Menoufia University **Faculty of Engineering** **Shebin El-Kom** **Dept. : Civil Engineering** **Semester : First-Final Exam** **Academic Year: 2017-2108**	Minufiya University	**Postgraduate: Diploma** **Subject: Site Investigation** **Code No. : CVE 516** **Date: 1/01/2018** **Time Allowed: 3.00 hours** **Total Marks: 100**

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

Question (1) (25)

1-a) Discuss the aims of site investigation.

1-b) Use Housel method to determine the size of square footing required to carry a column load P = 45 tons if the two plate loading tests results are as given below:-

- **Plate size (1) = 35x35 cm, corresponding load= 5.6 tons; relative to 1.0 cm settlement.**
- **Plate size (2) = 50x50 cm, corresponding load =10 tons; relative to 1.0 cm settlement**
- **Also, determine the expected settlement for the obtained footing (consider clay soil).**

1-c) Illustrate schematically wash boring method.

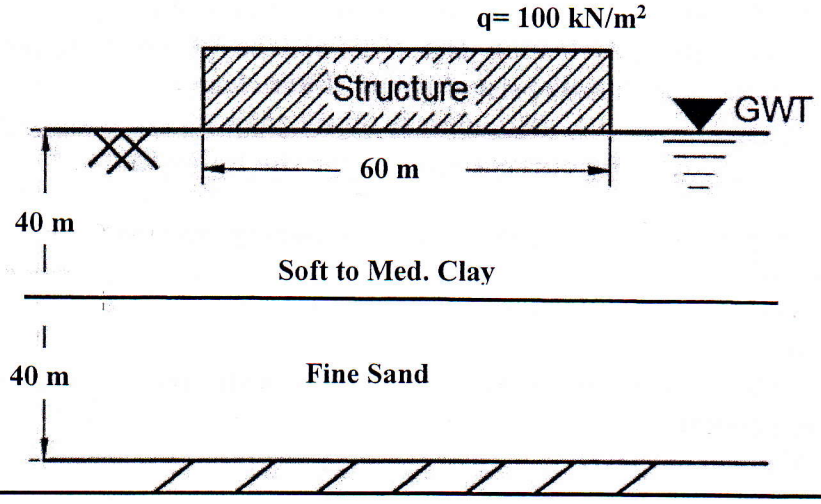
1-d) A vane tester with a diameter d = 9.1cms and a height h = 18.2 cm requires a torque of 110 N-m to shear a clay soil sample, with a plasticity index of 48%. Find the corrected undrained shear strength of the soil (c_{uv}).

Question (2) (20)

2-a) Show schematically different parts of piston sampler.

2-b) A residence building includes 50 floors. The building covers 1800 m^2 as shown in the below Figure. Suggest the required site investigation procedure. Compare between the calculated boring depth using Sowers formula, De Beer rule and the given soil profile.

2-c) Explain the cone penetration test (CPT) used in subsurface exploration.



Question (3) (23)

3-a) Describe the used method for determining ground water table in the field.

3-b) What are the solutions that can be used to overcome the unsuitability of construction site?

3-c) What are the common geophysical methods.

3-d) For the given data, determine the suggested foundation level and calculate the footing dimensions to carry a dead load = 40 ton and the live load = 60 ton .The foundation soil is silty

sand and the factor of safety = 2.5: $q_{ult} = 0.5\ N_{60}$ (ksf)

Depth (m)	1.0	2.0	3.0	4.0	5.0	6.0	7.0
N_{meas}	8	10	12	12	16	20	18

Note : $C_E = 0.80$, $C_B = 1.05$, $C_S = 1.1$, $C_R = 0.80$

Question (4) Comment on the following statements by True or False & explain as possible: (12)

1- The depth of investigations shall be extended to all strata that will affect the project or are affected by the construction.
2- Geophysical methods are used for detailed site investigations.
3- For dams, wires and excavations below groundwater level, and where dewatering work is involved, the depth of investigation shall also be selected as a function of the hydro-geological conditions.
4- The objective of CPT is to determine the resistance of soil and soft rock to the penetration of a cone and the local friction on a sleeve.
5- The ultimate pile bearing capacity cannot be determined from CPT data.
6- Geophysical methods represent indirect methods of subsoil exploration.
7- Bjerrum has reported that the obtained undrained cohesion by vane shear tests may give unsafe results for foundation design as the plasticity of soils increases.
8- SPT is one of the most important soil tests for geotechnical engineers because it's widely used in calculating different soil parameters.
9- Disturbed sampling provides a means to evaluate stratigraphy by visual examination and to obtain soil specimens for laboratory index testing.
10- Samples obtained via disturbed sampling methods can often be used for index property testing in the laboratory but explicitly should not be used to prepare specimens for consolidation and strength tests.
11- Soil index tests are not specifically used in the design but are invaluable in establishing general conditions assessing inherent material variabilities.
12- For a piezocone penetration test (CPTu), the penetration pore water pressures are monitored using a transducer and porous filter element.

