



Marks

Question (1):

[18]

- a) Discuss why subsurface exploration may be carried out for new and existing structures. (6)
- b) Explain the various steps of subsurface exploration programme. (12)

Question (2):

[15]

- a) Draw neat sketches for: (6)
- Wash borings.
 - Hollow stem auger borings.
 - Piston sampler.
- b) Discuss how you can stabilize the sides of borehole during subsurface investigation in cohesionless soils. (3)
- c) Suggest the minimum borings depths for the different situations shown in figure (1). (6)

Question (3):

[15]

- a) Discuss the major problems associated with obtaining undisturbed soil samples in the field. Show how these problems can be reduced. (8)
- b) Explain how you can determine the level of ground water table during subsurface investigation in cohesionless and cohesive soils. (3)
- c) What is meant by undisturbed sample? Discuss how you can measure the sample disturbance. (4)

Question (4):

[15]

- a) Describe using sketches the Standard Penetration Test. What are the factors affecting the SPT blow count? (6)
- b) Draw neat sketches for the different types of Cone Penetration Test. What type of results can be obtained for each type? (4)
- c) A Standard Penetration Test was conducted in a fine sand stratum at a depth of 6.0 m. The blow counts obtained in the field were (8, 11, 14) blows. The ground water table is at the ground surface. The average saturated unit weight of the soil is 2.0 t/m^3 . The test was conducted in a 12 cm diameter boring using a drill rod of length 6.50 m. Determine the corrected SPT blow counts. (5)

Question (5):

[12]

- a) A vane of diameter 14 mm and height 22 mm is used to determine the shear strength of clayey soil and fails at maximum torque of 0.15 N.m. Determine the undrained shear strength of clay. (3)
- b) Draw a neat sketch for Plate Load Test. Discuss the disadvantages of Plate Load Test. (6)
- c) A 30 cm square plate settles by 10 mm in a plate load test on a cohesionless soil under a certain loading intensity. Find the settlement of a prototype footing of size (1.50 m × 2.0 m) resting on the same soil and loaded to the same load intensity. (3)

