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Roll No

CE-701-CBGS

B.Tech., VII Semester

Examination, December 2020

Choice Based Grading System (CBGS)

Geotechnical Engineering

Time : Three Hours

Maximum Marks : 70

Note: i) Attempt any five questions.

ii) All questions carry equal marks.

1. a) A soil sample is compacted to a bulk unit weight of 18kN/m^3 at 10% water content. Find the void ratio and degree of saturation of the soil. Also find the weight of water to be added to 100 m^3 of this soil for complete saturation. Assume $G=2.75$. 7
b) What are the index properties of soil? Why are they important? 7
2. a) A partially saturated clay weighs 113.4 gm in its natural state and 93.4g in its dry state. If specific gravity is 2.65, find out the void ratio, porosity, degree of saturation, γ_{wet} , γ_d and γ_{sat} . Size of the clay is 3.7 cm in dia. and 7.5 cm ht. 7
b) Define the following terms.
i) Activity
ii) Thixotropy
3. a) State Darcy's law and explain the validity of the law. 7
b) What are the factors affecting Coefficient of Permeability? 7

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4. a) In a deposit of sand 10 m thick, water table is 2m below ground surface. Above the water table, soil is saturated with capillary water. Saturated unit weight of sand is 21 kN/m^3 . Plot the variation of Total stresses, Neutral stresses and Effective stresses over the depth of 10m. 10
- b) Explain effective stress principle. 4
5. a) A 20 m thick isotropic clay stratum overlies an impervious rock. The coefficient of consolidation is $5 \times 10^{-2} \text{ mm}^2/\text{s}$. Find the time required for 50% and 90% consolidation. The time factor for 50% consolidation is 0.2 and for 90% consolidation is 0.85. 10
- b) Explain the effect of capillarity on effective stress. 4
6. a) Differentiate between critical hydraulic gradient and exit gradient. 7
- b) State any four merits of triaxial test over direct shear test. 7
7. a) Explain the effect of capillarity on effective stress. 7
- b) Starting from the fundamentals, derive an expression for bulk unit weight in terms of air content, water content and percentage air voids. 7
8. a) What is meant by factor of safety with respect to cohesion? When does it become equal to factor of safety with respect to shear strength? 7
- b) What are the methods of soil stabilization. Explain functions and applications of geo synthetic in detail. 7
