No. of Printed Pages : 4

BCE-046

DIPLOMA IN CIVIL ENGINEERING
DCLE(G)

Term-End Examination

00967 **December, 2017**

BCE-046 : SOIL MECHANICS AND FOUNDATION ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *Question no. 1 is* ***compulsory****. Attempt any* ***four*** *out of the remaining seven questions. Use of calculator is permitted.*

---

1. Fill in the blanks. *7×2=14*

(a) Void ratio is defined as the ratio of the volume of _____ to the volume of _____ .

(b) Moisture content is defined as the ratio of the _____ of water to the weight of _____ .

(c) Dry unit weight is the weight of the _____ alone per unit _____ .

(d) Plasticity Index is the difference between _____ and _____ .

(e) The bulk unit weight is defined as the weight of the _____ including that of _____ per unit volume.

(f) The relation between void ratio (e) and porosity (n) is _____ .

(g) Hydrometer is used for _____ _____ .

2. (a) What is the Stokes' law ? How is it relevant in soil mechanics ?

(b) Write down and explain the equation to find out the terminal velocity expressed by Stokes' law, where

Y_s = Unit weight of solids or soil particles kN/m^3

Y_w = Unit weight of water

D = Diameter of soil particles *5+9=14*

3. (a) Explain the difference between pre-cast and cast-in-situ piles. How many types of cast-in-situ piles are there ? When and where are they used ?

(b) A pile with skin friction can carry a load of 02 ton while its diameter is fixed as 800 mm. Calculate the length of the pile in metres when c = 38 kN/m^3 of clay soil deposit and assuming m = 0·65. *6+8=14*

4. A soil sample has a dry unit weight of 19·5 kN/m^3, moisture content of 8% and specific gravity of solid particles is 2·67. Calculate the following : *2+3+4+5=14*

   (a) Void ratio

   (b) Moisture and saturated unit weight

   (c) The mass of water to be added to cubic metre of soil to reach 80% saturation

   (d) Volume of solid particles when the mass of water is 25 g for saturation

5. Dry sand is placed in a container having a volume of 0·3 m^3. The dry weight of the sample is 31 kg. Water is carefully added to the container so as not to disturb the condition of the sand. When the container is filled, the combined weight of soil plus water is 38·2 kg. Compute the void ratio of soil in the container and specific gravity of the soil particles. *7+7=14*

6. (a) What do you understand by normally consolidated and over consolidated clays ? Explain with the help of void ratio and effective pressure σ' curve.

   (b) How will you determine the preconsolidation pressure (σ'_c) for a clay specimen using laboratory (e-log σ') plot ? *7+7=14*

7. (a) List out the differences between standard and modified Proctor tests.

(b) Explain the procedure to determine shear strength and stresses in a consolidated undrained triaxial test on a normally consolidated clay. $7+7=14$

8. Write short notes on any ***four*** of the following : $4 \times 3\frac{1}{2} = 14$

(a) Specific Gravity

(b) Liquid Limit of Soil

(c) Porosity vs Permeability

(d) Plasticity Index

(e) Effect of Water Table on Bearing Capacity as per IS : 6403 – 1981