Code: 9A01602

R09

B.Tech III Year II Semester (R09) Supplementary Examinations December/January 2015/2016
GEOTECHNICAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours   Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Define the terms degree of saturation, specific gravity of solids, porosity, density of solids, air content and dry density
  (b) Establish a relation among specific gravity of solids, voids ratio, degree of saturation, unit weight of water and bulk unit weight of soil
  (c) A soil sample has a volume of 1000 cm^3 and a weight of 17.5 N. The specific gravity of solids is 2.67. If the dry unit weight of the soil is 14.8 kN/m^3. Determine: (i) Water content. (ii) Voids ratio. (iii) Porosity. (iv) Degree of saturation. (v) Saturated unit weight. (vi) Submerged unit weight.

2 (a) What is plasticity chart? How is it useful?
  (b) Explain clearly how coarse grained soils are classified as per I.S. system.

3 (a) Differentiate between seepage velocity and discharge velocity. Derive the relation between them.
  (b) A constant head permeability test has been run on a sand sample 25 cm length and 30 sq. cm in area under a head of 40 cm. The discharge was found to be 200 cc in 116 sec. The specific gravity of grains 2.65. The dry weight of sand is 1320 gm. Determine: (i) Coefficient of permeability. (ii) Seepage velocity. (iii) Discharge velocity.

4 (a) Describe the construction of phreatic line for an earth dam of homogeneous cross section.
  (b) What are the characteristics of a flow net?

5 (a) Describe Westergaard's elastic solution for stress distribution in soil under a point load.
  (b) A line load of 90 kN/m run extends to a long distance. Determine the intensity of vertical stress at a point 1.5 m below the surface.
      (i) Directly under the line load. (ii) At a distance 1m perpendicular to the line. Use Boussinesq's theory.

6 (a) Differentiate between standard Proctor and modified Proctor test
  (b) Discuss various methods by which soil is compacted in the field.
  (c) Following are the results of a standard compaction test performed on a sample of soil.

Bulk density (Kg/m^3)	1780	2000	2100	2160	2080
Water content (%)	5	10	13	18	24

Determine the OMC and maximum dry density, calculate the water content necessary to completely saturate the sample at the maximum dry density assuming no change in volume. Use G= 2.72.

7 (a) What is meant by coefficient of consolidation and what is its importance?
  (b) Two clay layers A and B are 5 m and 6 m thick respectively. Time taken by layer A to reach 50% consolidation is 4 months. Calculate the time taken by layer B to reach same degree of consolidation. Layer A has double drainage, while layer B has single drainage. Coefficient of consolidation of layer A is twice that of layer B.

8 (a) What is Coulombs equation for shear strength of soil? Discuss the factors which affect the shear strength parameters of soil.
  (b) A specimen of clean sand when subjected to direct shear test failed at a stress of 1.2 kg/cm^2 when the normal stress intensity was 1.6 kg/cm^2. Determine: (i) Angle of internal friction. (ii) Deviator stress at which the failure will take place, if a cylindrical sample of the same sand is subjected to triaxial test with a cell pressure of 1.0 kg/cm^2. Also find the angle made by failure plane with the horizontal.

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