

5E5063

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B.Tech. (Sem.V) (Main) Examination- 2014  
Civil Engineering  
5CE3 Geotechnical Engineering - I

Time : 3 Hours

Total Marks : 80  
Min. Passing Marks : 24

Instructions to Candidates :

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

UNIT-I

1. (a) Define : density index, consistency index, dry density and air content. (4)  
(b) A 10 cm dia and 30 cm long soil sample weighs 4125g. A moist specimen taken from the sample weighs 14.7g. and after oven drying it weighs 11.2g. Specific gravity of soil solids is 2.68. Determine : bulk density, dry density, water content and degree of saturation. Also determine the water content at which soil gets fully saturated without any increase in volume. What will be unit weight of saturated soil? (12)

OR

1. (a) Draw plasticity chart of soil classification as per ISC system. (8)  
(b) Enumerate the corrections applied to hydrometer reading. How corrections are determined? (8)

UNIT-II

2. (a) Describe various clay mineral. (8)  
(b) Describe various soil structures. (8)

OR

2. (a) Derive an expression for determination of coefficient of permeability by falling head method. (8)  
(b) Describe the factors affecting permeability of soil. (8)

UNIT-III

3. (a) A 5m thick layer of soil is having saturated unit weight of  $20.00 \text{ kN/m}^3$ . The upper 1M of the layer is saturated by capillary rise. Determine its effective stress along the depth and draw its variation. (8)  
(b) What do you understand by "Quick sand"? Derive an expression of critical hydraulic gradient. (8)

OR

3. (a) Derive an expression of "Laplace's Equation". What is the significance of this equation? (8)  
(b) What is "flow net"? Describe its properties and uses. (8)

UNIT-IV

4. (a) Explain Mohr-Coulomb theory of shear strength of soils. (8)  
(b) Describe unconfined compressive strength test for determination of cohesion of soil. (8)

OR

4. Explain direct shear test. How shear strength parameters are obtained by this test? (16)

UNIT-V

5. A soil in the borrow pit is at a dry density of  $17 \text{ kN/m}^3$  and water content of 10%. The soil is excavated from this pit and compacted in an embankment to a dry density of  $18 \text{ kN/m}^3$  with a water content of 15%. Compute the quantity of soil to be excavated from the borrow pit and the amount of water to be added for  $100 \text{ m}^3$  of compacted soil in the embankment. (16)

OR

5. (a) Describe process of lime stabilization of soil. (8)  
(b) Explain mechanical stabilization of soil. (8)