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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY: PUTTUR
(AUTONOMOUS)**B.Tech III Year I Semester Supplementary Examinations August-2022****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 the phenomenon of formation and transportation of soils **L1 6M**
 b A sample of clay soil of volume $1 \times 10^{-3} \text{ m}^3$ and weight 17.62 N, after being dried out in an oven had a weight of 13.68 N. If the specific gravity of the particle was 2.69 find void ratio, saturated unit weight, dry unit weight and water content. **L2 6M**

OR

- 2 a Describe in detail the Indian System of soil classification. When would you use dual symbols for Soils. **L1 6M**
 b A saturated soil sample has a water content of 35% and unit weight of 25 kN/m^3 . Determine the specific gravity of the solid particles, dry unit weight and void ratio. **L2 6M**

UNIT-II

- 3 a Explain the phenomenon of capillary rise in soil and write an expression for the capillary rise. **L1 6M**
 b A falling head permeability test is to be performed on a soil sample whose permeability is estimated to be about $3 \times 10^{-5} \text{ cm/sec}$. What diameter of the stand pipe should be used if the head is to drop from 27.5 cm to 20.0 cm in 5 minutes and if the cross-section area and length of the sample are respectively 15 cm^2 and 8.5 cm. How much time will it take for the head to drop from 37.5 cm to 30.0 cm. **L2 6M**

OR

- 4 a Write the permeability equation by constant head method and explain factors effecting permeability. **L1 6M**
 b An earth dam is built on an impervious foundation with a horizontal filter at the base near the toe. The permeability of the soil in the horizontal and vertical directions are $3 \times 10^{-2} \text{ mm/s}$ and $1 \times 10^{-2} \text{ mm/s}$ respectively. The full reservoir level is 30 m above the filter. A flow net constructed for the transformed section of the dam, consists of 4 flow channels and 16 head drops. Estimate the seepage loss per meter length of the dam. **L2 6M**

UNIT-III

- 5 a Derive an expression for the vertical stress at a point due to a point load, using Boussinesq's theory. **L1 6M**
 b A concentrated load of 1500 kN acts vertically at the ground surface. determine the vertical stress at A point which is at i) a depth of 2.5 m and a horizontal distance of 4.0 m. ii) at a depth of 5.0 and a radial distance of 2.5 m. **L2 6M**

OR

- 6 a What do you understand by 'Pressure bulb'? Illustrate with sketches. **L1 6M**
 b The following data are obtained in a compaction test. Specific gravity = 2.65 **L2 6M**

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 a Describe the consolidometer test. Show how the results of this test are used to predict the rate of Settlement and the magnitude of settlement. **L1 6M**
 b A sand fill compacted to a bulk density of 18.32 kN/m³ is to be placed on a compressible saturated Mass deposit 4 m thick. The height of the sand fill is to be 3.5 m. If the volume compressibility m_v of the deposit is $6.5 \times 10^{-4} \text{m}^2/\text{kN}$, estimate the final settlement of the fill. **L2 6M**

OR

- 8 a Describe the consolidometer test. Show how the results of this test are used to predict the rate of settlement and the magnitude of settlement. **L1 6M**
 b 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. **L2 6M**

UNIT-V

- 9 a Briefly explain how you conduct Unconfined compression Test. **L1 6M**
 b Calculate the potential shear strength on a horizontal plane at a depth of 3 m below the surface in a formation of cohesionless 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? **L2 6M**

OR

- 10 a Briefly explain how you conduct the triaxial compression test. Compute the shear parameters for the soil from the test data. **L1 6M**
 b A vane, 10.8 cm long, 7.2 cm in diameter, was pressed into a soft clay at the bottom of a bore hole. Torque was applied and the value at failure was 45 Nm. Find the shear strength of the clay on a horizontal plane **L2 6M**

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