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BICE-024

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

Term-End Examination

June, 2014

BICE-024 : SOIL MECHANICS AND FOUNDATION ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *(i) Question No. **1** is **compulsory** and answer **four** questions from the remaining.*

(ii) Assume missing data if any.

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1. (a) Which of the soil constituents has higher specific gravity ? 2

(i) Calcite
(ii) Quartz
(iii) Talc
(iv) Magnetite

(b) If a sample of saturated clay has water content 50% and G = 3.00. Then its n = 2

(i) 0.5
(ii) 0.6
(iii) 0.7
(iv) 0.55

(c) Permeability varies approximately as the square of the grain size. (TRUE/FALSE) 2

(d) A local shear failure is associated with considerable vertical soil movement before soil bulging takes place. (TRUE/FALSE) 2

(e) Sample obtained from SPLIT - SPOON sampler for standard penetration test is an un - disturbed sample. (TRUE/FALSE) 2

(f) Equation for zero air voids line : 2

(i) $\rho_d = \frac{(1 - n_a)G\,\rho_\omega}{1 + \omega G}$

(ii) $\rho_d = \frac{G\,\rho_\omega}{1 + \omega G}$

(iii) $\rho_d = \frac{(1 + n_a)\,G\,\rho_\omega}{1 + \omega\,G}$

(iv) $\rho_d = \frac{\rho_\omega}{G(1 + \omega G)}$

(g) Which of the following test is used for measuring shear strength ? 2

(i) Un - confined compression test
(ii) Constant head permeability test
(iii) Horizontal capillarity test
(iv) None of the above

2. (a) Define : **4x1.5=6**

(i) Degree of saturation
(ii) Density Index
(iii) Uniformity co-efficient
(iv) Co-efficient of curvature

(b) The voids ratio of a clay sample is 0.5 and the degree of saturation is 70% compute the : 8

(i) Water content
(ii) Dry unit weight
(iii) Bulk unit weight and
(iv) Air void ratio

Assume G=2.7 and γ_ω=9.81 kN/m^3

3. (a) List out different classification systems of soil and explain Indian standard classification system. 7

(b) What do you mean by consistency ? Explain Attenberg limits and their significance. 7

4. (a) Define co-efficient of Permeability and list out factors affecting permeability in brief. 8

(b) Define total stress, effectives stress and neutral stress and explain their inter-relationship with the help of a diagram. 6

5. (a) List out the methods of measurement of shear strength of soil and explain direct shear test. 9

(b) What are the different factors that contribute to shearing resistance ? 5

6. (a) A laboratory compaction test on a soil specimen having specific gravity equal to 2.5 gave a maximum dry density 1.25 g/cm^3 and a water content of 40%. Determine the degree of saturation (s), air content (ac) and air voids (na). 7

(b) Explain the effects of compaction on soil behaviour and properties. 7

7. (a) What do you mean by safe bearing capacity, net safe bearing capacity and surcharge (or overburden) and relate them with an equation ? 4

(b) Explain the plate load test method for determining the ultimate bearing capacity of soil. 10

8. Write short notes on **any four :** **4x3.5=14**

(a) Phase diagram of soil

(b) Validity of Darcy's law

(c) Soil Exploration

(d) Stress Strain Curve

(e) Optimum water content - Zero air voids line

(f) Necessity of Raft footing