

Menoufia University
 Faculty of Engineering
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 Dept. : Civil Engineering
 Semester : First-Final Exam
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Postgraduate: Diploma
 Subject: Site Investigation
 Code No. : CVE 516
 Date: 08/01/2017
 Time Allowed: 3.00 hours
 Total Marks: 100

Answer the following questions and any missing data can be reasonably assumed

Question(1)

(23)

1-a) Show schematically the different parts of standard split spoon.

1-b) List the factors, which cause soil disturbance.

1-c) Four soil samplers were used for extracting soil samples with the shown dimensions in the following table, all dimensions in millimeters :

Sampler No.	Outer diameter of cutting edge (D ₂)	Inner diameter of cutting edge (D ₁)	Inner diameter of sample tube (D ₃)	Outer diameter of sample tube (D ₄)
1	50	48	48.5	49.1
2	52	48	48.5	50
3	60	48	48.5	58
4	60	52	54	58

Compute the degree of disturbance as A_r , C_i and C_o for each sampler. Which sampler gives undisturbed sample?

1-d) Differentiate between subsurface investigation in fine and coarse soils considering the following:

i- Type of samples obtained.

ii- Type of samplers used

iii- Type of shear strength data can be measured.

1-e) A multistory building consists of fifteen floors. The building covers 1600 m² (50.0 × 32.0 m). Assume the soil is average stratified. Suggest number of borings required, borings distribution, boring depth and list the tests required for soil classification and for determining the bearing capacity of soil and soil settlement assuming the top 20 meters of the soil are clayey soil overlying a deep layer of sandy soil.

Question(2)

(19)

2-a) Illustrate schematically the wash boring method and chopping bits.

2-b) Make a comparison between the suitability of the studied soil samplers.

2-c) What is criteria of boring log? Give a sample of typical boring log.

2-d) A plate load test was performed on cohesive layer and the following results were recorded in the following table:

Plate size (cm)	Ultimate load (ton)	Settlement (mm)
30 × 30	11.6	12.5
45 × 45	18	18.75
60 × 60	25	25

i- Compute the footing dimension to carry a dead load of 2000 kN and live load of 1000 kN.

ii- What is the expected maximum settlement? Comment of results.

Question(3)

(19)

3-a) Differentiate between laboratory and field tests.

3-b) Differentiate between soil report and field report.

3-c) Write a short note about the following:

i- SPT, CPT

ii- FVST, VST

iii- RQD, A_r , L_r

3-d) A shallow square foundation for a column is to be constructed it may carry a net load of 120 ton the foundation soil is cohesionless soil:

$$Q_{ult} = 20 N \dots\dots\dots(kPa)$$

Depth, m	1.0	3.0	5.0	7.0	9.0	11.0	13.0	15.0	20.0
N	5	11	11	17	16	16	20	21	23

- 1- Suggest the foundation depth in case of shallow & deep foundation.
- 2- Determine the size of the foundation; assume that factor of safety equals to 2.

Question(4) Comment on the following statements by True or False & explain as possible: (15)

- 1- The standard penetration results may be applied to both cohesive and cohesionless soils.
- 2- SPT is an in-situ test does not directly measure any of the engineering properties or design parameters for a soil.
- 3- In Dutch cone penetration test, the instrument is steadily pushed into the ground from the surface and the resistance recorded continuously.
- 4- No soil sample is recovered during CPT.
- 5- CPTU measure pore water pressure.
- 6- Bjerrum (1974) has shown that as the plasticity of soils increases, C_u obtained by vane shear tests may give unsafe results for foundation design.
- 7- CPT is highly repeatable, insensitive to operators, and best suited for uncemented soils, sands, or clay.
- 8- Plate load test may be carried out near ground surface or at the bottom of the borehole.
- 9- CPT data was used to estimate geotechnical parameters, which can be used as input in analysis.
- 10- The ultimate pile bearing capacity can be calculate from CPT data.
- 11- Inferred soil lithology can be defined based on R_f value.
- 12- PLT suitable for gravel/boulder strata when SPT and DCPT does not give dependable results.
- 13- 24 hours is enough for GWT to become stable in average permeability soil.
- 14- There are two forms of rotary drilling, open-hole drilling and core drilling.
- 15- Geophysical methods are used for preliminary investigations, are quick and results are obtained rapidly.

Question(5) Complete the following parts: (4)

- 1- Hand-augered hole can be drilled to depth of about, although depths greater than aboutare usually not practical.
- 2- Samples may be obtained from.....as the augers are extracted, or from
- 3- The samples of soil and their properties should lead to and design.
- 4- All present-day augering is done by drills. Other accessories, which may be needed for Drilling are,....., and
- 5- It is nearly impossible to obtain a of soil, so in general usage the term means a sample where some precautions have been taken to the existing soil skeleton.
- 6- The cost of the site investigation must be weighed against
- 7- Site investigation is the process by whichand their properties might effect on the design of building foundations.
- 8- For uniform soil-..... spacing will be adequate, while for erratic soil condition spacing ofto ... are occasionally used.