CVL701: Site Investigations & Foundations

Name: [redacted]

Entry No. [redacted]

Minor 1 : Answer All Questions

PART A: Each question carries 0.5 marks

(Encircle the correct answer or fill in the blanks. Answer on this sheet)

30/08/2017

Max. Marks 25

Time : 1 Hour

1. Which of the following is not an objective of Site Investigations for foundation design of buildings: (a) depth to ground water, (b) type of soil, and thickness of soil layers, (c) electrical resistivity of soil, (d) depth to bedrock.

2. Which of the following does not require site investigations down to relevant depth below the ground surface: (a) bearing capacity problem, (b) seepage problem, (c) retaining wall design, (d) erosion control problem.

3. After a site investigation report has been submitted, it is desirable that the geotechnical engineer who prepared the report is to be involved in [redacted] and [redacted].

4. Soil Maps available in India are of limited use to geotechnical engineers because [redacted].

5. We undertake site investigations in two stages, i.e. preliminary and detailed, when (a) depth of investigation is large; (b) area of investigation is large; (c) topography is undulating; (d) all of the above.

6. In which case is the number of boreholes likely to be more: (a) 5 km long road; (b) 5 km long flood protection embankment, (c) 5 km long fencing; (d) 5 km long rigid boundary wall.

7. For which case will the depth of investigation be deeper? (bedrock is at 45 m depth): (a) 20m wide raft; (b) 10m deep pile, 0.75m in diameter; (c) 20 m high dam.

8. When boreholes are drilled in soils during site investigations, which type of sample is retrieved continuously: (a) disturbed non-representative sample; (b) disturbed representative sample; (c) undisturbed non-representative sample; (d) undisturbed representative sample.

9. During drilling, maximum torque is required for (a) short flight helical auger; (b) post hole auger; (c) continuous flight solid stem auger; (d) continuous flight hollow stem auger.

10. In which drill tool do we have a valve near the tip: (a) solid stem auger; (b) rotary drill; (c) bailer; (d) clamshell.

11. For very deep drilling in soils, which method is the best: (a) wash boring; (b) wash boring with chopping; (c) wash boring with rotary drill; (d) wash boring with casing?

12. Which drill bit is used for rock coring: (a) hardened steel; (b) tungsten carbide; (c) diamond; (d) platinum?

13. In ideal undisturbed samples, what remains unchanged: (a) density; (b) structure); (c) water content; (d) a + b + c; (e) a + c; (f) b + c.

14. In one borehole we have to obtain 5 UDS and 5 SPT samples. What are the minimum number of total sampling tubes required? (a) 10; (b) 5; (c) 12; (d) 6.

15. In thin walled sampling tube, which ratio is the minimum: (a) area ratio; (b) outside clearance ratio; (c) inside clearance ratio.

16. In an undisturbed sampling tube, the length of the sample in the tube is smaller than the penetration depth. However the sample has not moved down from its original position in the tube. Which two recovery ratios will be identical (a) total and gross; (b) total and net; (c) gross and net; (d) net and specific.

17. In soft sensitive clay, sampling disturbance will result in (a) increase in strength; (b) decrease in strength; (c) structure becoming flocculated; (d) decrease in density.

18. Sampling disturbance in loose sands results in (a) decrease in strength; (b) decrease in compressibility; (c) increase in permeability.

19. Which field vane gives the best results in deep boreholes in offshore clays: (a) 75mm driven vane; (b) 75 mm remote (wireline) vane; (c) 75 mm pushed vane?

20. Field permeability tests above water table level yield results, in comparison to those below water table level, which are (a) more accurate; (b) less accurate; (c) same accuracy.

21. In fine grained soils which are dry near the ground surface, plate load test results indicate bearing capacity values which are (a) safe; (b) conservative; (c) unsafe; (d) same (in comparison to that of an isolated footing of width twice that of the plate).

22. After energy correction is applied, N –values obtained by using "dough nut" hammers (a) decrease by 33%; (b) increase by 33%; (c) decrease by 50%, (d) ~~decrease~~ increase by 50%.

23. Dynamic cone penetration tests yield Nc values which are usually (a) higher than N, (b) lower than N; (c) equal to N; (d) a + c; (e) b + c.

24. In static cone penetration test, type of soil can be identified using (a) cone tip resistance; (b) friction ratio; (c) pore pressure ratio; (d) a + c ; (e) a + b + c.

25. SPT is preferred over ECPT at a depth of 20 to 30m in (a) very loose to loose sands; (b) dense to very dense sands; (c) dry sands; (d) saturated sands.

26. The pressuremeter test gives values of (a) Su, (b) Cc, (c) E, (d) k.

27. The flat dilatometer measures the pressure required to achieve a deformation of (a) 1.1 inch, (b) 1.1 cm, (c) 1.1mm, (d) 1.1 microns.

28. In a site investigation report, the scatter observed in data indicates (a) natural variability of the soil; (b) low precision of testing techniques; (c) inadequacies in skill of the manpower conducting the investigation.

29. Borelogs in a site investigation report offer the following advantage over tabular data: (a) more accuracy; (b) more sensitivity; (c) better visual picture; (d) higher reproducibility.

30. Generalized soil profile in a report highlights the following: (a) variations in thicknesses of soil layers; (b) changes in strength; (c) variations in bearing capacity; (d) variations in water content.

31. Electrical resistivity methods may not be able to identify water table depths very precisely in clays (in comparison to sands or gravels) because of (a) capillary fringe; (b) high resistivity; (c) low resistivity; (d) presence of cations.

32. Seismic reflection methods are not useful for soil investigations for building foundations because: (a) waves are not reflected from shallow layer boundaries; (b) reflected waves from shallow layers arrive before direct waves and are not separable in the geophone output; (c) waves are reflected only from deeper layers; (d) reflected waves from shallow layers arrive after direct waves and are not separable in the geophone output.

33. In Prof. Sukhmander Singh's lecture, the equipment which was finally successfully used to identify the cause of movement of the slide, was

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PART B: (Each question carries 3 marks) Answer on separate sheet.

1. By means of diagrams alone, show how drilling is done using wash boring with rotary casing. Mark the components & dimensions.

2. List the steps you will follow to find the effective angle of shearing resistance of sand using a disturbed representative sample received from a SPT test in the laboratory.

3. Show, by means of diagrams, how an electric cone penetration test is done at 10m depth using a piezocone. Mark the components & dimensions.