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06CV64

Sixth Semester B.E. Degree Examination, May/June 2010
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. Enumerate the objectives of subsurface exploration. (04 Marks)
 - b. Explain with a neat sketch, the seismic refraction method of exploration. (08 Marks)
 - c. A sampling tube has inner diameter 70 mm and that of a cutting edge is equal to 68 mm. Their outer diameters are 72 and 74 mm respectively. Determine the inside clearance, outside clearance and area ratio of the sampler. This tube is pushed at the bottom of a borehole to a distance of 550 mm and length of sample covered is 530 mm. Find the recovery ratio. (08 Marks)
2.
 - a. List the different methods used to control ground water during excavation. Explain any two methods. (12 Marks)
 - b. To establish the location of ground water table in a clayey strata, water in the borehole is bailed out to depth of 12 m below ground surface. Rise in water was recorded at 24 hrs interval as:
 first day = 0.6 m, second day = 0.55 m, third day = 0.5 m.
 Estimate the ground water table. (08 Marks)
3.
 - a. List the assumptions and limitations of Boussinesq's and Westergaard's theory of stresses in soils. (06 Marks)
 - b. Explain the use of Newmark's chart to find vertical pressure at a point. (04 Marks)
 - c. A rectangular area 4 m × 2 m is uniformly loaded with a load intensity of 80 kN/m² at the ground surface. Calculate the vertical pressure at a point 3 m below one of its corners:
 i) By equivalent-area method ii) By Newmark's table given. (10 Marks)

Newmark's influence factor K		
m	n	
	0.5	1.0
1.0	0.1202	0.1752
2.0	0.135	0.1999

4.
 - a. What are flow nets? What are their characteristics and uses? (08 Marks)
 - b. For the earth dam of homogeneous section with a horizontal filter as shown in Fig.Q4(b), draw the phreatic line. If the coefficient of permeability of the soil material used in the dam is 3×10^{-4} cm/sec, find the seepage flow per unit length of the dam. (12 Marks)

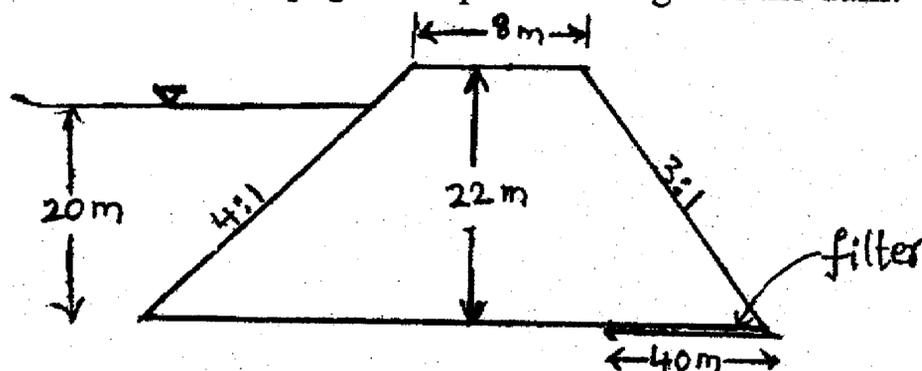


Fig.Q4(b)

PART – B

- 5 a. Distinguish between active and passive earth pressure. (04 Marks)
 b. Describe the Rebhann's graphical method of finding active earth pressure on a retaining wall. (06 Marks)
 c. Vertical wall 6 m high, backfill horizontal carrying uniformly distributed surcharge of 45 kN/m^2 , $\phi_1 = 36^\circ$ in top 3 m and $\phi_2 = 32^\circ$ in bottom 3 m, $\gamma_1 = 19.8 \text{ kN/m}^3$ in top 3 m and $\gamma_2 = 19 \text{ kN/m}^3$ in bottom 3 m. Find the total active earth force and point of application. (10 Marks)
- 6 a. What is stability number? Discuss the use of stability chart. (04 Marks)
 b. Explain friction circle method of stability analysis for slopes. (09 Marks)
 c. A laboratory test gave the following soil parameters $c = 40 \text{ kN/m}^2$, $\phi = 30^\circ$. The expected parameters of the mobilized shearing resistance are $c = 25 \text{ kN/m}^2$, $\phi_m = 22^\circ$. The average effective pressure on the failure plane is 150 kN/m^2 . Find the factors of safety with respect to average shearing strength, cohesion and internal friction. (07 Marks)
- 7 a. Discuss the effect of ground water table on bearing capacity of soils. (04 Marks)
 b. What is standard penetration test? Explain. (07 Marks)
 c. What will be the gross and net safe bearing pressure of sand having $\phi = 36^\circ$ and effective weight 19 kN/m^2 under:
 i) 1.2 m wide strip footing?
 ii) 1.2 m side square footing?
 iii) 1.2 m diameter circular footing?
 Assume the footings are placed at 1.2 m below the ground surface and that the water table is at a great depth. Also assume a factor of safety 3.0. Use Terzaghi's theory. Given for $\phi = 36^\circ$, $N_g = 47$ and $N_\gamma = 43$. (09 Marks)
- 8 a. What are the ill effects of total and differential settlement of soil on buildings? (04 Marks)
 b. A layer of clay 8 m thick underlies a proposed new building. The existing over burden pressure at the centre of layer is 300 kN/m^2 and the load due to construction of new building increases by 150 kN/m^2 . The liquid limit of the soil is 65%. Water content of soil is 50%. Specific gravity of soil grains is 2.65. Estimate consolidation settlement. (08 Marks)
 c. Two plate load tests were conducted at the level of a prototype foundation in cohesionless soil close to each other. The following data are given:
- | Size of plate | Load applied | Settlement recorded |
|----------------------------|--------------|---------------------|
| $0.3 \times 0.3 \text{ m}$ | 30 kN | 25 mm |
| $0.6 \times 0.6 \text{ m}$ | 90 kN | 25 mm |
- If a footing is to carry a load of 1250 kN, determine the size of the footing for the same settlement of 25 mm. (08 Marks)

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