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**Sixth Semester B.E. Degree Examination, June/July 2015**  
**Geotechnical Engineering - II**

Time: 3 hrs.

Max. Marks: 100

**Note:** Answer any FIVE full questions, selecting atleast TWO questions from each part.

**PART - A**

- 1
  - a. Explain the wash boring method, with the help of a neat sketch. (08 Marks)
  - b. With a neat sketch, explain the seismic refraction method. (06 Marks)
  - c. Establish the location of ground water in a clayey strata, water in bore was bailed out to a depth of 10.67m below ground surface and rise of water recorded at 24 hour interval.  $h_1 = 64.0\text{cm}$ ,  $h_2 = 57.9\text{cm}$  and  $h_3 = 51.8\text{cm}$ . (06 Marks)
- 2
  - a. Derive an expression for vertical pressure under a uniformly loaded circular area along vertical symmetrical axis. (10 Marks)
  - b. Define isobar. Construct an isobar for a vertical stress of  $40\text{kN/m}^2$  when ground surface is subjected to a concentrated load of 1000kN. (10 Marks)
- 3
  - a. What are the assumptions made in deriving Laplace equation? (04 Marks)
  - b. Describe the Casagrande's method to locate the phreatic line in a homogeneous earth dam with a horizontal filter at its toe. (10 Marks)
  - c. A 3m thick soil stratum has coefficient of permeability of  $3 \times 10^{-7}\text{m/sec}$ . A separate test gave porosity of 40% and bulk unit weight of  $21\text{kN/m}^3$  at a water content of 31%. Determine the head at which upward seepage will cause quick sand condition. What is the flow required to maintain critical condition? (06 Marks)
- 4
  - a. Compare Rankine's and Coulomb's theory of earth pressure. (04 Marks)
  - b. Explain how do you determine Active Earth pressure by Rebhann's method. (10 Marks)
  - c. A retaining wall, 6m high, retains dry sand with an angle of friction of  $30^\circ$  and unit weight of  $16.2\text{kN/m}^3$ . Determine the earth pressure at rest. If the water table rises to the top of the wall, determine the increase in the thrust on the wall. Assume the submerged unit weight of sand is  $10\text{kN/m}^3$ . (06 Marks)

**PART - B**

- 5
  - a. Explain the causes for a slope failure and list the types of slope failures. (06 Marks)
  - b. Explain Swedish method of slices of stability analysis of slopes. (06 Marks)
  - c. A 5m deep canal has side slopes of 1:1. The properties of soil are  $C_u = 20\text{kN/m}^2$ ,  $\phi_u = 10^\circ$ ,  $e = 0.8$  and  $G = 2.8$ . If Taylor's stability number is 0.108. Determine the factor of safety with respect to cohesion when the canal runs full. Also find the same in case of sudden drawdown, if Taylor's stability number for this condition is 0.137. (08 Marks)
- 6
  - a. List the assumptions made in Terzaghi analysis. (04 Marks)
  - b. Discuss the effect of ground water table on bearing capacity of soils. (06 Marks)
  - c. A strip footing 2m wide carries a load intensity of  $400\text{kN/m}^2$  at a depth of 1.2m in sand. The  $r_{\text{sat}}$  of sand is  $19.5\text{kN/m}^3$  and unit weight above water table is  $16.8\text{kN/m}^3$ ,  $\phi = 35^\circ$ , using Targahi's analysis determine Factor of safety with respect to shear failure for the following locations of water table. Take  $N_q = 41.4$ ,  $N_r = 42.4$ . (10 Marks)
    - i) Water table 4m below ground level
    - ii) Water table 1.2m below ground level.

- 7 a. What are the different types of settlement of footings? Explain. (08 Marks)
- b. Determine the elastic settlement of footing  $3\text{m} \times 3\text{m}$  resting on a sandy soil. Given  $E_s = 45000\text{kN/m}^2$  and  $\mu = 0.3$ , Footing carries a load of  $2000\text{kN}$ . Take  $I_w = 0.82$ . (06 Marks)
- c. A normally consolidated clay layer is  $18\text{m}$  thick. Natural water content is  $45\%$ , saturated unit weight is  $18\text{kN/m}^3$ , specific gravity is  $2.7$  and liquid limit is  $63\%$ . The vertical stress increment at the centre of clay layer due to foundation load is  $9\text{kN/m}^2$ . Determine the settlement. (06 Marks)
- 8 a. Explain the factors influencing the selection of depth of foundation. (06 Marks)
- b. Discuss the proportioning of combined Trapezoidal footings. (08 Marks)
- c. Explain determination of the pile load capacity in detail. (06 Marks)

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