| **BCE-046**

DIPLOMA IN CIVIL ENGINEERING DCLE(G)

Term-End Examination

00092   **December, 2016**

BCE-046 : SOIL MECHANICS AND FOUNDATION ENGINEERING

Time : 2 hours   *Maximum Marks : 70*

*Note : Question no. 1 is **compulsory**. Attempt any **four** questions from the remaining five questions.*

1. Choose the correct answer.   *7×2=14*

    (a) The minimum water content at which the soil just begins to crumble when rolled into threads of 3 mm dia is known as

    (i)   Liquid Limit

    (ii) Plastic Limit

    (iii) Shrinkage Limit

    (iv) Permeability Limit

    (b) The active earth pressure of a soil is proportional to (where ϕ is the angle of friction)

    (i) $\tan (45° - \phi)$

    (ii) $\tan^2 (45° + \frac{\phi}{2})$

    (iii) $\tan^2 (45° - \frac{\phi}{2})$

    (iv) $\tan (45° + \phi)$

(c) The rise of the ground surface due to frost action is called

(i) Frost heave

(ii) Frost swell

(iii) Frost bulge

(iv) Frost expansion

(d) The pressure of organic matter in soil (Bearing Capacity is abbreviated as BC)

(i) Increases the BC

(ii) Decreases the BC

(iii) Makes BC remain unchanged

(iv) Has no effect on BC

(e) The maximum value of dry density is obtained at (Water Content – WC)

(i) Maximum WC

(ii) Minimum WC

(iii) Optimum WC

(iv) Normal WC

(f) The shearing strength of a cohesionless soil depends on

(i) Dry density

(ii) Rate of loading

(iii) Confining pressure

(iv) Nature of loading

(g) The compression index of the soil _____ with liquid limit.

    (i)   remains constant

    (ii)   decreases

    (iii) increases

    (iv) has no relation

2. Define the following : $7 \times 2 = 14$

    (a)   Seepage Velocity

    (b)   Permeability

    (c)   Laminar Flow

    (d)   Quicksand

    (e)   Specific Gravity

    (f)   Density

    (g)   Void Ratio

3. (a) A soil sample has a unit weight of 105.7 kg/cum and a saturation of 50%. When its saturation is increased to 75% its unit weight rises to 112.7 kg/cum. Determine the Void Ratio (e) and the Specific Gravity (G_s) of this soil.

    (b) What are the factors that affect the following ?

        (i)   Permeability

        (ii) Shear strength of soil $2 \times 7 = 14$

4. Calculate the ultimate and allowable bearing capacity for the footing shown in the sketch with a factor of safety of at least 2.

$D_f = 1 \cdot 0$ m

$0 \cdot 85$ m

$(2 \cdot 5 \times 2 \cdot 5$ m$)$

∇ WT
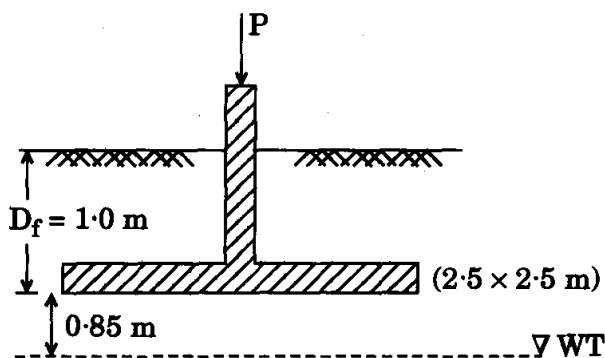
$c = 0$

$\phi = 35°$

$\gamma = 18 \cdot 10$ kN/m^3

$w_n = 10\%$ and $G_s = 2 \cdot 68$

Given $N_q = 33 \cdot 3$ and $N_\gamma = 33 \cdot 92$.   *14*

5. Write short notes on the following : $4 \times 3\dfrac{1}{2} = 14$

    (a) Alluvial Soils

    (b) Vane Shear Test

    (c) Mohr-Coulomb Theory

    (d) Resistivity Profiling

6. (a) Explain in detail the classification of coarse grained and fine grained soil.

    (b) What are the differences between Triaxial test and Direct shear test ? Explain the use and reasons for selection. $2 \times 7 = 14$