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USN

15CV53

Fifth Semester B.E. Degree Examination, Dec.2D of Mn.2020

Applied Geotechnical Engineering

Time: 3 hrs. Max. Marks: 80

Note: 1. *Answer FIVE full questions, choosing one full question from each module.*
2. *Missing data may be assumed suitably.*
3. *Use of IS:6403 is permitted.*

Module-1

1 a. List and explain various objectives of subsurface exploration. **(03 Marks)**
b. What is Borehole Log? With an example, state the details of exploration to be enclosed in Borehole log. **(04 Marks)**
c. Explain with neat diagram, any three methods of dewatering. **(09 Marks)**

OR

2 a. What are the objectives of Dewatering? Explain. **(03 Marks)**
b. The inner diameters of a sampling tube and that of a cutting edge are 70 mm and 68 mm respectively, their outer diameters are 72 mm and 74 mm respectively. Determine the inner clearance, outside clearance and area ratio of the sampler. **(04 Marks)**
c. What are the Geophysical methods of subsoil exploration? Explain in detail seismic refraction method. **(09 Marks)**

Module-2

3 a. What are the assumptions made in Boussinesq's analysis to determine the stresses in soil? **(03 Marks)**
b. A concentrated load of 22.5 kN acts on the surface of a homogenous soil mass of large extent. Find the stress intensity at a depth of 15 m and
(i) Directly under the load.
(ii) At a horizontal distance of 7.5 m.
Use Boussinesq's analysis. **(06 Marks)**
c. Explain the stress distribution on a vertical plane due to point load from Boussinesq's theory. **(07 Marks)**

OR

4 a. What is Newmarks's chart? Explain with neat diagram, the construction of Newmarks chart with influence value of 0.005q. **(08 Marks)**
b. Explain contact pressure diagram in different soils for different types of footings. **(04 Marks)**
c. A soft, normally consolidated clay layer is 18 m thick. The natural water content is 45%. The saturated unit weight is 18 KN/m^3, the grain specific gravity is 2.70 and the liquid limit is 63%. The vertical stress increment at the centre of the layer due to foundation load is 9 KN/m^2. The ground water is in level at the surface of clay layer. Determine the settlement of foundation. **(04 Marks)**

Module-3

5 a. Differentiate between active earth pressure and passive earth pressure on a retaining wall. **(04 Marks)**
b. Explain different types of finite slope failures. **(04 Marks)**
c. A gravity retaining wall retains 12 m of a back fill. r = 17.7 KN/m^3, (l) = 25° with a uniform horizontal surface. Assume that wall interface to be vertical, determine the magnitude and point of application of total active earth pressure. If the water table is at a height of 6 m, how do the magnitude and point of application of total active earth pressure change. Submerged unit weight of soil 7- 10 KN/m^3. **(08 Marks)**

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OR

6 a. List the assumptions made in Rankine's theory to determine lateral earth pressure in soils. **(04 Marks)** \

b. A Carial is to be excavated through a soil with C = 15 KN/m ^{2}, = 20°, e = 0.9 and G = 2.67. \ The side slopes is I in 1. The depth of canal is 6 m. Determine the FOS, with respect to cohesion when canal runs full. What will be the FOS, if the canal is rapidly emptied? Taylor's stability numbers are 0.06 and 0.114 respectively with respect to two cases. **(06 Marks)**

c. How do you locate the centre of critical slip circle using Fellinious method? **(06 Marks)**

Module-4

7 a. Explain in detail how bearing capacity of soil is determined using BIS method (IS6403). **(08 Marks)**

b. How do you consider the effect of water table on determination bearing capacity of soil. **(04 Marks)**

c. Compute the ultimate load that an eccentrically loaded square footing of width 2.1 m with an eccentricity of 0.35 m can take at a depth of 0.5 m in a soil with r =18 KN/m', C = 9 KN/m^2, Nc = 82, N_{q} = 35 , N, = 42. **(04 Marks)**

OR

8 a. Proportion a rectangular combined footing for uniform pressure under dead load, plus reduced live load, using the following data:

Allowable soil pressure, 150 KN/m$^-$ for dead load + reduced live load.

225 KN/m^2 for dead load + live load

Column loads	Column A	Column B
Dead load (DL)	540 KN	690 K.N
Live load (LL)	400 KN	810 KN

Distance C/C of columns = 5.4 m

Projection of footing beyond column A = 0.5 m. Draw the diagram. **(12 Marks)**

b. List the assumptions made in Terzaghi's analysis to find bearing capacity of soils. **(04 Marks)**

Module-5

9 a. With neat diagrams, explain the classification of piles based on different criteria. **(10 Marks)**

b. What is negative skin friction? How it is estimated in different types of soils. **(06 Marks)**

OR

10 a. Explain the static formula to find pile load carrying capacity. **(10 Marks)**

b. A 16 pile group has to be arranged in the form of a square in a soft clay with uniform spacing. Neglecting end hearing, determine the optimum value of spacing of the piles in terms of pile diameter. Assuming a shear mobilization factor 0.6. **(06 Marks)**

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