Code :R5320101

R5

III B.Tech II Semester(R05) Supplementary Examinations, April/May 2011
GEOTECHNICAL ENGINEERING
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE questions
All questions carry equal marks

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1. (a) What is meant by weathering? Describe its agents, process and effects on rocks.
   (b) A natural soil deposit has a bulk unit weight of 19 kN/m^3 and water content of 5%. Estimate the amount of water required to be added to 1 m^3 of soil to raise the water content to 15%. Assume the void ratio to remain constant. The specific gravity of solids is 2.67.

2. (a) With the help of sketches explain the following:
      i. well graded soil,
      ii. uniformly graded soil,
      iii. gap graded soil.
   (b) The Atterberg limits of a soil sample are: liquid limit = 50%, plastic limit = 30% and shrinkage limit = 15%. If the specimen of this soil shrinks from a volume of 10 cm^3 at liquid limit to 5.94 cm^3 when oven dried, calculate the shrinkage ratio and specific gravity of soil solids.

3. (a) How do you determine the permeability of a clayey soil in the laboratory? Derive the formula you use.
   (b) Estimate the quantity of flow of water through a soil mass in a 300 sec period when a constant head of 1m is maintained. The length of the sample is 150 mm and the cross sectional area is 100×100 mm. The coefficient of permeability of the soil sample is 1×10^{-1} mm/s.

4. (a) What is quick sand condition? Derive the expression for the critical hydraulic gradient.
   (b) Explain the graphical procedure of drawing the phreatic line in a homogeneous earth dam provided with a toe drain.

5. Discuss the essential differences between Boussinesq's and Westergaard's theories. For which condition do both these theories yield approximately the same value of vertical stress.

6. Describe standard proctor test and modified proctor test. How would you decide the type of the test to be conducted in the laboratory?

7. (a) What is the time factor? How it is related to the average degree of consolidation?
   (b) Discuss the Limitations of Terzaghi's theory of consolidation. Why this theory is used despite its limitations?

8. (a) Define critical void ratio. Explain the shear behavior of a soil whose void ratio is less than the critical void ratio.
   (b) Explain how a negative pore water pressure develops in a consolidated - undrained test on a over-consolidated clay.

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