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ET-501(A)

B.Tech. Civil (Construction Management) /
B.Tech. Civil (Water Resources Engineering)

Term-End Examination

June, 2017

00535

ET-501(A) : SOIL MECHANICS

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions. All questions carry equal marks. Use of scientific calculator is allowed.*

1. (a) Derive an expression for estimating percentage finer than a given diameter from the reading of hydrometer analysis. 7

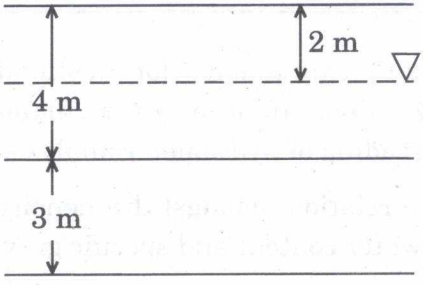
(b) Derive the relation amongst dry density, air porosity, water content and specific gravity. 7

2. A saturated soil with a volume of 18 cc has a mass of 34 g. After drying the soil has a volume of 13·9 cc. Its mass was 24 g. Find the shrinkage limit of the soil.
Derive the formula used. *7+7=14*

3. (a) Explain the types of soil water. 7

(b) Explain how the hydraulic conductivity of soil is determined in the field. 7

4. The profile of a soil deposit is shown below, in which a 4 m thick sand layer is underlain by a clay layer. The water table is at 2 m below the ground level. The density of sand above and below the water table is 17 kN/m^3 and 19·81 kN/m^3, respectively. The saturated density of clay is 16·9 kN/m^3. Determine the effective stress, pore pressure and total stress up to a depth of 7 m. Draw the variations also. *14*



5. What is the difference between the Standard Proctor test and Modified Proctor test ? Discuss the effect of the following on OMC and MOD : *14*

(a) Water content

(b) Amount of compaction

(c) Types of compaction

6. (a) What is the difference between equipotential lines and streamlines ? How is seepage quantity estimated through the flow net ? 7

(b) Explain with a suitable example, how is pressure under a hydraulic structure estimated. 7

7. (a) Write a note on Newmark's chart for the estimation of vertical stress at a point in the soil medium due to uniformly loaded area of any shape. 7

(b) The consolidation settlement of a landfill due to 4 m thick clay is estimated as 111 mm. The layer is doubly drained. Determine the time rate of consolidation settlement. Given $C_v = 2{\cdot}537 \times 10^{-4}$ cm^2/sec. 7

8. (a) Discuss the factors affecting shear strength of cohesive and cohesionless soils. 7

(b) Discuss the Swedish circle method for finding the factor of safety of the slope. 7

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