DIPLOMA IN CIVIL ENGINEERING DCLE(G)

Term-End Examination

December, 2015

BCE-046 : SOIL MECHANICS AND FOUNDATION ENGINEERING

Time : 2 hours   *Maximum Marks : 70*

Note : *Question no. 1 is* **compulsory**. *Attempt any* **four** *more questions from the remaining. All questions carry equal weightage.*

1. Choose the correct alternative :   7×2=14

   (a) The particle size distribution of soil is carried out by the following test :

      (i)   Core Cutter method

      (ii) Sieve Analysis

      (iii) Pycnometer method

      (iv) All of the above

(b) Specific gravity of a soil sample is 2·60. If the void ratio of the soil is 0·30, the dry density of the soil will be

(i) 2·6 g/cc

(ii) 1·3 g/cc

(iii) 2 g/cc

(iv) 1 g/cc

(c) Shear strength of the soil depends upon

(i) Cohesion

(ii) Angle of shearing resistance

(iii) Interlocking of particles

(iv) All of the above

(d) The moisture absorbed by soil from atmosphere is called

(i) Hygroscopic water

(ii) Capillary water

(iii) Gravitational water

(iv) Structural water

(e) Which of the following factors is *not* responsible for the change in permeability of the soil ?

(i) Viscosity of water

(ii) Shape and size of particles

(iii) Temperature

(iv) None of the above

(f) On increasing compactive effort, the maximum dry density of the soil

(i) decreases at slow rate

(ii) decreases at fast rate

(iii) increases

(iv) No change

(g) At shrinkage limit the soil has the degree of saturation

(i) zero percent

(ii) 50%

(iii) 75%

(iv) 100%

2. (a) Using phase relationship, show that

$$\gamma_d = \frac{G\,\gamma_w}{1+e}.$$ 7

(b) A soil sample has bulk density 16·97 kN/m^3 and void ratio of 0·84. Determine the water content, dry density and degree of saturation of the sample, if the specific gravity of the soil particle is 2·70.   7

3. (a) What is the difference between consolidation and compaction ? Discuss the factors affecting compaction.   7

(b) The following are the results of Proctor's compaction test performed on a soil sample :

Water content (%)	Bulk density (kN/m^3)
12·0	16·0
14·0	17·0
17·0	18·0
19·5	17·8
20·5	16·5

Draw the compaction curve and find OMC and MDD. 7

4. (a) For a stratified soil, how are the permeabilities determined in the direction of flow and perpendicular to the direction of flow ? Write equations only. 7

(b) A constant head permeability test was carried out on a cylindrical sample of sand of diameter 100 mm and height 150 mm. 160 cc water was collected in 105 sec. under a constant head of 300 mm. Determine the coefficient of permeability. 7

5. (a) Explain the merits and demerits of direct shear test. **7**

(b) In an unconfined compression test on a soft clay, the following data was observed :

Length of the sample = 75 mm

Initial area of the sample = 1200 mm^2

Extension of spring at failure = 25 mm

Spring constant = 15 N/mm

Compression of sample at failure = 18 mm

Determine the unconfined compressive strength of the soil sample using corrected area. **7**

6. (a) Explain the geophysical methods of soil exploration. **7**

(b) Write the equation for finding the bearing capacity of a shallow foundation given by Terzaghi. Mention the assumptions made. **7**

7. (a) Explain the circumstances under which a Strap footing and a Raft footing are provided. **7**

(b) A rectangular pile section, 0·6 m × 0·75 m and length 12 m, penetrates a deposit of clay with C = 42 kN/m^2. Assuming m = 0·75, find the magnitude of skin friction. **7**

8. Write short notes on any *two* of the following : *2×7=14*

(a) Triaxial Shear Test

(b) Classification of Soils

(c) Permeability of Stratified Soil