

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

Term-End Examination

June, 2012

BICE-024 : SOIL MECHANICS AND  
FOUNDATION ENGINEERING

Time : 2 hours

Maximum Marks : 70

Note : Attempt any five questions. Use of scientific calculators allowed. Question No.1 is compulsory. All questions carry equal marks.

1. (a) The ratio of volume of voids to volume of the solids is known as \_\_\_\_\_. 7x2=14
- (b) Sheepfoot roller is used for \_\_\_\_\_ soil.
- (c) The unconfined compression test is a special case of a triaxial compression test in which the all round pressure  $\sigma =$  \_\_\_\_\_.
- (d) For cohesionless soil  $C =$  \_\_\_\_\_.
- (e) Soil is said to be wellgraded if  $C_C$  lies between \_\_\_\_\_.
- (f) The maximum shearing resistance which the materials are capable of developing is called \_\_\_\_\_.
- (g) The shear strength of a soil increases with the amount of \_\_\_\_\_ applied.

2. (a) Define plasticity index and how will you classify the soil with the help of Plasticity chart ? Also write the equation of the A line in this plasticity chart. 7
- (b) Write the importance of the classification of soils. Also give the significance of  $D_{10}$ ,  $D_{30}$  and  $D_{60}$ . What is uniformity coefficient and coefficient of curvature ? 7
3. (a) Define total stress, effective stress and neutral stress. Write the significance of effective stress in engineering problems. 7
- (b) Calculate the value of K of a sample of 6 cm ht. and  $50 \text{ cm}^2$  cross-sectional area, if a quantity of water of  $430 \text{ cm}^3$  flows down in 10 min under an effective constant head of 40cm. On oven drying, the test specimen weighed 498g. Assuming  $G = 2.65$ , calculate the seepage velocity of water during the test. 7
4. (a) Discuss the factors that affect the shear strength parameter of soil. Explain Triaxial shear test in brief. 7
- (b) What is the shear strength of soil along a horizontal plane at a depth of 4m in a deposit of sand having the following properties ? 7
- Angle of internal friction,  $\phi = 35^\circ$   
 Dry unit wt,  $\gamma_d = 17 \text{ kN/m}^3$   
 Specific gravity,  $G = 2.7$
- Assume the ground water table is at a depth of 2.5m from the ground surface.

5. (a) List the methods of compaction and explain the effects of compaction on engineering behaviour of soil. 7
- (b) A small cylinder having volume of  $600 \text{ cm}^3$  is pressed into a recently compacted fill of embankment filling the cylinder. The mass of the soil in the cylinder is 1100 g. The dry mass of the soil is 910 g. Determine the void ratio and the saturation of the soil. Take the specific gravity of the soil grains as 2.7. 7
6. (a) What do you mean by Soil Exploration ? Write scope and purpose of soil exploration. 7
- (b) Describe split spoon sampler with the help of diagram. 7
7. (a) Explain plate load test with its limitations. 7
- (b) A square footing fails by general shear in a cohesionless soil under an ultimate load of  $Q_d = 7500 \text{ KN}$ . The footing is placed at a depth of 2m below ground level. Given  $\phi = 35^\circ$ ,  $\gamma = 17.25 \text{ KN/m}^3$ . Determine the size of the footing if the water table is at a great depth. For  $\phi = 35^\circ$ ,  $N_q = 41.4$ ,  $N_\gamma = 42.4$ ,  $N_c = 57.8$ . 7

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

- (a) Well Foundation
  - (b) Settlement of pile group
  - (c) Static cone penetration test (CPT)
  - (d) Deep foundation
  - (e) Direct shear test
  - (f) Types of piles and their suitability
- 

**3½x4=14**