BICE-024

DIPLOMA IN CIVIL ENGINEERING (DCLEVI) / ADVANCED LEVEL CERTIFICATE IN CIVIL ENGINEERING (ACCLEVI)

Term-End Examination

☐☐5735

December, 2014

BICE-024 : SOIL MECHANICS AND FOUNDATION ENGINEERING

Time : 2 hours　　　　　　　　*Maximum Marks : 70*

Note : *Answer any **five** questions. Question no. 1 is **compulsory**. Assume suitable data if found missing.*

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1. (a) Permeability is directly proportional to unit weight of water and inversely proportional to viscosity. (True/False)　　2

    (b) Unconfined compression test is a special case of Tri-Axial Test. (True/False)　　2

    (c) The Ultimate bearing capacity of soil q_f and Net bearing capacity q_{nf} are connected by the relation $q_f = q_{nf} - \gamma D$. (True/False)　　2

    (d) The water content corresponding to maximum density is called the optimum water content. (True/False)　　2

(e) For reducing and controlling differential settlements, which footing is more suitable ? *2*

   (i)   Spread footing
   (ii) Strap footing
   (iii) Raft footing
   (iv) None of them

(f) Plate load test determines *2*

   (i)   Capillarity
   (ii) Ultimate bearing capacity
   (iii) Soil permeability
   (iv) None of the above

(g) Relationship between e, G, S & w is *2*

   (i) $e = \dfrac{SG}{w}$

   (ii) $e = \dfrac{wS}{G}$

   (iii) $e = wGS$

   (iv) $e = \dfrac{wG}{S}$

2. (a) Define voids ratio (e), water content (w), specific gravity (G) and degree of saturation (S) and also derive the relationship between them. *8*

   (b) A compacted sample of soil with a bulk unit weight of 19·62 kN/m^3 has a water content of 15%. What are its dry density, degree of saturation and air content ?

   Assume G = 2·65. *6*

3. (a) What are the stages of particle size distribution ? Explain particle size distribution curve and its significance. *7*

   (b) Name the different soil classification systems and briefly discuss IS classification system. *7*

4. (a) List out the methods for determining coefficient of permeability and explain Constant Head Permeability Test. *10*

   (b) What are Darcy's Law, Discharge velocity and Seepage velocity ? *4*

5. (a) Explain the fundamental equation proposed by Coulomb for shear strength of soil. *4*

   (b) Define Compaction and explain the factors affecting compacted density of soil. *10*

6. (a) List out the different tests on compaction of soil and explain the Standard Proctor Test. *8*

   (b) What is the need of soil exploration ? List out the different methods of soil exploration. *6*

7. (a) What are the effects of water table on bearing capacity of soil ? How can it be computed ? 5

(b) Classify piles based on function, materials used for construction and necessity. 9

8. Write short notes on any *four* of the following :

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

(a) Atterberg limits

(b) Permeability test for fine sand

(c) Limitations of plate load test

(d) Vertical stress distribution in soils

(e) Water content and density relationship

(f) Load carrying capacity of piles