

|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|
|  |  |  |  |  |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|

10CV64

**Sixth Semester B.E. Degree Examination, Jan./Feb. 2021**  
**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. Distinguish between :
  - i) Representative and non representative soil samples
  - ii) Undisturbed and remolded samples
  - iii) Area ratio and recovery ratio
  - iv) Rotary drilling and permission drilling. (06 Marks)
- b. What is 'Bore log'? Draw a typical bore log and explain the salient features. (06 Marks)
- c. List out the different methods of dewatering of soils. Explain any two methods in brief. (08 Marks)
  
- 2 a. Explain the terms "Pressure bulb" and "Isobar". (06 Marks)
- b. Explain the construction and uses of Newmarks chart. (06 Marks)
- c. A reinforced concrete water tank of size 6m × 6m is resting on ground surface and carries a uniformly distributed load of 200kN/m<sup>2</sup>. Estimate the maximum vertical stress at a depth of 12m at a point i) vertically below the centre of base ii) below one of the corners. Use Boussinesq's theory and equivalent concentrated load concept. (08 Marks)
  
- 3 a. What are flownets? What are their characteristics and uses? (10 Marks)
- b. For a homogeneous earth dam with horizontal filter as shown in Fig.Q3(b), below establish the phreatic line. Check the value of 'S' with analytically calculated value of 'S'. IF the coefficient of permeability of down soil material is  $3 \times 10^{-5}$ cm/sec. Find the quantity of seepage per unit length of the dam.

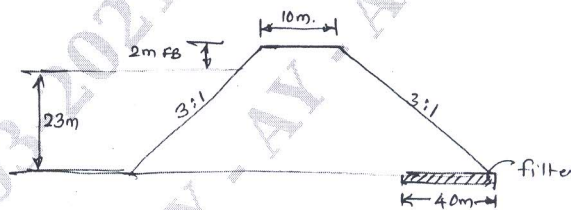


Fig.3(b)

(10 Marks)

- 4 a. Define :
  - i) Active earth pressure
  - ii) Passive earth pressure
  - iii) Earth pressure at rest. (06 Marks)
- b. Describe the Culmann's graphical method of finding active earth pressure and retaining wall. (06 Marks)
- c. A retaining wall 8m high retains a cohesionless back fill has a unit weight of 18kN/m<sup>3</sup> and  $\phi = 30^\circ$  for top 4.0m. The rest of the strata has a unit weight of 16kN/m<sup>3</sup> and  $\phi = 20^\circ$ . Determine the active earth per Distribution behind the wall. Also find total active thrust and its position. (08 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.

## PART – B

- 5 a. What are the types of slopes and slope failures? Explain the causes of slope failure. (06 Marks)
- b. Explain the method of slices of stability of slope. (08 Marks)
- c. An embankment 15m high is inclined at  $35^\circ$ . The angle of shearing resistance is  $15^\circ$  and cohesion  $150 \text{ kN/m}^2$ . The unit wt of soil is  $18 \text{ kN/m}^3$ . If Taylor's stability number is 0.06 find the factor of safety with respect to cohesion. (06 Marks)
- 6 a. What are the assumptions made in Terzaghi's general bearing capacity theory? (06 Marks)
- b. Explain the modes of shear failure. (06 Marks)
- c. In a purely cohesive soil, two footings are laid. One footing is 1.5m wide strip footing and the other is  $1.5 \text{ m} \times 1.5 \text{ m}$  square footing. Both are laid at 2m depth. Assuming  $\gamma = 18 \text{ kN/m}^3$  and unconfined compressive strength as  $300 \text{ kN/m}^2$  estimate the net ultimate bearing capacity of the soil. Use Terzaghi's theory. (08 Marks)
- 7 a. What are the effects of total and differential settlements? What are the remedial measures to contract settlements? (08 Marks)
- b. Estimate the immediate settlement of a footing  $1.5 \text{ m} \times 2.5 \text{ m}$ , placed at 1.5m depth in a soil with  $E = 25000 \text{ kN/m}^2$  and  $\mu = 0.3$ . The footing is subjected to a load of 500kN. Take  $I_f = 1.30$ . (06 Marks)
- c. A soft clay layer 4m thick undergoes compression due to construction of a structure. At mid clay layer the initial effective pressure is  $350 \text{ kN/m}^2$  and increase in stress at this layer due to building is  $150 \text{ kN/m}^2$ . If the liquid limit of clay is 65%, natural water content is 48% and  $G = 2.70$ , calculate consolidation settlement. (06 Marks)
- 8 a. Explain the factors affecting allowable bearing pressure. (06 Marks)
- b. Explain the factors affecting the selection of depth of footing. (06 Marks)
- c. Explain the classification of piles based on various parameters. (08 Marks)

\*\*\*\*\*