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BICE-026

B.Tech. IN CIVIL ENGINEERING (BTCLEVI)

01325

Term-End Examination

December, 2014

BICE-026 : GEO-TECHNICAL ENGINEERING – I

Time : 3 hours *Maximum Marks : 70*

Note : *Attempt any **seven** questions. All questions carry equal marks. Assume missing data, if any. Use of scientific calculator is permitted.*

1. (a) Derive the relation between void ratio [e], specific gravity of particles [G] and moisture content at full saturation [w]. *5*

(b) One cubic meter of wet soil weighs 19·80 kN. If the specific gravity of soil particles is 2·70 and water content is 11%, find the void ratio, dry density and degree of saturation. *5*

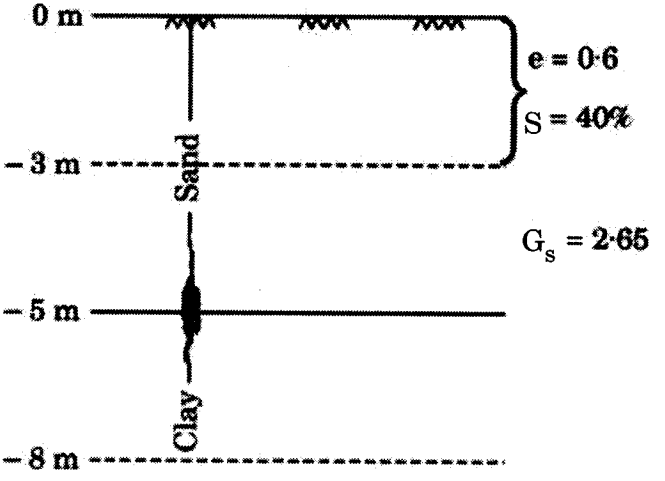
2. Describe in detail the Indian system of soil classification. *10*

3. (a) A soil has bulk density of 19 kN/m^3 and water content of 12%. Calculate the water content, if the soil partially dries to a density of 18·5 kN/m^3 and the void ratio remains unchanged. *7*

(b) Describe the soil classification system on the basis of texture and mineral composition. 3

4. (a) State the principle of Darcy's Law for laminar flow of water through saturated soil. What are the various parameters that affect the permeability of soil in the field ? 5

(b) In the figure below if the water table rises up to the ground surface, what is the change in effective stress at elevation of 8 m : 5



(a) Subsoil conditions

5. (a) Write brief notes on 'Compaction' and 'Consolidation' of soil. 5

(b) Draw a curve showing the relation between dry density and moisture content and indicate the salient features of the curve. 5

6. (a) In a consolidation test the following results have been obtained. When the load was changed from 50 kN/m^2 to 100 kN/m^2, the void ratio changed from 0·70 to 0·65. Determine the coefficient of volume decrease (M_v) and the compression index (C_c). *5*

(b) State the assumption of Terzaghi's theory of one-dimensional consolidation. Distinguish between normally consolidated and over consolidated soils. *5*

7. (a) Explain the zero air voids line in brief. *5*

(b) Write brief critical note on "Taylor's Stability Number". *5*

8. Write short notes on the following :

(a) Unified soil classification *5*

(b) Consistency of clayey soils *5*

9. (a) Sketch the phase diagram for a soil and indicate the volumes and weights of the phase on it. Derive the relationship between dry density and bulk density in terms of water content. *5*

(b) A soil sample has a unit weight of 1 g/cm^3. The moisture content of this soil is 20% when the degree of saturation is 50%. Determine the void ratio, specific gravity of soil solid and saturated unit weight. *5*

10. (a) Write short notes on 'neutral' and 'effective' pressure. *5*

(b) Calculate the total, effective and water pressure at points A and B for the soil profile shown below. *5*