

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

Term-End Examination

June, 2018

00173

ET-501(A) : SOIL MECHANICS

Time : 3 hours

Maximum Marks : 70

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

1. (a) What is relative density ? If the minimum and maximum dry density of a sandy soil were found to be 15.2 kN/m^3 and 17.43 kN/m^3 respectively, determine the dry density corresponding to a relative density of 60%. Assume $G = 2.65$. 7
- (b) What is shrinkage limit ? Discuss how it is determined in the laboratory. 7
2. (a) The consistency limits of soil A and soil B are given below. What will be designation of these soils ? 7

Soil	Liquid limits (%)	Plastic limits (%)
A	45%	32%
B	20%	15%

(b) Explain the structures of clay minerals. How do they behave in the presence of water? 7

3. (a) Discuss the structure and engineering behaviour of compacted cohesive soils. 7

(b) The results of a constant head permeability test on a soil sample are as follows :

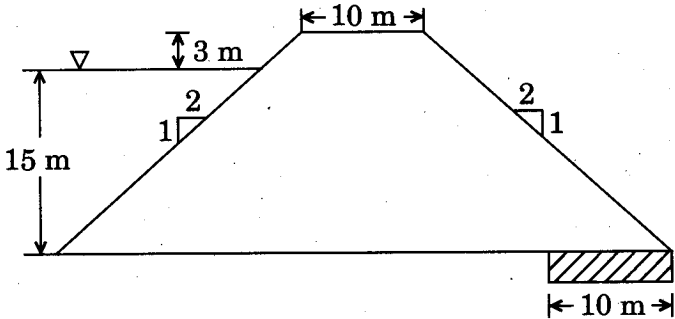
Diameter and length of permeameter are 10 cm and 12.5 cm respectively.

Head causing flow is 20 cm.

The quantity of water collected in 10 min is 160 c.c.

Determine the coefficient of permability. 7

4. (a) Find the seepage through the dam body as shown below :



The coefficient of permeability of the dam material is 8×10^{-6} m/sec. 7

(b) What is capillary action in the soil ? Discuss with the help of any three examples. 7

5. (a) Discuss the assumptions made in Terzaghi's theory of one-dimensional consolidation. 7
- (b) A normally consolidated clay layer settled by 18 mm when the effective stress was increased from 25 to 50 kN/m². What will be the settlement when the effective stress is increased from 50 to 100 kN/m²? 7
6. (a) Discuss how unconfined compressive strength test is performed in the laboratory. Explain the failure pattern. 7
- (b) Determine the shear strength in terms of effective stress on a plane within a saturated soil mass at a point where the total normal stress and pore pressure are 200 kN/m² and 70 kN/m² respectively. The effective shear strength parameters for the soil are : $c' = 18 \text{ kN/m}^2$ and $\phi' = 28^\circ$. 7
7. (a) Discuss how the bearing capacity of the soil is determined by plate load test. Also discuss the limitations of the test. 7
- (b) What are the methods for improving the stability of a slope? 7
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