

# CBCS SCHEME

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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)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

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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