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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth Semester B.Tech Degree S4 (S,FE) Examination June 2022 (2015 scheme)

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 Marks

1 a) Define void ratio, porosity, degree of saturation, air content and percentage of air voids. 5

b) List the major soil deposits in India and explain the properties of any 2 types of deposits. 5

c) Distinguish between thixotropy and sensitivity. 5

2 a) What are the corrections applied to hydrometer analysis? 3

b) Explain well graded, poorly graded and gap graded soil with the help of particle size distribution curves. 6

c) A sandy soil in its loosest state has a void ratio of 0.92, and a void ratio of 0.53 in its densest state. At the natural sate the relative density is 60%. The specific gravity of solid particle is 2.7. Calculate; (i) the void ratio in the natural state (ii) the dry unit weights in the densest, loosest and natural states. 6

3 a) Sieve analysis was conducted on a sample of sand and the following results were obtained: Percentage of gravel = 12, Percentage of sand = 88, D10 = 0.16mm, D30 = 0.64mm, D60 = 1.22mm. Classify the soil according to IS specification. 7

b) A soil has a bulk density of 20.5kN/m^3 and water content of 18%. Calculate the void ratio and degree of saturation if the specific gravity of soil is 2.67. At what water content would be the same soil sample be fully saturated? 8

PART B

Answer any two full questions, each carries 15 marks

4 a) What are the factors affecting Coefficient of Permeability? 5

b) During a falling head permeability test, the head fell from 600mm to 300mm in 540s. The specimen was 50mm in diameter and had a length of 100mm. The cross sectional area of the stand pipe was 60mm^2. Compute the coefficient of permeability of the soil. What was the probable classification of soil tested? 5

c) Explain the quick sand condition. 5

5 a) List the demerits of direct shear test. 5

b) Explain the procedure for conducting vane shear test. 5

c) An unconfined compression test was performed on a clay sample 150mm in diameter and 300 mm in height. The failure load was 100N and the axial deformation at failure was 2mm. Find the shear strength of soil. 5

6 a) Explain Mohr-Coloumb failure criterion. 7

b) A layer of sand 8m thick lies above a layer of clay. The water table is at a depth of 1m below the ground surface. Above the water table sand is saturated with capillary moisture. The saturated unit weight of sand is 20kN/m^3 and its dry unit weight is 17kN/m^3. Plot the total stress, neutral stress and effective stress up to a depth of 8m. 8

PART C

Answer any two full questions, each carries 20 marks

7 a) A clay stratum 2m thick is subjected to an overburden pressure of 150kN/m^2. 5

Estimate the probable settlement of the clay layer if effective pressure at centre of clay layer is expected to increase to 345kN/m^2. The slope of e- log p curve is 0.09. The initial void ratio is 1.12.

b) Explain the procedure for determination of coefficient of consolidation by logarithm of time fitting method. 10

c) What are the different types of slope failure? 5

8 a) Define 6

i) Normally consolidated clay ii) Over consolidated clay

b) The optimum moisture content and maximum dry density of a soil obtained from the standard Proctor tests are 18% and 1.67g/cc. If the sp. Gravity of soil solids is 2.7, determine the degree of saturation of the soil at OMC and the dry density corresponding to a zero air voids condition at OMC. 8

c) What is meant by control of compaction? 6

9 a) What are the assumptions in Terzaghi's one dimensional consolidation theory? 5

b) Explain the Swedish circle method for the analysis of slopes for a c-Ø soil. 10

c) 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 2×10^{4} cm/s 5

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