Code: CE4T2

II B.Tech - II Semester–Regular/Supplementary Examinations–April 2018

GEOTECHNICAL ENGINEERING - I
(CIVIL ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

Answer **all** the questions.   All questions carry equal marks

                                             11 x 2 = 22M

1. a) Explain how soils are formed?

   b) Define soil structure and Thixotropy?

   c) Define Void ratio and Porosity?

   d) In a wet soil mass, air occupies one six of its volume and water occupies one third of its volume. Then find void ratio of the soil?

   e) Prove $I_c + I_L = 1$

   f) What are the limitations of darcy 's law?

   g) What are the different types of soil water?

   h) What is meant by Critical Hydraulic Gradient?

   i) What is meant by Pressure bulb?

   j) Differentiate between compaction and consolidation?

   k) Mention different drainage conditions adopted in Triaxial test?

PART – B

Answer any ***THREE*** questions.   All questions carry equal marks.

$$3 \times 16 = 48 \text{ M}$$

2. A sample of moist soil has a volume of 8100 cm^3 and weighs180 N. Its oven dry weight is 161 N. Assuming the specific gravity of soil solids is 2.7, calculate its (i) water content (ii) moist unit weight (iii) dry unit weight (iv) void ratio (v) degree of saturation and (vi) quantity of water to be added in 1 m^3 of moist soil to saturate the soil.   16 M

3. a) Derive an expression to determine coefficient of permeability of soil by laboratory falling head permeability test.   12 M

   b) The coefficient of permeability of a soil sample is found to be 1x10^{-3} cm/sec at a void ratio of 0.4. Estimate its permeability at a void ratio of 0.6.   4 M

4. a) Explain briefly about Newmark's Influence Chart and Westergaards equation?   8 M

   b) Explain briefly about seepage pressure using Quick sand Condition Phenomenon.   8 M

5. a) Explain the terms normally consolidated and over consolidated soils?   4 M

b) A normally consolidated clay layer 2m thick is sandwiched between two sand layers. The average overburden stress at the middle of clay layer can be taken as 160kN/m². Due to construction of a structure there is an increase in effective vertical stress of 40kN/m² at the middle of clay layer. The liquid limit of clay layer is 60% and the initial void ratio is 0.9. Estimate the primary settlement.   12 M

6. a) What are the merits and demerits of direct shear test?

          6 M

   b) Derive a relationship between the principal stresses at failure using Mohr-Coulomb failure criterion?   10 M