text{kN/m}^2$, $G = 2.7$, $e = 0.7$. Consider the following cases :
i) Slope is dry ii) Slope is saturated and seepage is parallel to the surface. (06 Marks)
- 6 a. Explain the modes of shear failures. (06 Marks)
b. What are the assumptions made in Terzaghi's theory? (04 Marks)
c. Calculate the safe load carried by a square footing of side 1.2m, located at a depth of 1m. The soil properties are : $\gamma_b = 18\text{kN/m}^3$, $C = 15\text{kN/m}^2$, $\phi = 25^\circ$, $\gamma_{\text{sat}} = 20\text{kN/m}^3$. For $\phi = 25^\circ$, $N_c = 20$, $N_q = 10$ and $N_\gamma = 5$. What is the change in load if the water table which was at great depth raises to ground level. Take $FS = 3$. (10 Marks)
- 7 a. What are the ill effects of total and differential settlements of soil on buildings? (04 Marks)
b. A 30cm square plate at 1.5m below ground level failed under a load of 55kN in clay soil having $\phi = 0^\circ$. What is the ultimate bearing capacity of strip footing at the same depth? Take $\gamma = 19\text{kN/m}^3$, $N_c = 5.7$. (08 Marks)
c. A clay stratum 8m thick has a voids ratio of 0.85 at an initial pressure of 15N/m^2 and a voids ratio of 0.723 at a pressure of 300N/m^2 . The liquid limit of soil is 55%. Determine settlement of clay stratum. (08 Marks)
- 8 a. Enumerate the factors influencing selection of depth of a foundation. (06 Marks)
b. Explain the classification of pile foundation. (06 Marks)
c. Proportion a trapezoidal combined footing for two columns 3m c/c. One column is $400 \times 400\text{mm}$ carrying a load of 800kN and the other is $350 \times 350\text{mm}$ carrying a load of 600kN. The allowable soil pressure is 160kN/m^2 . The footing cannot extend 200mm beyond both the columns. (08 Marks)
