

Code: 9A01602

R09

B.Tech III Year II Semester (R09) Supplementary Examinations May/June 2016

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 the following structures: (i) Single grained. (ii) Honeycombed. (iii) Flocculent
(b) A 5 cm long cube of dry clay has a mass of 210 gm. The same sample under saturated condition and unchanged volume has a mass of 260 gm. Determine the specific gravity of solids and void ratio.
- 2 Discuss the following in detail:
 - (a) Sedimentation analysis.
 - (b) Determination of shrinkage limit.
 - (c) Field identification of soils.
- 3 (a) Define permeability. Enumerate the various parameters that affect the permeability of soil in the field. Explain how you would determine permeability in the field.
(b) Determine the average horizontal and vertical permeability of a soil mass made up of three horizontal strata each 1 m thick, if the coefficients of permeability are 1×10^{-1} mm/s, 3×10^{-1} mm/s and 8×10^{-2} mm/s for the three layers.
- 4 (a) What is a flow net? What are its uses? What are the essential characteristics of a flow net?
(b) A soil profile consists of surface layer of sand 3.5m thick ($\gamma = 16.5$ kN/m³), an intermediate layer of clay 3 m thick ($\gamma = 19.5$ kN/m³) and the bottom layer gravel 3.5 m thick ($\gamma = 19.3$ kN/m³). The water table is at the upper surface of the clay layer. Draw total, neutral and effective stress variation diagrams.
- 5 (a) Distinguish between Boussinesq and Westergaard stress distribution theories
(b) Discuss about influence diagram and pressure bulb.
- 6 (a) Describe the Proctor's modified compaction test for determining field compaction of a given soil.
(b) Discuss in detail about Plasticity needle.
- 7 (a) Explain how you will determine void ratio of the sample by change in void ratio method. Also explain how do you find coefficient volume change?
(b) The following consolidation test readings were obtained on undisturbed clay. Estimate the compression index and pre-consolidation pressure.

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|--------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Stress kN/m ² | 0 | 5 | 10 | 20 | 40 | 80 | 160 | 320 | 640 |
| Void ratio | 2.855 | 2.802 | 2.793 | 2.769 | 2.631 | 2.301 | 1.939 | 1.576 | 1.314 |

- 8 (a) What is the Mohr-Coulomb theory of failure?
(b) Discuss Skempton's pore pressure parameters.
(c) In a direct shear test the major and minor principal stresses were found to be 500 kN/m² and 300 kN/m², respectively. Determine the normal and shear stresses on a plane inclined at 30° to the major principal plane in a clockwise direction.