

R09

Code No: 09A50104

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY, HYDERABAD

B. Tech III Year I Semester Examinations, May/June – 2013

Geotechnical Engineering – I

(Civil Engineering)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) Describe the clay forming minerals that are widely found.
b) A sample of soil was found to be partially saturated and when tested in the laboratory gave the following results. Specific gravity of soil particles is 2.7, wet weight of sample is 250g, dry weight of sample is 210g and volume of sample is 150cm^3 . Compute the degree of saturation, water content, porosity and void ratio. [5+10]
- 2.a) Distinguish between:
i) Liquid limit and Liquidity Index
ii) Density and Relative Density.
b) Draw the plasticity chart and classify the fine grained soils. [4+11]
- 3.a) What is Darcy's law and under what conditions it is valid?
b) State the factors effecting permeability of soil.
c) In a falling head permeability test, if the time intervals for the head to fall from h_1 to h_2 and h_2 to h_3 are same. Show that the h_2 is the geometrical mean of h_1 and h_3 ($h_2 = \sqrt{h_1 h_3}$). [3+4+8]
- 4.a) What is seepage pressure and describe the piping phenomenon.
b) A soil profile consists of a surface layer of sand of 3m thick with $\gamma = 17\text{kN/m}^3$, an intermediate clay layer of 2m thick with $\gamma_{\text{sat}} = 16\text{kN/m}^3$ and a bottom layer of gravel of 4m thick with $\gamma_{\text{sat}} = 19\text{kN/m}^3$. The water table is at the top of clay layer. Determine the effective stress at various levels at 3m, 5m & 9m from ground level. [4+11]
- 5.a) Distinguish between Boussinesq's and Westergaard's theory of stress distribution in soils.
b) An annular ring footing of external and internal diameters of 6m and 3m respectively transmits a pressure of 200kN/m^2 . Calculate the vertical stress at a depth of 1.0m and 3.0m below the centre. [5+10]
- 6.a) Explain the mechanism of compaction and Explain the effects of compaction on physical and engineering properties of soils.
b) Explain how field control of compaction soil is achieved. Describe at least one example in each case. [7+8]

- 7.a) Explain square root time fitting method to determine coefficient of consolidation.
 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/m^2 . Due to construction of a structure there is an increase in effective vertical stress of 40kN/m^2 at the middle of clay layer. The liquid limit of clay layer is 60% and the initial void ratio is 0.9. Determine the consolidation settlement.

[6+9]

- 8.a) State the advantages and disadvantages of direct shear test.
 b) The following are the results of a Triaxial test. Determine Shear strength parameters.

[5+10]

Sample No	Cell Pressure (kN/m^2)	Deviator stress (kN/m^2)
1	50	350
2	100	440
3	150	530
