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Total No. of Questions : 18

B.Tech. (Civil Engineering)   (Sem.–5)

GEOTECHNICAL ENGINEERING#

Subject Code : BTCE-506-18
M.Code : 78465

Time : 3 Hrs.   Max. Marks : 60

INSTRUCTIONS TO CANDIDATES :

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

SECTION-A

Write briefly :

1) A compacted sample of soil with a bulk unit weight of 19.62 kN/cubic metre has a water content of 15 per cent. What are its dry density, degree of saturation? Assume G = 2.65.

2) Write the significance of Atterberg limits for soils.

3) Name the soil as per IS: ML, SP and WG, CI.

4) Differentiate Standard Proctor from Modified Proctor test.

5) For a homogeneous earth dam 52 m high and 2 m free board, a flow net was constructed and following results were obtained: Number of potential drops = 25; Number of flow channels = 4. Calculate the discharge per metre length of the dam if the co-efficient of permeability of the dam material is 3×10^{-5} m/sec.

6) Name the factors affecting permeability.

7) In a laboratory consolidometer test on a 20 mm thick sample of saturated clay taken from a site, 50% consolidation point was reached in 10 minutes. Estimate the time required for the clay.

8) What is the effect of water table fluctuation on effective stresses?

9) Why Triaxial shear test is considered better than direct shear test?

10) Draw and label the different types of finite and infinite Slope failure.

SECTION-B

11) Explain the significance of studying soil mechanics to a Civil Engineer.

12) Calculate the coefficient of permeability of a soil sample 8 cm in height and cross sectional area 60 cm square. It is observed that in 12 minutes, 600 ml of water passed down under an effective head of 50 cm. On oven drying the test specimen weighs 750gm. Take 2.70 as specific gravity of soil, calculate the seepage velocity of water during the test.

13) Differentiate between Compaction and Consolidation. Give examples.

14) In an unconfined compression test, the following results were obtained.

Diameter of sample = 3.7cm, Length of sample = 7.5 cm, Spring extension = 3.00 cm, Spring constant = 100 N/cm, Deformation of sample = 12 mm,

Determine the unconfined compressive strength of the soil.

15) How pre consolidation pressure can be found, explain with figure?

SECTION-C

16) The following observations were noted during Proctor's compaction test for a soil :

Water Content(%)	8	11	12	14	16	18	20
Density (kN/m^3)	18	20	21.5	22.5	20.3	19	17.5

Sp. Gravity of soil is 2.7. Find the maximum dry density and optimum moisture content. Plot zero air void line and 85% saturation curve also.

17) a) A clay laying on impervious rock and having pervious overburden is10 m thick. Calculate the final settlement and time required for 60% consolidation due to construction of a structure at top of stratum, imparting a uniform load of 20 tons per meter square. The initial and final void ratio of clay were found to be 0.752 and 0.722 respectively. Clay is saturated and the structure may be considered infinite in any horizontal direction. Coefficient of consolidation for clay 16×10^{-4} square cm per sec and for U= 60% time factor Tv = 0.16   (6)

b) Discuss briefly pumping out test for permeability of soils.   (4)

18) The result of a CU test on a compacted soil are given below :

Sample No	σ_3 (kN/m^2)	$\sigma_1 - \sigma_3$ (kN/m^2)	u (kN/m^2)
1	70	230	-20
2	350	550	+90

a) Find out shear strength parameters by Mohr circle method.

b) Determine the cohesion intercept and the angle of shearing resistance in terms of (i) total stresses (ii) effective stresses.

NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.