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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CE) (2012 to 2017) (Sem.-5)

**GEOTECHNICAL ENGINEERING**

Subject Code : BTCE-502

M.Code : 70513

Time : 3 Hrs.

Max. Marks : 60

**INSTRUCTION TO CANDIDATES :**

1. SECTION-A is COMPULSORY consisting of TEN questions carrying TWO marks each.
2. SECTION-B contains FIVE questions carrying FIVE marks each and students have to attempt any FOUR questions.
3. SECTION-C contains THREE questions carrying TEN marks each and students have to attempt any TWO questions.

**SECTION-A****1) Answer briefly :**

- a) Explain the term principal stresses.
- b) What do you understand by Index properties of soil?
- c) What is the basic difference in compression behavior of granular and fine-grained soils?
- d) Given :  $D_{10} = 0.1$  mm,  $D_{30} = 0.41$  mm,  $D_{60} = 0.62$  mm. Write down soil classification as per 1498-1970.
- e) If  $w = 40\%$ ,  $G = 2.71$ , then calculate  
 $\gamma_{\text{sat}}$  and  $\gamma_{\text{dry}}$  in  $\text{kN/m}^3$
- f) Give complete name of soil groups: SM, GW-GM
- g) Draw typical stress-strain curves for sandy soils
- h) Define Skempton's pore pressure parameter
- i) Which type of roller is the most suitable for compacting subgrade with high plastic clays?
- j) Give any two assumptions of wedge theory.

**SECTION-B**

- 2) Give general engineering properties of different types of soils classified according to Indian standard classification system.
- 3) A ring footing of external diameter 8 m and internal diameter 4 m rests at a depth 2 m below the ground surface. It carries a load intensity  $150 \text{ kN/m}^2$ . Find the vertical stress at depths of 2, 4 and 8 m along the axis of the footing below the footing base. Neglect the effect of the excavation on the stress.
- 4) Explain concept of consolidation using Spring Analogy.
- 5) A soil sample has a porosity of 30% the specific gravity of solids is 2.60. Calculate its
  - a) Void ratio,
  - b) Dry density
  - c) Unit weight if the soil is 50% saturated and
  - d) Unit weight if the soil is completely saturated
- 6) Explain briefly about the effect of compaction on soil properties.

**SECTION-C**

- 7) The soil in a borrow pit has a void ratio of 0.90. A fill-in-place volume of  $20,000 \text{ m}^3$  is to be constructed with an in-place dry density  $18.84 \text{ kN/m}^3$ . If the owner of borrow area is to be compensated at Rs. 1.50 per cubic metre of the excavation, determine the cost of compensation.
- 8) Explain and derive Terzaghi's theory of one-dimensional consolidation. Also enlist its assumptions.
- 9) Write short notes on **any two** of the following :
  - a) Sieve analysis
  - b) Triaxial shear test
  - c) Causes of over consolidation.

**NOTE : Disclosure of Identity by writing Mobile No. or Making of passing request on any page of Answer Sheet will lead to UMC against the Student.**