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SIDDHARTH INSTITUTE OF ENGINEERING & TECHNOLOGY:: PUTTUR
(AUTONOMOUS)**B.Tech III Year II Semester Regular & Supplementary Examinations October 2020****Geotechnical Engineering-I**

(Civil Engineering)

Time: 3 hours

Max. Marks: 60

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

- 1 a In order to find the relative density of sand, a mould of volume 1000 ml was used. When the sand was dynamically compacted in the mould, its mass was 2.10 kg, whereas when the sand was poured in loosely, its mass was 1.635 kg. If the in-situ density of the soil was 1500 kg/m^3 , calculate the relative density. $G = 2.70$. Assume that the sand is saturated. **7M**
- b Derive the relationship between bulk density and dry density in terms of water content. **5M**

OR

- 2 a Briefly explain the Procedure of core cutter method. **6M**
- b Derive the relationship between $S.e = w.G$ where S = degree of saturation, e = void ratio, w = water content and G = specific gravity of soil solids. **6M**

UNIT-II

- 3 a 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. **7M**
- b Explain factors effecting permeability **5M**

OR

- 4 a Determine the average coefficient of permeability in the horizontal and vertical directions for a deposit consisting of three layers of thickness 5 m, 1 m and 2.5 m and having coefficient of permeability of $3 \times 10^{-2} \text{ mm/sec}$, $3 \times 10^{-5} \text{ mm/sec}$, and $4 \times 10^{-2} \text{ mm/sec}$, respectively. Assume that the layers are isotropic. **6M**
- b Write the permeability equation by constant head method and explain factors effecting permeability. **6M**

UNIT-III

- 5 The following data are obtained in 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'

OR

- 6 a Write short notes on Field compaction control **6M**
- b A concentrated load of 1500 kN acts vertically at the ground surface. Determine the vertical stress at A point which is at a depth of 2.5 m and a horizontal distance of 4.0 m. **6M**

UNIT-IV

- 7 a 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. **7M**
- b Define the following terms (i) Expansion Index (ii) coefficient of volume change. **5M**
- OR**
- 8 a With the help of a typical graph explain how pre-consolidation pressure is determined as suggested by Casagrande. **9M**
- b Define the Recomaction Index. **3M**

UNIT-V

- 9 a Explain the principle of the direct shear test. What are the advantages of this test? What are its Limitations? **6M**
- b Briefly explain how you conduct Unconfined compression Test. **6M**
- OR**
- 10 Write brief critical notes on: **12M**
- i) Mohr's Circle
 - ii) Explain the Mohr-Coulomb strength envelope.

*** END ***