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10CV64

**Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017**  
**Geotechnical Engineering – II**

Time: 3 hrs.

Max. Marks:100

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

**PART – A**

- 1 a. What is dewatering? What are the objectives of dewatering and list the methods of dewatering employed in field practice. (08 Marks)
- b. A soil sampler was pushed into the soil for a depth of 600mm and the length of the sample obtained was 590mm. What is the recovery ratio? What happened to the sample? How can this be avoided? (04 Marks)
- c. A seismic refraction study of an area has given the following data:

|  |       |      |      |      |      |
|--|-------|------|------|------|------|
| Distance from impact point to geophone (m) | 15    | 30   | 60   | 90   | 120  |
| Time to receive wave (Sec.)                | 0.025 | 0.05 | 0.10 | 0.11 | 0.12 |

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

- 2 a. Distinguish between Boussinesq's and Westergaard's theory of stress distribution. (06 Marks)
  - b. Explain construction and uses of Newmarks chart for determining stress distribution. (06 Marks)
  - c. Two columns M and N 6m apart, load on column M is 400kN and on column N is 300kN. The load can be considered as point loads. Calculate the vertical stresses in the soil 3m below the foundation vertically below M and N. (08 Marks)
- 3 a. What is flownet? What are the uses of flownet? (04 Marks)
  - b. Explain the graphical method of determining phreatic line in homogeneous earthen dam with horizontal drainage filter. (08 Marks)
  - c. A soil stratum with permeability  $K = 5 \times 10^{-7}$  cm/sec overlies an impermeable stratum. The impermeable stratum lies at a depth of 18m below the ground surface. A sheet pile wall penetrates 8m into the permeable soil stratum. Water stands to a height of 9m on upstream side and 1.5m on downstream side, above the surface of soil stratum. Sketch the flow net and determine quantity of seepage. (08 Marks)
- 4 a. Derive equations for the earth pressure coefficients  $K_a$  and  $K_p$  by considering backfill with horizontal surface. Use Rankine's theory. (08 Marks)
  - b. A retaining wall 8m height supports sandy back fill with  $e = 0.6$ ,  $G = 2.65$  and  $\phi = 30^\circ$ . 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 active earth pressure. Assume soil above water table has degree of saturation of 50%. (12 Marks)

**PART – B**

- 5 a. Explain the causes for a slope failure and list the modes of finite slope failure. (06 Marks)
- b. With the help of sketch explain Swedish circle method of stability analysis for cohesive soil. (06 Marks)

- c. A 5m deep cut is made in a soil having  $C = 15 \text{ kN/m}^2$ ,  $\phi = 10^\circ$ . If the slope is 1:1, what is the factor of safety? If the slope is changed to  $1V:1\frac{1}{2}H$  what will be the change in factor of safety? The density of soil is  $18 \text{ kN/m}^3$  and the stability number for  $\phi = 10^\circ$  are as follows:

|                         |            |            |            |
|-------------------------|------------|------------|------------|
| Slope angle (i)         | $45^\circ$ | $30^\circ$ | $15^\circ$ |
| Stability No. ( $s_n$ ) | 0.108      | 0.075      | 0.023      |

(08 Marks)

- 6 a. Define the following:
- Ultimate bearing capacity
  - Safe bearing capacity
  - Net ultimate bearing capacity
  - Allowable bearing capacity. (08 Marks)
- b. A strip footing 2m wide carries a load intensity of  $400 \text{ kN/m}^2$  at a depth of 1.2m in sand. The saturated unit weight of sand is  $19.5 \text{ kN/m}^3$  and unit weight above water table is  $16.8 \text{ kN/m}^3$ . The shear strength parameters are  $c = 0$  and  $\phi = 35^\circ$ . Determine the factor of safety with respect to shear failure for the following cases of location of water table:
- Water table is 4m below ground level
  - Water table is 1.2m below ground level
  - Water table is 2.5m below ground level
- For  $\phi = 35^\circ$  consider  $N_q = 41.4$  and  $N_\gamma = 42.4$ . (12 Marks)

- 7 a. What are settlements? Explain the components of settlement and their determination. (08 Marks)
- b. A square footing 2m side as shown in Fig.Q.7(b) carries a load of 4000kN. Calculate the settlement at the centre of clamp layer assuming a distribution of 2V:1H. (12 Marks)

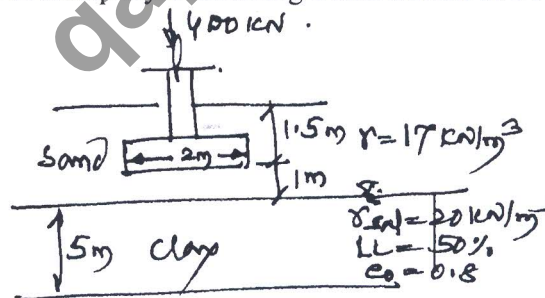


Fig.Q.7(b)

- 8 Write short notes on any four of the following:
- Factors influencing the selection of depth of foundation.
  - Factors influencing the choice foundation.
  - Combined footing.
  - Mat foundation.
  - Pile foundation.
  - Pile load capacity. (20 Marks)

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