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BCE-046

00334

DIPLOMA IN CIVIL ENGINEERING
DCLEC (G)

Term-End Examination

June, 2013

BCE-046 : SOIL MECHANICS AND FOUNDATION ENGINEERING

Time : 2 hours *Maximum Marks : 70*

*Note : Question Number **1** is **compulsory**. Attempt **any** 4 questions more out of question number 2 to 7. All questions carry **equal** marks.*

1. (a) The uniformity coefficient of a uniformly graded soil is : **2x7=14**

(i) 1 (ii) 1 to 3

(iii) more than 4 (iv) more than 6

(b) The maximum, minimum and natural void ratios of a soil are 0.6, 0.3 and 0.4 respectively the relative density of the soil will be :

(i) $\frac{2}{3}$ (ii) $\frac{1}{2}$

(iii) $\frac{3}{2}$ (iv) $\frac{3}{4}$

(c) The liquid limit, plastic limit and shrinkage limit of a soil are 40%, 20% and 10%, respectively. The plasticity index of the soil will be :

(i) 10% (ii) 20%

(iii) 30% (iv) 40%

(d) The unconfined compressive strength of a clay sample is 4 kg/cm^2. The cohesion of the soil will be :

(i) 4 kg/cm^2 (ii) 3 kg/cm^2

(iii) 2 kg/cm^2 (iv) 1 kg/cm^2

(e) The velocity of flew through a soil under unit hydraulic gradient is 2×10^{-3} m/sec. The coefficient of permeability will be :

(i) 2×10^{-1} m/sec

(ii) 2×10^{-2} m/sec

(iii) 2×10^{-3} m/sec

(iv) 1 m/sec

(f) The angle of shearing resistance of a sandy soil is 25°. The bearing capacity estimated using Terzaghi's equation will be based on :

(i) General shear

(ii) Local shear

(iii) Mixed shear

(iv) None of the above

(g) The liquid limit of a soil is 30%. The compression index of the soil will be :

(i) 0.07 (ii) 0.14

(iii) 0.21 (iv) 0.30

2. (a) Derive the relation : 7

$$r_d = \frac{arw}{1+e}$$

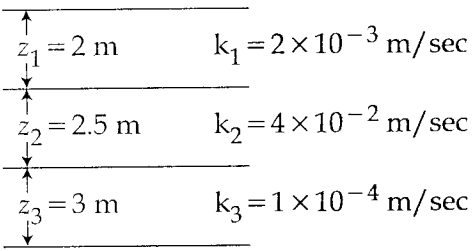
(b) A compacted soil has a void ratio of 0.70. The specific gravity of its soil grains is 2.70 and water content is 22% calculate the Bulk density, dry density and degree of saturation of the soil. 7

3. (a) What is stokes law ? How is the particle size of soil determined with the help of this law ? 7

(b) The liquid limit of a soil sample is 45%, and the plastic limit is 20%. The natural water content of the soil is 15%. Determine the plasticity index, consistency index, liquidity index and classify this soil. 7

4. (a) What is permeability ? Discuss the factors affecting it. 7

(b) The following diagram represents the layers of a soil mass : 7



Determine the average permeability when the flow is taking place in the direction parallel and perpendicular to the layer.

5. (a) Explain direct shear test in brief. What are the limitations of this test ? 7

(b) Discuss the factors affecting shear strength of sand. 7

6. (a) Explain the compaction characteristics of clay, and discuss the affect of compaction on the properties of soil. 7

(b) What are the various modes of shear failure of a shallow foundation ? Discuss. 7

7. Write short notes on ***any four*** : **3½x4=14**

(a) Under-reamed piles

(b) Hydrometer test

(c) Falling head permeameter

(d) Vane shear test

(e) Quick sand phenomenon