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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, JULY 2017

Course Code: CE208

Course Name: GEOTECHNICAL ENGINEERING I (CE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions. Each carries 15 marks.

1 a) What are the major soil deposits of India? (5)

b) Derive the relationship between dry density, Υ_d and Bulk density, Υ of soil. (5)

c) A moist soil sample of soil has a mass of 700 g and a volume of 200 cc at a water content of 10 %. Determine the Void ratio, Degree of Saturation and Percentage air voids Also determine the water content at which the soil gets fully saturated without any increase in volume (5)

2 a) What is a gradation curve? Sketch the gradation curves for Well graded and Gap graded soils? (4)

b) A soil sample consisting of particles of size ranging from 0.1 mm to 0.01mm, is put on the surface of still water tank 6 m deep. Calculate the time of settlement of the coarsest and finest particles of the sample to the bottom of the tank. Specific gravity of soil = 2.66, Viscosity of water = 0.008 poise. (5)

c) Explain the IS classification of soils. (6)

3 a) Define the following terms: - (4)

i) Activity ii) Thixotropy

b) The Liquid limit of a soil sample is 46 % and Plastic limit is 27%. Classify the soil using a Plasticity chart. (5)

c) The Atterberg limits of a soil sample are LL= 52 %, PL = 33% and SL = 17%. If the specimen of the soil shrinks from a volume of 11.5 cc at Liquid limit to 6.2 cc when it is oven dried. Calculate: - (6)

i) Shrinkage ratio ii) specific gravity of soil solids

PART B

Answer any two full questions. Each carries 15 marks.

4 a) State Darcy's law and explain the validity of the law (4)

b) Find the average horizontal and vertical permeabilities of a soil mass made up of three horizontal layers. The first and second layer have same thickness of 0.6 m each and third layer is 0.8 m thick. The coefficient of permeability of first, second and third layer are 2×10^{-4}cm/s, 2.5×10^{-5}cm/s and 1.2×10^{-4}cm/s respectively. (5)

c) Explain Mohr Coulomb failure criteria. Also draw the failure envelope for: - (6)

i) Pure sand ii) Pure clay

5 a) What is UU and CD tests? (4)

b) What are the factors affecting Coefficient of Permeability? (5)

c) 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. (6)

6 a) Explain the quick sand condition (5)

b) The Triaxial tests conducted on four identical soil sample specimens gave the following results. (10)

Cell pressure in kN/m^2	100	150	200	250
Deviator stress in kN/m^2	300	420	515	607
Neutral stress in kN/m^2	6	12	14	16

Determine the shear parameters in terms of: -

i) Total stresses ii) Effective stresses

PART C

Answer any two full questions. Each carries 20 marks.

7 a) Define (5)

i) Normally consolidated clay ii) Over consolidated clay

b) A clay layer 4m thick is sandwiched between layer of sand at top and impermeable strata at bottom. Calculate the time taken by clay layer to reach 40 % consolidation, if coefficient of consolidation is 2x 10^{-4} cm/s. (5)

c) Explain the Friction circle method for slope stability analysis. (10)

8 a) What are the different types of slope.failure? (5)

b) What is meant by control of compaction (5)

c) A saturated clay sample of height 25mm, cross sectional area 50 cm^2 was subjected to a consolidation test and the results are as follows. Height of solids = 14.25mm. Final water content = 25%. Find the void ratio at various load increments by Height of solids method. (10)

Pressure in kN/m^2	0	10	20	40	80	160	320	640	0
Dial reading	490	482	470	431	390	343	295	249	350

9 a) A clay stratum 2m thick is subjected to an overburden pressure of 150 kN/m^2. Estimate the probable settlement of the clay layer if effective pressure at centre of clay layer is expected to increase to 345 kN/m^2. The slope of e- log p curve is 0.09. The initial void ratio is 1.12. (5)

b) What are the uses of Stability number and Stability charts? (5)

c) Explain about the standard proctor test. (10)

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