S–2015

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Seat No.	

T.E. (Civil) (Semester - V) (Revised) Examination, December - 2015

GEOTECHNICAL ENGINEERING - I

Sub. Code : 45537

Day and Date : Thursday, 10 - 12 - 2015 **Total Marks : 100**

Time : 02.30 p.m. to 05.30 p.m.

Instructions : 1) **Question No. 1 from Section - I and Question No. 5 from Section - II are compulsory. Attempt any two questions from the remaining in each section.**

2) **Figures to the right indicate full marks.**

3) **Make assumptions wherever necessary.**

4) **Use of non-programmable calculator is allowed.**

SECTION - I

Q1) All questions are compulsory : **[3 × 6 = 18]**

a) Explain two phase systems and three phase system of soil with neat sketches.

b) State Darcy's law and explain regarding its validity.

c) Explain the different types of corrections applied to the observed Hydrometer reading in wet mechanical analysis.

Q2) a) Derive the equation for determination of coefficient of permeability of fine grained soil in laboratory by falling head method with appropriate sketch. **[8]**

b) A sandy soil is required to be compacted at a certain dry density to achieve 70 % relative density. Test conducted on a soil yielding following results, Maximum void ratio –0.9, Minimum void ratio –0.6 and Specific gravity –2.7. What is the desired dry density to which the soil should be compacted. **[8]**

P.T.O.

Q3) a) List and Explain soil structures formed due to structural composition of sedimented soils with appropriate sketches. **[8]**

b) Data from standard Proctor compaction test is given below : **[8]**

Water content (%)	5.62	8.80	10.95	13.65	14.45	18.25
Weight of mould + compacted soil (N)	35.9	36.95	39.50	40.1	40.27	39.25

i) Volume of compaction mould – 1000 cc.

ii) Weight of compaction mould – 19.8 N.

iii) Sp. Gravity of soil particles – 2.77.

Plot compaction curve, determine OMC and MDD, determine zero air void dry density at OMC.

Q4) a) Explain the process of consolidation using spring analogy. **[8]**

b) A clay layer 6 m thick is subjected to a pressure of 50 KN/ sq. m. If the layer has a double drainage and undergoes 60 % consolidation in two years. Determine the coefficient of consolidation. If the coefficient of permeability is 0.015 m/ year. Determine the settlement in two years. **[8]**

SECTION - II

Q5) All questions are compulsory : **[4 × 5 = 20]**

a) Differentiate between Boussinesq and Westergaard theories for stress distribution.

b) Discuss the factors affecting shear strength of soil.

c) For which type of soil, unconfined compression test is suitable? How Mohr circle is drawn for this test.

d) What are the assumptions of Rankine's theory?

Q6) a) Discuss equivalent point load method. **[6]**

b) Calculate the intensity of stress below the center of the footing at a depth of 13 m due to load of 1.6 N/mm^2 over footing area of 3.2 m × 6.5 m. **[9]**

i) By using Boussinesq point load equation.

ii) By using Westergaard point load equation.

Q7) a) Discuss Vane shear test. **[6]**

b) A laboratory results on a soil have shown that its Unconfined Compression strength is 1.2 kg/cm^2. In a triaxial compression test same specimen of the soil sample when subjected to a cell pressure of 0.4 kg/cm^2 failed at deviator stress of 1.6 kg/cm^2 .Estimate the shearing strength of the same soil along a horizontal plane at a depth of 2.5 m in a deposit. Take dry unit weight of soil as 1.7 gm/cc and sp.gravity 2.7. **[9]**

Q8) a) With help of neat sketches , differentiate between Rankine' s active and passive earth pressure. **[6]**

b) A retaining wall 5 m high is pushed against a cohesive back fill. The uniform surcharge on the level backfill is 40 kN/m^2. The cohesive strength of soil 30 kN/m^2 and angle of shearing resistance is 20°. The unit weight of soil is 20 kN/m^3. Determine the total Rankine's passive thrust and its point of application. **[9]**

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