II B.Tech - II Semester – Regular Examinations - JUNE 2015

GEOTECHNICAL ENGINEERING-I
(CIVIL ENGINEERING)

Duration: 3 hours   Marks: 5x14=70

Answer any FIVE questions. All questions carry equal marks

1. a) Derive a relationship between voids ratio, water content, specific gravity of particles and degree of saturation.   7 M

    b) In a compaction test on a soil the mass of wet soil when compacted in the mould was 1.9kg. The water content of the soil was 16.5%. If the volume of the mould was 0.94 litres, Determine dry density, void ratio, degree of saturation and percentage air voids. Take G=2.68.   7 M

2. a) Explain the test procedure to determine shrinkage limit of a soil.   7 M

    b) The consistency limits of a soil are LL = 52%, PL = 32% and SL= 17%. If the soil shrinks from a volume of $10cm^3$ at LL to $6.01cm^3$ at shrinkage limit, calculate the specific gravity of solids.   7 M

3. a) In a falling head permeameter, if the time intervals for drop in levels from H_1 to H_2 and H_2 to H_3 are equal, prove that $H_2 = \sqrt{(H_1 * H_3)}$.   7 M

b) What are the different parameters of the soils that influence the permeability of soils? 7 M

4. a) What are the characteristics of flow nets? Explain in detail the methods of constructing the same. 7 M

b) What is quick sand condition? List out the conditions that are favorable for quick sand condition. 7 M

5. a) Derive an expression for vertical stress at a point due to vertical load. Use Boussinesq's theory. 7 M

b) Two columns A and B are 5m apart. Column A transfers a load of 400kN and that of B is 600kN. Determine the vertical stress beneath these columns at a depth 4m below. 7 M

6. a) What are the factors that affect the compaction properties of soils? Discuss in brief. 7 M

b) The observations of a compaction test are as follows:

Water Content (%)	7.7	11.5	14.6	17.5	19.7	21.2
Mass of wet soil (kg)	1.7	1.89	2.03	1.99	1.96	1.92

Volume of the mould is 950cm^3. Take G=2.65; Plot the water content- dry density curve and determine the optimum water content and Maximum dry density. 7 M

7. a) Explain Terzaghi's theory of consolidation. Discuss the assumption and their validity. 7 M

b) A 3m thick clay layer beneath a structure is overlain by a permeable stratum and is underlain by an impervious stratum. The coefficient of consolidation of the clay was found to be $0.028 cm^2$/minutes. The final expected settlement of the layer is 80mm. Determine the time taken for 75% of full consolidation and the time required for 2.5cm settlement. 7 M

8. a) What are the merits of tri axial shear test over box shear test? Explain the different conditions for which soils under tri axial tests can be conducted. 7 M

b) The following are the results of box shear test on a soil.

Normal Stress(kPa)	25	75	150	250
Shear stress at failure(kPa)	55	75	100	140

Determine cohesion and angle of internal friction of the soil. Also determine the deviator stress required for the failure of the same soil specimen under triaxial test with a cell pressure of 100 kPa. 7 M