

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

June, 2018

00543

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. Explain in detail the Indian System of Soil Classification (BIS). 10

2. Discuss various field and laboratory methods used for water content determination of soils as per I.S. code. 10

3. What is Stokes' Law ? Under what conditions is this law valid ? Discuss its validity with respect to Hydrometer Analysis of the soil particles. 10

4. (a) In a falling head permeameter test, the initial head ($t = 0$) is 40 cm. The head drops by 5 cm in 10 minutes. Calculate the time required to run the test for the final head to be at 20 cm. 5
- (b) Write the factors that affect the permeability of a soil stratum. If k_1 , k_2 , k_3 are the permeabilities of layers h_1 , h_2 and h_3 thick, what is its equivalent permeability in the horizontal and vertical directions? 5
5. (a) An undisturbed sample of a clay stratum 2 m thick, was tested in the laboratory and the average value of coefficient of consolidation was found to be 2×10^{-4} cm²/sec. If a structure is built on the clay stratum, how long will it take to attain half the ultimate settlement under the load of the structure? Assume double drainage. (Time value of $T_v = 0.197$ for $U = 50\%$) 5
- (b) State the assumption of Terzaghi's theory of one-dimensional consolidation. Distinguish between normally consolidated and over consolidated clays. 5

6. (a) Define the terms "Compression index" and "Coefficient of consolidation" and indicate their units and symbols. 5
- (b) Explain the zero air-voids line in brief. 5
7. (a) A cylinder of soil fails under an axial vertical stress of 160 kN/m^2 , when it is laterally unconfined. The failure plane makes an angle of 50° with the horizontal. Calculate the value of cohesion and the angle of internal friction of the soil. 6
- (b) Discuss the advantages of triaxial test. 4
8. Explain the method of slices for finding the factor of safety against slope failure. 10
9. Write short notes on any *two* of the following : $2 \times 5 = 10$
- (a) Soil Formation
- (b) Neutral and Effective Pressure in Soil
- (c) Direct Shear Test
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