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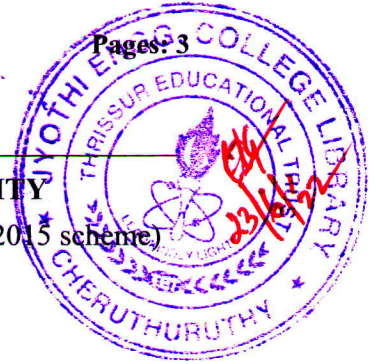
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Reg No.: _____

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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 state 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, $D_{10} = 0.16\text{mm}$, $D_{30} = 0.64\text{mm}$, $D_{60} = 1.22\text{mm}$. 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 60mm². 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/m³ and its dry unit weight is 17kN/m³. 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/m². 5
Estimate the probable settlement of the clay layer if effective pressure at centre of clay layer is expected to increase to 345kN/m². 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- ϕ 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
