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No. of Printed Pages : 3

BCE-046

DIPLOMA IN CIVIL ENGINEERING

DCLE(G)

Term-End Examination

June, 2019

**BCE-046 : SOIL MECHANICS AND FOUNDATION
ENGINEERING**

Time : 2 Hours

Maximum Marks : 70

*Note : Question No. 1 is compulsory. Attempt any
four questions out of the balance remaining
questions. All questions carry equal marks.*

1. Define the following :

2×7=14

- (a) Degree of Saturation
- (b) Percentage Air Voids
- (c) Water Content
- (d) Liquid Limit
- (e) Bulk Density
- (f) Isobars
- (g) Consolidation

(A-52) P. T. O.

2. A standard Proctor compaction test performed on a sample of crushed Lime stone ($G = 2.7$) obtained a maximum dry unit wt of 14 kN/m^3 at OMC. A field compacted sample showed a moisture of 28% and a unit wt of 16.38 kN/m^3 . Find relative compaction (RC) and degree of saturation "S" of the field soil sample, where :

14

$$\gamma_w = 10 \text{ kN/m}^3$$

3. What do you mean by shear strength ? Explain the factors influencing shear strength and its parameters. List out the tests for determining shear strength. 3+6+5=14
4. By three phase soil system, prove that the degree of saturation "S" (as ratio) in terms of mass unit weight (γ), void ratio (e), Specific gravity of soil grains (G) and unit weight of water (γ_w) is given by the expression : 14

$$\gamma = \frac{(G + eS)\gamma_w}{1 + e}$$

5. Explain Darcy's law and how is this used to find the constant of proportionality (K) for variable heads parameters in the laboratories.

(8+6=14)

6. Explain with a neat sketch the Terzaghi's one-dimensional consolidation theory. 14
7. A water tank is supported by a ring foundation having outer diameter of 10 m and an inner diameter of 7.5 m. The ring foundation transmits uniform load intensity of 160 kN/m². Compute the vertical stress induced at depth of 4 m below the centre of the ring foundation using Boussinesque's equation analysis and Wastergaard's analysis. 14
8. Write short notes on any *four* of the following :

$$3\frac{1}{2} \times 4 = 14$$

- (a) Newmarks influence chart
- (b) Mohr's-Coulomb theory
- (c) Vane shear test
- (d) Infinite slope
- (e) Direct Shear test
- (f) Plasticity chart