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BCE-046

DIPLOMA IN CIVIL ENGINEERING
DCLE(G)

Term-End Examination

00928

June, 2015

BCE-046 : SOIL MECHANICS AND FOUNDATION ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *Attempt any **five** questions out of the following questions. Notations given here have their usual meanings. All questions carry equal marks.*

1. (a) From 3-phase diagram of soil, derive the expression S.e = w.G. 7

(b) An imaginary soil mass is contained in a cubical container measuring 100 mm sides. The soil consists of spherical grains of size 10 mm in diameter. Determine the maximum possible void ratio and porosity. 7

2. (a) Explain consistency limits of soil and discuss their significance. 7

(b) A grading curve of a soil gives effective size as 0·15 mm, 30 percent finer size as 0·4 mm and 60 percent finer as 0·9 mm. Find the uniformity coefficient and coefficient of curvature. 7

3. (a) Describe the procedure to determine coefficient of permeability using Variable Head Test. 7

(b) A 6 m thick layer of saturated clay is overlain by sand 5 m deep. The water table is 4 m below the ground surface. The saturated unit weight of clay and sand are 21 kN/m^3 and 19 kN/m^3, respectively. The unit weight of sand above the water table is 16 kN/m^3. Find the total and effective vertical stresses at the top and middle of clay layer. 7

4. (a) Discuss how shear strength is determined using unconfined compression test. 7

(b) In a consolidated undrained triaxial test on a normally consolidated clay ($c' = c = 0$), deviatoric stress and pore pressure at failure are 120 kPa and 100 kPa respectively. The sample was consolidated under cell pressure of 180 kPa. Find σ'_1, σ'_3, ϕ' and α_f. 7

5. (a) Discuss the comparison between Standard and Modified Proctor tests for compaction with their applicability in the field. 7

(b) The following results were obtained from a standard compaction test on a soil sample. Determine optimum moisture content and maximum dry density. 7

Water content (%)	Wet weight (gm)
8·0	1450
11·2	1690
14·0	1910
17·0	1930
18·5	1845
20·4	1736

6. (a) Describe how SPT is performed and discuss corrections to observed N-values. 7

(b) Describe the various samplers with their appropriate usage. 7

7. (a) Explain effect of water table on the bearing capacity as per IS : 6403 – 1981. 7

(b) A 500 mm square bearing plate settles by 10 mm in the plate load test on cohesionless soil, when the intensity of loading is 200 kN/m^2. Estimate the settlement of a shallow foundation of size 2 m × 2 m under the same intensity. 7

8. (a) Describe under-reamed piles with their applicability. Also draw its sectional elevation with dimension proportioning. 7

(b) A circular pile of diameter 600 mm and 11 m length penetrates a deposit of clay with $c = 38\ kN/m^2$. Assuming $m = 0{\cdot}65$, determine the load carried by the pile with skin friction. 7