Q.P. Code: 16CE122 **R16**

Reg. No: | | | | | | | | | | |

SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR

(AUTONOMOUS)

B.Tech III Year I Semester Supplementary Examinations December-2021

GEOTECHNICAL ENGINEERING - I

(Civil Engineering)

Time: 3 hours Max. Marks: 60

(Answer all Five Units **5 x 12 = 60** Marks)

UNIT-I

1	a	Explain with sketches various types of soil structures.	L1	6M
	b	The unit weight of sand backfill was determined by field measurements to be 17.13kN/m^3. The Water content at the time of test was 8.60% and the unit weight of the solid constituents was 25.50kN/m^3 .In the laboratory the void ratio in the loosest and densest state ware found to be 0.642, 0.462	L2	6M

OR

2	a	Using three phase diagram of soil, derive an expression for water content in terms of void ratio, Specific gravity and degree of saturation.	L1	6M
	b	A saturated soil sample has a water content of 25% and unit weight of 20 KN/m^3. Determine the Specific gravity of the solid particles, dry unit weight and void ratio	L2	6M

UNIT-II

3	a	Define permeability & Darcy's law. How do you determine the permeability of a clayey soil in the Laboratory? Write the formula you use and explain the terms.	L1	6M
	b	A 1.25 m layer of the soil (G = 2.65 and porosity = 35%) is subject to an upward seepage head of 1.85 m. What depth of coarse sand would be required above the soil to provide a factor of safety of 2.0 Against piping assuming that the coarse sand has the same porosity and specific gravity as the Soil and that there is negligible head loss in the sand.	L2	6M

OR

4	a	Write an expression for determining permeability of soil by falling head permeameter and Explain the terms.	L1	6M
	b	Estimate the quantity of flow of water through a soil mass in a 300 sec period when a constant Head of 1m is maintained. The length of the sample is 150 mm and the cross sectional area is 100×100 mm. The coefficient of permeability of the soil sample is 1×10−1 mm/s.	L2	6M

UNIT-III

5	a	Explain Westergaard's theory for the determination of the vertical stress at a point.	L1	6M
	b	The soil from a borrow pit is at a bulk density of 17.50 kN/m3 and a water content of 12.3%. It is Desired to construct an embankment with a compacted unit weight of 19.82 kN/m3 at a water Content of 17%.Determine the quantity of soil to be excavated from the barrow pit and the amount of water to be added for every 100 m3 of compacted soil in the embankment.	L2	6M

OR

6	a	Describe the Standard Proctor test and modified Proctor test to be conducted in the laboratory.	L1	6M
	b	A rectangular area 4 m × 6 m carries a uniformly distributed load of 100 kN/m^2 at the ground Surface. Estimate the vertical pressure at a depth of 6 m vertically below the centre.	L2	6M

UNIT-IV

7	a	Obtain the differential equation defining the one-dimensional consolidation as given by Terzaghi, Listing the various assumptions.	L1	6M
	b	In a consolidation test the following results have been obtained. When the load was changed from 50 kN/m2 to 100 kN/m2 , the void ratio changed from 0.70 to 0.65. Determine the coefficient of volume Decrease, mv and the compression index, Cc	L2	6M

OR

8	a	Discuss the spring analogy for primary consolidation. What are it uses?	L1	6M
	b	A layer of soft clay is 5 m thick and lies under a newly constructed building. The weight of sand Overlying the clayey layer produces a pressure of 250 Kn/m^2 and the new construction increases the Pressure by 120 Kn/m^2 If the compression index is 0.5, compute the settlement. Water content is 40% and specific gravity of grains is 2.68	L2	6M

UNIT-V

9	a	Briefly explain how you conduct the triaxial compression test? Compute the shear parameters for the soil from the test data.	L1	6M
	b	The stresses at failure on the failure plane in a cohesionless soil mass were Shear stress = 4 kN/m^2; Normal stress = 10 kN/m^2 . Determine the resultant stress on the failure plane, the angle of internal Friction of the soil and the angle of inclination of the failure plane to the major principal plane.	L2	6M

OR

10	a	Describe the vane shear test with neat a sketch.	L1	6M
	b	A particular soil failed under a major principal stress of 300 kN/m^2 with a corresponding minor Principal stress of 100 kN/m^2 . If, for the same soil, the minor principal stress had been 200 kN/m^2, Determine what the major principal stress would have been if (a) $\varphi = 30°$ and (b) $\varphi = 0°$.	L2	6M

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