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BCE-046

96000

DIPLOMA IN CIVIL ENGINEERING

Term-End Examination

December, 2010

BCE-046 : SOIL MECHANICS AND FOUNDATION ENGINEERING

Time : 2 hours *Maximum Marks : 70*

Note : *Question No.1 is compulsory. Attempt any four those questions out of question number 2 to 7. All questions carry equal marks.*

1. Choose the correct answer : **7x2=14**

(a) Which of the following is a residual soil ?

(i) Alluvial soil

(ii) Aeolin soil

(iii) Marine soil

(iv) None of the above

(b) A soil is said to be well graded sand if :

(i) $C_u > 4$ and $C_c = 1$ to 3

(ii) $C_u < 4$ and $C_c = 1$ to 3

(iii) $C_u > 6$ and $C_c = 1$ to 3

(iv) $C_u < 6$ and $C_c = 1$ to 3

(c) In order to determine the permeability of gravel which of the following method is suitable -

(i) Constant head permeometer

(ii) Falling head permeometer

(iii) Capillarity permeability

(iv) Consolidometer

(d) Consolidated undrained test is also known as :

(i) Quick test

(ii) Rapid test

(iii) Slow test

(iv) Very slow test

(e) On increasing the compaction effort

(i) OMC decreases and MDD also decreases.

(ii) OMC decreases and MDD increases

(iii) OMC increases and MDD decreases

(iv) OMC increases and MDD also increases.

(f) Time - distance graph is plotted in the following method of soil exploration :

(i) Percussion drilling.

(ii) Seismic refraction method.

(iii) Electrical resistivity method.

(iv) Penetration method.

(g) The efficiency of pile group can be :

(i) 100%

(ii) Less than 100%

(iii) More than 100%

(iv) Can take any value.

2. (a) Using phase relationship show that 7

$V_{bulk} = V_{dry} + S[V_{sat} - V_{dry}]$

Where all the terms have there usual meanings.

(b) The natural water content of a soil in the borrow area is 10% and its bulk density is 18 kN/m^3. The soil is to be used in construction of an embankment. The specifications for embankment compection require its water content to be 11.5% and dry density 18.5 kN/m^3. Compute the quantity of soil to be excavated per m^3 of the embankment. 7

3. (a) Explain the procedure of determination of liquid limit by Casagrande's method. 7

(b) Explain classification criteria for coarse grained soils as per BIS 1498-1970. 7

4. (a) Determine the total, neutral and effective stresses at a depth of 10 m below the ground surface for following conditions. 8

(i) Water Table (WT) 1 & 2 m below 4L.

(ii) Average water content above WT is 10%.

(iii) G = 2.70, e = 0.65

(iv) $V_w = 10\ kN/m^3$

(b) Discuss the factors affecting permeability. 6

5. (a) Discuss the salient features of Mohr-Coulomb's failure theory. 7

(b) An unconfined compression test is conducted on a clay sample 40mm in diameter and 80mm high. The load at failure is 50N and the axial deformation is 10mm. Determine the undrained Shear strength. 7

6. (a) The results obtained from standard proctor's and modified proctor's tests on a soil in the laboratory are presented in the following table 7

Water content (%)	V_d(kN/m3) Standard proctor	V_d(kN/m3) Modified proctor
7.0	16.0	17.5
9.0	16.4	18.5
11.9	17.4	19.1
14.1	17.9	19.0
15.9	17.6	18.2
18.4	16.4	17.3
21.3	15.0	16.0

Use G_s = 2.60. Plot the compaction curves and determine OMC and MDD obtained from both the tests.

(b) Explain following methods of soil exploration: 2x3½=7

(i) Wash boring.

(ii) Electrical resistivity method.

7. (a) Determine the diameter of a circular footing for column to carry an axial load of 830 kN. The depth of footing is 1.5m. The soil is partly saturated and has cohesion value 55 kN/m^2, $\phi = 15^o$ and bulk density 19 kN/m^3, use factor of safety as 3 and do the analysis by Tevzagln's method. Given Nc=12.9, Nq=4.4 & Nr=2.5. 7

(b) Explain dynamic analysis of load carrying capacity of the pile foundations. What are its demerits. 7