



(Following Paper ID and Roll No. to be filled in your Answer Book)

**PAPER ID : 180409**

Roll No.

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## B. Tech.

(SEM. IV) THEORY EXAMINATION, 2014-15

### SOIL MECHANICS

Time : 3 Hours]

[Total Marks : 100

**Note :** Attempt each section.

#### SECTION –A

- 1 Attempt each short answer type questions. **10×2=20**
- (a) Define soil mechanics. What do you understand by density of soil?
  - (b) List the field of soil mechanics.
  - (c) For what type of uses a "new mark influence – chart" is used?
  - (d) What do you mean by shear strength of soil?
  - (e) Define "Compaction of soils". Where compaction is essential?
  - (f) Is the compaction of soil by tractor rear wheel affect the germination of seeds?
  - (g) What is  $c_o$  – efficient of consolidation?
  - (h) Define "void ratio". How it is a important factor in the field of agricultural growth?

- (i) What do you understand by "Taylor's stability number"?
- (j) Differentiate between cohesive and non cohesive soils with examples.

### **SECTION – B**

- 2** Attempt any three parts of the following : **10×3=30**
- (a) Explain the I.S. Soil classification. Also draw a phase diagram.
  - (b) Discuss the Mohr – coulomb failure theory.
  - (c) Differentiate between standard and modified proctor test.
  - (d) What are the methods to calculate the "void ratio"? Is the coefficient of volume change depend on void ratio?
  - (e) Derive the "Passive earth pressure" of cohesive soils.

### **SECTION – C**

- 3** Attempt all parts of the following : **10×5=50**
- (a) A clay sample has a void ratio of 0.53 in dry state. What will be the shrinkage limit if  $G = 2.70$ ?

**OR**

A soil has a bulk unit weight of  $20.11 \text{ kN/m}^2$  and water content of 15%. Calculate the water content if the soil partially dries to a unit weight of  $19.42 \text{ kN/m}^3$  and the void ratio remains unchanged.

- (b) Discuss the Bousinesque's analysis for concentrated force.

**OR**

A rectangular area  $2\text{m} \times 4\text{m}$  carries a uniform load of  $80 \text{ kN/m}^2$  at the ground surface; Find the vertical pressure at  $5\text{m}$  below the centre and the corner of loaded area.

- (c) Describe the factor affecting on consolidation.

**OR**

With the help of sketch explain the water density relationship in very much essential for standard proctor test.

- (d) An unsaturated sample of clay stratum,  $2\text{m}$  thick was tested in the laboratory and the average value of coefficient of consolidation was found to be  $2 \times 10^{-4} \text{ cm}^2/\text{sec}$ . If the structure is build on the clay stratum, how long will it take to attain half the ultimate settlement under the load of structure? Assume double drainage.

**OR**

Discuss the Taylor's method of consolidation.

- (e) Compute the intensities of active and passive earth pressure at depth of  $8\text{m}$  in dry cohesion less sand with an angle of internal friction of  $30^\circ$  and unit weight of  $18 \text{ kN/m}^3$  What will be the intensities of active and passive earth pressure if the water level rises to the ground level? Take saturated unit weight of sand as  $22 \text{ kN/m}^3$ .

**OR**

Discuss the stability analysis of finite slopes?