

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

Term-End Examination

00904

June, 2017

**BICE-024 : SOIL MECHANICS AND FOUNDATION
ENGINEERING**

Time : 2 hours

Maximum Marks : 70

Note : Attempt any **five** questions. Question no. **1** is **compulsory**. All questions carry equal marks. Use of scientific calculator is allowed.

1. Choose the correct option in the following questions :

7×2=14

(a) The unit of the coefficient of consolidation is

(i) cm^2/gm

(ii) cm^2/sec

(iii) $\text{gm}/\text{cm}^2/\text{sec}$

(iv) $\text{gm-cm}/\text{sec}$

(b) Valid Range for S, the degree of saturation of a soil, in percentage is

(i) $S > 0$

(ii) $S \leq 0$

(iii) $0 \leq S \leq 100$

(iv) $0 < S < 100$

- (c) A soil has a bulk density of 22 kN/m^3 and water content 10%. The dry density of the soil is
- (i) 18.6 kN/m^3
 - (ii) 20.0 kN/m^3
 - (iii) 20 kN/m^3
 - (iv) 23.2 kN/m^3
- (d) If the voids of a soil mass are full of air only, the soil is termed as
- (i) air entrained soil
 - (ii) partially saturated soil
 - (iii) dry soil
 - (iv) dehydrated soil
- (e) If the Plasticity Index of a soil mass is zero, the soil is
- (i) sand
 - (ii) silt
 - (iii) clay
 - (iv) clayey soil
- (f) The ratio of volume of voids to the total volume of a soil mass is called
- (i) air content
 - (ii) porosity
 - (iii) percentage air voids
 - (iv) void ratio

- (g) Select the correct range of Density Index I_D .
- (i) $I_D > 0$
 - (ii) $I_D \geq 0$
 - (iii) $0 \leq I_D < 1$
 - (iv) $0 \leq I_D \leq 1$
2. (a) Describe the pycnometer method to determine the water content for a coarse grained soil with known specific gravity. 7
- (b) Find the relation between porosity and void ratio. 7
3. Determine the average coefficient of permeability in the horizontal and vertical directions for a deposit consisting of three layers of thickness 5 m, 1 m and 2.5 m, having the coefficient of permeability 3×10^{-2} mm/s, 3×10^{-5} mm/s and 4×10^{-2} mm/s respectively. Assume that the layers are isotropic. 14
4. (a) Describe direct shear test. What are its merits and demerits? 7
- (b) A sample of dry cohesionless soil was tested in a triaxial machine. If the angle of shearing resistance and confining pressure were 36° and 100 kN/m^2 respectively, determine the deviator stress at which the sample failed. 7

5. (a) What are the factors that affect compaction of soils ? Discuss in brief. 7

(b) Differentiate between modified proctor test and standard proctor test. 7

6. (a) Write the assumptions in Terzaghi's analysis for the bearing capacity of soil and discuss the effect of water table on the bearing capacity of soil. 7

(b) A footing 2 m square is laid at a depth of 1.3 m below the ground surface. Determine the net ultimate bearing capacity using the IS code method.

Take $\gamma = 20 \text{ kN/m}^3$, $\phi' = 30^\circ$ and $c' = 0$.
 $\phi = 30^\circ$, $N_c = 30.14$, $N_q = 18.4$, $N_\gamma = 22.4$,
 $S_c = 1.3$, $S_q = 1.25$, $S_\gamma = 0.8$, $d_c = 1.23$,
 $d_q = 1.11$. 7

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

(a) Standard Penetration Test

(b) Pile Load Test

(c) Darcy's Law

(d) Negative Skin Friction

(e) Consolidation of Soil

(f) Density of Soil