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Total No. of Pages : 02

Total No. of Questions : 09

B.Tech.(CE) (2011 Onwards) (Sem.–5) GEOTECHNICAL ENGINEERING Subject Code : BTCE-502 Paper ID : [A2079]

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

Q1 Answer briefly :

- a) Define Skempton's pore pressure parameter.
- b) What do you understand about index properties?
- c) What is the difference between cohesive and cohesionless soils? Explain with examples.
- d) Write name of any four tests used for determination on in-situ unit weight.
- e) Define the terms void ratio and dry density.
- f) How would you determine the bulk density of a soil in field?
- g) A soil has a liquid limit of 25% and a flow index of 12.5%. If the plastic limit is 15%. Determine the plasticity index and the toughness index. If the water content of the soil in its natural condition in the field is 20%. Find the liquidity index and the relative consistency.
- h) Which type of roller is the most suitable for compacting sub grade with high plastic clays?
- i) Write revised Mohr-Coulomb equation. How does it differ from the original equation?
- j) What is Darcy's law? What are its limitations?



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SECTION-B

- Q2 What are the different factors of safety used in the stability of slopes?
- Q3 A clay layer 4 m thick is subjected to a pressure of 55 kN/m². If the layer has a double drainage and undergoes 50% consolidation in one year, determine the coefficient of consolidation. Take T_v = 0.196. If the coefficient of permeability is 0.020 m/yr, determine the settlement in one year and rate of flow of water per unit area in one year.
- Q4 Explain concept of O.M.C. and zero air void line the help of a diagram.
- Q5 In a consolidation test on a soil, the void ratio of the sample decreased from 1.25 to 1.10 when the pressure is increased from 200 kN/m² to 400 kN/m². Calculate the coefficient of consolidation if the coefficient of permeability is 8×10^{-8} cm/sec.
- Q6 What is a flow net? Describe its properties and applications. Describe different methods used to construct the flow net.

SECTION-C

Q7 The results of two drained triaxial tests on saturated clay are given as:

Specimen I:
$$\sigma_3 = 69 \text{ kN/m}^2$$

 $\sigma_d = 213 \text{ kN/m}^2$
Specimen II: $\sigma_3 = 120 \text{ kN/m}^2$
 $\sigma_d = 258.7 \text{ kN/m}^2$

Calculate shear strength parameters of the soil.

- Q8 What is particle size distribution curve? What is its use in soil engineering?
- Q9 Obtain the differential equation defining the one dimensional consolidation as given by Terzaghi, listing the various assumptions.