Question (5) Choose the correct answer for the following: (20)

1- As per Egyptian code for general soil, the boring can cover area equal to:
   a- 250 m^2.
   b- 500 m^2.
   c- 1500 m^2.
2- The number of borings and their locations in a site area depend on:
   a- The proposed structure.
   b- Design parameters.
   c- Access issues.
   d- Geologic constraints.
   e- All of the above.
3- Before designing the investigation program, the available information and documents should be evaluated in:
   a- A desk study.
   b- Preliminary investigation.
   c- Detailed investigation.

d- No one of the above.

4- Advantages of seismic exploration:
   a- Permits a rapid coverage of large areas at a relatively small cost.
   b- Not hampered by boulders and cobbles, which obstruct borings.
   c- Used in regions not accessible to boring equipment.
   d- All of the above.

5- Iwan auger is a very simple hand tool used for drilling into soft soils down to maximum depth of:
   a- 6 m.
   b- 10 m.
   c- 15 m.

6- The laboratory tests for soils commonly carried out include:
   a- Moisture content.
   b- Liquid and plastic limits to classify fine grained soil
   c- Particle size distribution to give the relative proportions of soil matrix.
   d- Soil strength.
   e- Soil permeability.
   f- Any one or all of the above.

7- Block soil samples can be taken from:
   a- Deep depths.
   b- Shallow depths.
   c- Boreholes.
   d- All of the above.

8- For obtaining undisturbed soil samples.
   a- $R_r < 95$ %.
   b- $A_r > 10$%.
   c- $C_o < 2$ %.
   d- No one of the above.

9- The thicker wall of the standard sampler permits:
   a- Higher driving stresses than the Shelby tube.
   b- However, does so at the expense of higher levels of soil disturbances.
   c- Obtained samples are used for visual examination.
   d- Any one of the above.

10- Standard penetration test can be used for:
   a- Investigation of thickness of bearing strata.
   b- Estimation of angle of friction.
   c- Direct application of 'N' value in empirical formula for pile load capacity.
   d- Any one of the above.

11- Indirect methods of site investigation:
   a- Geophysics methods.
   b- Exploratory pits.
   c- Boreholes.
   d- Trenches.

12- Shallow disturbed samples can also be obtained using:
   a- Split –barrel sampler.
   b- Hand augers.
   c- Test pits.
   d- Any one of the above.

13- Site investigation costs:
   a- Usually about 5 to 10 % of the cost of the earthworks & foundations.

b- About 4 % of capital cost of works.
c- About 0.5 of the cost of the earthworks.
d- No one of the above.

14- Plate load test is suitable for:
a- Determination of allowable bearing capacity of sub-soil.
b- Boreholes.
c- Calculating shear strength parametres.

15- Hand- auger boring can be made to a maximum depth of:
a- 25m.
b- 15 m.
c- 20 m.
d- Any one of the above.

16- CPT is an invasive soil test that defines:
a- Soil properties.
b- Strength parameters.
c- Production of detailed soil profiles.
d- All of the above.

17- A site visit should be performed and engineer observations should include:
a- Utility locations.
b- Access issues.
c- Topographic conditions.
d- Adjacent property use.
e- All of the above.

18- Geotechnical report should contain the followings:
a- Purpose & scope of the investigation.
b- Factual details of field exploration.
c- Geological setting.
d- Design analysis & recommendations.
e- All of the above.

19- Spacing between borings:
a- 8-15 m for erratic soil.
b- 20-30 m for uniform soil.
c- Up to 250 m for roads.
d- All of the above.

20- Advantages of CPT:
a- The test provides a continuous record of data measurement for the completely investigated soil depth.
b- The test equipment is complicated and economical.
c- The test is operator dependent.
d- The test provides a noncontiuous record of data.
e- Any one of the above.

With our best wishes

This exam measures the following ILOs																		
Question Number	Q1-a	Q1-d	Q2-a	Q3-a	Q4	Q5		Q1-b	Q1-e, Q2-c	Q2-b	Q3-c	Q4	Q5		Q1-c	Q3-b	Q3-d,	Q4
Skills	a3-1	a3-1	a2-2	a3-1	a3-1	a2-1		b1-1	b2-1	b1-1	b1-1	b2-1	b2-1		c1-1	c1-2	c1-3	c1-3
	Knowledge &Understanding Skills							Intellectual Skills							Professional Skills			