00515

DIPLOMA IN CIVIL ENGINEERING

Term-End Examination

June, 2010

BCE-046 : SOIL MECHANICS AND FOUNDATION ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *Answer **any five** questions. Use of calculator is permitted.*

1. (a) Explain phase diagram of the soil. Define-water content and Degree of Saturation. **8**

(b) A 1000 m^3 embankment is to be constructed using 10% water content with a bulk density of 19.8 kN/m^3. Find out quantity of soil required to be excavated from the nearby area which has natural water content as 14% and bulk density 18.24 kN/m^3. **6**

2. (a) Discuss the Corrections made to the Hydrometer Readings. **6**

(b) A 500 g soil sample was tested in the laboratory for Grain Size Analysis. The observed weights retained over each sieve are given below. Test the soil for its gradation by determining C_u and C_c. 8

Sieve sizes	4.75 mm	2.36 mm	1.18 mm	600 μ	425 μ	300 μ	150 μ	75 μ	Pan
Weight (g)	0	78	83	64	44	69	80	71	11

3. (a) Define the following : 6

(i) Total Stress

(ii) Effective Stress

(iii) Permeability

(b) A sand deposit in an area is made up of 4 horizontal layers of equal thicknesses. The permeabilities of (top to bottom) I, II, III and IV layers are 4×10^{-5} mm/s, 3×10^{-5} mm/s, 2×10^{-5} mm/s and 2×10^{-5} mm/s respectively. Find the equivalent permeability in the horizontal and vertical directions. 8

4. (a) Describe Mohr-Coulomb Failure theory. 7

(b) In the laboratory, a soil sample was tested using vane shear test. The vane has 12.5 mm diameter and 20 mm. The torque was applied and gradually increased to 80 Nmm when failure took place. Determine the undrained shear strength of the soil. 7

5. (a) Write short notes on the following : **4x2=8**

(i) Sand Piles

(ii) Stone Columns

(iii) Dynamic Compaction

(iv) Water Jetting

(b) Compare Standard Proctors and Modified. Proctors tests. **6**

6. (a) What do you mean by Soil Exploration ? How the soil can be identified using open excavation ? **7**

(b) Describe Split Spoon Sampler with the help of diagram. **7**

7. (a) A shallow foundation can fail in three principal modes of shear failure due to insufficient bearing capacity. Discuss these modes of failure. **6**

(b) Using IS Code method to calculate safe load on a column which has square footing $2m \times 2m$ and founding depth 2m. Assume suitable factor of safety against shear failure. Take $c = 10\ kN/m^2$, $\gamma = 18\ kN/m^3$, $\phi = 33°$. **8**

8. Write short notes on ***any four*** of the following : **3½x4=14**

(a) Well Foundation

(b) Grillage Foundation

(c) Direct shear test

(d) Constant head Permeameter

(e) Efficiency of Pile Group

(f) Settlement of Pile Group

(g) Negative Skin Friction