Chapter 17
Subsoil Exploration

1. The process of identifying the layers of deposits that underlie a proposed structure and their physical characteristics is generally referred to as
   (a) subsurface determination.
   (b) subsurface exploration.
   (c) in situ testing.
   (d) site investigation.

2. Subsurface exploration is necessary for
   (a) selecting the type and depth of foundation for a given structure.
   (b) evaluating the load-bearing capacity of the foundation.
   (c) estimating the probable settlement of the foundation.
   (d) all of the above.

3. Which of the following phases of the subsurface exploration program consists of planning, making test boreholes, and collecting soil samples at desired intervals for subsequent observation and laboratory tests?
   (a) Collection of preliminary information
   (b) Reconnaissance
   (c) Site investigation
   (d) None of the above

4. The minimum depth of core boring into bedrock is about
   (a) 1 m.
   (b) 1.5 m.
   (c) 3 m.
   (d) 9 m.

5. The approximate spacing of boreholes for highway projects is
   (a) 10 – 30 m.
   (b) 20 – 60 m.
   (c) 40 – 80 m.
   (d) 250 – 500 m.

6. Which of the following is the simplest method of making exploratory boreholes?
   (a) Auger boring
   (b) Wash boring
   (c) Percussion drilling
   (d) Rotary drilling

7. The drilling mud is a slurry of water and
   (a) china clay.
   (b) bentonite.
   (c) silty soil.
   (d) silty-clayey soil.
8. Disturbed soil samples cannot be used for
   (a) grain-size analysis.
   (b) specific gravity of soil solids.
   (c) classification.
   (d) hydraulic conductivity.

9. The soil sample collected by a sampler is generally considered to be undisturbed when the area ratio is
   (a) less than 10%.
   (b) equal to or less than 10%.
   (c) greater than 10%.
   (d) equal to or greater than 100%.

10. The split-spoon samples are generally taken at intervals of about
    (a) 0.5 m.
    (b) 1.0 m.
    (c) 1.5 m.
    (d) 3.0 m.

11. If the numbers of blows required for the penetration of a split-spoon sampler into the soil deposit for three 152.4-mm consecutive intervals are 8, 12 and 10, the standard penetration number \( (N) \) will be
    (a) 18.
    (b) 20.
    (c) 22.
    (d) 30.

12. The standard penetration number measured in the field is required to be corrected for
    (a) hammer efficiency.
    (b) borehole diameter and rod-length.
    (c) sampling method.
    (d) all of the above.

13. If the corrected standard penetration number \( (N_{60}) \) for a clayey soil deposit is greater than 30, the soil consistency will be described as
    (a) soft.
    (b) stiff.
    (c) very stiff.
    (d) hard.

14. If the corrected standard penetration number \( (N_{60}) \) for a clayey soil deposit lies between 0 and 5, its unconfined compressive strength will be in the range of
    (a) 0 – 50 kN/m\(^2\)
    (b) 50 – 200 kN/m\(^2\)
    (c) 200 – 400 kN/m\(^2\)
    (d) > 400 kN/m\(^2\)
15. The standard penetration number measured in the field is corrected for the effective overburden pressure for
(a) clayey soils.
(b) silty soils.
(c) sandy soil.
(d) all of the above.

16. For a dense sandy soil deposit, the standard penetration number is generally
(a) less than 5.
(b) between 5 and 10.
(c) between 10 and 30.
(d) between 30 and 50.

17. Shelby tube is
(a) a thin wall steel tube.
(b) used to obtain undisturbed clayey soil samples.
(c) sharpened at its bottom end.
(d) all of the above.

18. After completion of the boring in a highly permeable soil deposit, the level of water in the borehole generally stabilizes in
(a) 1 h.
(b) 24 h.
(c) 1 week.
(d) more than one week.

19. Which of the following field tests does not require a borehole?
(a) Cone penetration test (CPT)
(b) Standard penetration test (SPT)
(c) Pressuremeter test (PMT)
(d) All of the above

20. When the rock core samples are recovered, a recovery ratio of 1 indicates the presence of
(a) highly fractured rock.
(b) highly jointed rock.
(c) intact rock.
(d) none of the above.

21. The NX size rock core sample has an approximate diameter of
(a) 22 mm.
(b) 28 mm.
(c) 41 mm.
(d) 54 mm.

22. If the rock quality designation ($RQD$) is in the range of 0.25 to 0.5, the rock quality can be described as
(a) very poor.
(b) poor.
(c) good.
(d) excellent.
Answers, Hints and Discussion

1. (b)
2. (d)
3. (c)
4. (c)
5. (d)
6. (a)
7. (b)
8. (d)
9. (b)
10. (c)
11. (c)

*Discussion:* The numbers of blows required for the last two consecutive intervals are added to give the standard penetration number ($N$).

12. (d)
13. (d)

*Hint:* See Table 17.4.

14. (a)

*Hint:* See Table 17.4.

15. (c)
16. (d)

*Hint:* See Table 17.6.

17. (d)
18. (b)

*Discussion:* (d) is correct for low permeable soil deposit such as clayey soil deposits.

19. (a)
20. (c)
21. (d)

*Hint:* See Table 17.7.

22. (b)

*Hint:* See Table 17.8.