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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)**B.Tech III Year I Semester Regular & Supplementary Examinations Nov/Dec 2019**
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 Clay mineralogy. 6M
b Explain with sketches various types of soil structures. 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. 6M
b A saturated soil sample has a water content of 25% and unit weight of 20 KN/m³. Determine the Specific gravity of the solid particles, dry unit weight and void ratio. 6M

UNIT-II

- 3 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. 12M

OR

- 4 a 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? 8M
b What is flow net? Describe its properties and applications. 4M

UNIT-III

- 5 a Explain Westergaard's theory for the determination of the vertical stress at a point. 6M
b Explain the concept of 'Pressure Bulb' in soils. 6M

OR

- 6 The following data are obtained in a compaction test. Specific gravity = 2.65 12M

Moisture content (%)	2	4	5.8	6.7	7.8	10
Wet density (kN/m ³)	20.4	20.9	21.4	22.2	22.4	22.0

Determine the OMC and maximum dry density. Draw 'Zero-air-void line'.

UNIT-IV

- 7 Obtain the differential equation defining the one-dimensional consolidation as given by Terzaghi, Listing the various assumptions. 12M

OR

- 8 The void ratio of clay A decreased from 0.574 to 0.512 under a change in pressure from 125 to 185 kg/m². The void ratio of clay B decreased from 0.608 to 0.592 under the same increment of Pressure. The thickness of sample A was 1.5 times that of B. Then time required for 50% Consolidation was three times longer for sample B than for sample A. What is the ratio of the Coefficient of permeability of A to that of B. 12M

UNIT-V

- 9 Explain the principle of the direct shear test. What are the advantages of this test? **12M**
What are its Limitations?
- OR**
- 10 Calculate the potential shear strength on a horizontal plane at a depth of 3 m below the surface in a Formation of cohesion less soil when the water table is at a depth of 3.5 m. The degree of saturation May be taken as 0.5 on the average. Void ratio = 0.50; grain specific gravity = 2.70; angle of internal Friction = 30° . What will be the modified value of shear strength if the water table reaches the Ground surface? **12M**

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