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## Fifth Semester B.E. Degree Examination, Feb./Mar. 2022

### Applied Geotechnical Engineering

Time: 3 hrs.

Max. Marks: 100

**Note :** 1. Answer any FIVE full questions, choosing ONE full question from each module.  
 2. Use of IS : 6403 is permitted.

#### Module-1

- 1 a. List the objectives of Subsurface Exploration. (05 Marks)
- b. What are the Undisturbed, disturbed and representative samples, with respect to subsurface exploration? (06 Marks)
- c. Explain any three method of Dewatering in detail. (09 Marks)

**OR**

- 2 a. What are the different methods of stabilization of boreholes? Explain the methods. (06 Marks)
- b. Draw a typical borehole log. Give the various details to be included in the borehole log. (06 Marks)
- c. Explain Wash Boring method of soil exploration, with neat diagram. (08 Marks)

#### Module-2

- 3 a. With usual notations, derive the expression for Pressure at a depth Z below the centre of circular loading of radius 'a'. (10 Marks)
- b. A concentrated point load of 200kN acts on the ground surface. Find the intensity of vertical pressure at a depth of 10m, below the ground surface and situated on the axis of loading. What will be vertical pressure at a point at a depth of 5m and at a distance of 2m from the axis of loading? Use Boussinesq's analysis. (05 Marks)
- c. A clay layer 5m thick lies under a newly constructed building. The effective pressure due to overlying strata on the clay layer is 300kN/m<sup>2</sup> and the new construction increases the overburden by 120kN/m<sup>2</sup>. If the compression index of clay is 0.45, compute the settlement assuming the natural W.C of the clay layer to be 43% and specific gravity of its soil grains is 2.7. Assume that clay layer is saturated. (05 Marks)

**OR**

- 4 a. Briefly explain the procedure to draw Newmark's chart with influence value of 0.005q. (10 Marks)
- b. Write a brief explanation of Contact Pressure in different types of soil for various types of foundation. (06 Marks)
- c. What are different types of Foundation Settlement? Explain. (04 Marks)

#### Module-3

- 5 a. With usual notations, derive expression for coefficient of earth pressure at rest. (04 Marks)
- b. A soil mass is retained by a smooth backed vertical wall, of 6.0m height. The soil has a bulk unit weight of 20kN/m<sup>3</sup> and  $\phi = 16^\circ$ . The top of the wall is horizontal. If the soil surface carries a Uniformly distributed load of 4.5kN/m<sup>2</sup>, determine the total active thrust on the wall and its position. (08 Marks)
- c. Explain Fellinions method to determine Centre of Critical Slip circle. (08 Marks)



OR

- 6 a. Explain with neat diagram, Rebhann's method to find total active earth pressure in cohesionless soil using Coulomb's theory. (10 Marks)
- b. List the assumptions made in Rankin's theory to find Lateral Earth Pressure. (04 Marks)
- c. Compute the intensities of active and passive earth pressure at depth of 8m in dry cohesionless sand with an angle of internal friction of  $30^\circ$  and unit weight of  $18\text{kN/m}^3$ . What will be the intensities of active and passive earth pressure if water level rises to ground level? Take saturated unit weight of sand as  $22\text{kN/m}^3$ . (06 Marks)

**Module-4**

- 7 a. Explain the effect of water table and eccentricity on bearing capacity of shallow foundations. (08 Marks)
- b. A square footing 2.5m by 2.5m is built on a homogenous bed of sand of unit weight  $20\text{kN/m}^3$  and having an angle of shearing resistance of  $36^\circ$ . The depth of base of footing is 1.5m below the ground surface. Calculate the safe load that can be carried by the footing with a FOS of 3 against complete shear failure. Use Terzaghi's analysis.  
 $N_c = 65.4$ ,  $N_q = 49.0$  and  $N_r = 54.0$ . (08 Marks)
- c. What are the limitations of Plate Load test? (04 Marks)

OR

- 8 a. Plate Load test were conducted on a C – Q soil, on plates of 2 different sizes and the following results were obtained :

Load	Size of Plate	Settlement
40kN	0.3m × 0.3m	25mm
100kN	0.6m × 0.6m	25mm

Find the size of square footing to carry a load of 800kN at the settlement of 2.5mm.

- (08 Marks)
- b. Explain the steps to proportion a Trapezoidal Shallow foundation. (06 Marks)
- c. A strip footing, 1m wide at its base is located at a depth of 0.8m below ground surface. The properties of the foundation soil are  $r = 18\text{kN/m}^3$ ,  $c = 30\text{ kN/m}^2$  and  $\phi = 20^\circ$ . Determine the safe bearing capacity, using a FOS of 3. Use Terzaghi's analysis.  
 $[N_c' = 11.8$ ,  $N_q' = 3.9$  and  $N_r' = 1.7]$ . Assume Local Shear failure. (06 Marks)

**Module-5**

- 9 a. Explain the classification of Piles, based on different consideration. (10 Marks)
- b. What are Under – reamed Piles? How do you find the Load carrying capacity of Under – reamed Piles? (10 Marks)

OR

- 10 a. How do you determine the Pile Load Carrying capacity in C – Q soil using static formula? Explain in detail. (10 Marks)
- b. What is Negative Skin Friction? How do you evaluate negative skin friction in Pile Foundation? (10 Marks)

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