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## B.Tech III Year II Semester (R09) Supplementary Examinations May/June 2017 GEOTECHNICAL ENGINEERING – I

(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions All questions carry equal marks

- 1 (a) Explain with sketches various types of soil structures.
  - (b) Derive an expression for bulk unit weight in terms of its void ratio, water content, specific gravity of solids, degree of saturation and unit weight of water.
  - (c) A soil sample has a water content of 31% and unit weight of 15 kN/m<sup>3</sup> with a specific gravity of solids of 2.70. Determine the voids ratio and degree of saturation.
- 2 (a) Define and explain the significance of uniformity coefficient and coefficient of curvature.
  - (b) Explain pycnometer method of finding the specific gravity of soil sample.
- 3 (a) Describe a test for determining the permeability of clay soil. Obtain the necessary equation.
  - (b) Water is flowing under constant hydraulic head of 5 cm through a specimen 50 cm<sup>2</sup> in cross section and 6 cm in height. Calculate the coefficient of permeability and velocity of flow if 1500 cc of water passes in an interval of 30 min.
- 4 (a) What is a flow net? What is a phreatic line? What will be the geometric shape of a phreatic line in earth dams?
  - (b) A stratified soil deposit consists of two layers. The top layer is 2.5 m thick having a bulk density of 17 kN/m<sup>3</sup> and the bottom layer is 3.5 m thick having a saturated density of 21 kN/m<sup>3</sup>. The water table is at a depth of 3.5 m from the surface and the zone of capillary saturation is 1 m above the water table. Draw the diagrams showing the variation of total, neutral and effective stresses.
- 5 (a) Write brief note on Newmark's influence chart.
  - (b) A ring foundation is of 3 m external diameter and 2.0 m internal diameter. It transmits a uniform pressure of 90 kN/m<sup>2</sup>. Calculate the vertical stress at a depth of 1.5 m directly beneath the centre of the loaded area.
- 6 (a) What are the methods adopted for determining the density of soil in the field? Explain them in brief and what are their limitations.
  - (b) Discuss the factors affecting compaction of soils.
- 7 (a) Discuss Terzaghi theory of consolidation, stating various assumptions.
  - (b) In a consolidation test on a soil, the void ratio of sample decreased from 1.25 to 1.1 when pressure is increased from 200 kN/m<sup>2</sup> to 400 kN/m<sup>2</sup>. Calculate the coefficient of consolidation if coefficient of permeability is 8 × 10<sup>-8</sup> cm/s.
- 8 (a) Explain the following terms: (i) Critical void ratio. (ii) Pore pressure coefficients.
  - (b) Describe a triaxial shear test with a neat sketch.