

National Exams November and December 2010

04-Geol-B3, Site Investigation

3 hours duration

NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is urged to submit with the answer paper, a clear statement of any assumptions made.
2. This is an OPEN BOOK EXAM.
3. Candidates may use any non-communicating calculator.
4. Questions have equal value. The grade for each question is given. It is suggested that the candidate proportion time based on the allocated value.
5. All questions require an answer in essay format. Clarity and organization of the written answer and any figures or sketches are important.
6. The examination has an overall value of 100 Marks: 4 questions consisting of 25 Marks each.

Marking Scheme

1. 25 marks total

(a) 5 marks

(b) 5 marks

(c) 5 marks

(d) 5 marks

(e) 5 marks

2. 25 marks total

25 marks total answer

3. 25 marks total

25 marks total answer (5 marks per technology cited)

4. 25 marks total

(a) 10 marks

(b) 10 marks

(c) 5 marks

Value

25 Marks

Question #1

As an Engineer at an Engineering firm, your boss decides that you are the ideal candidate for a road construction project and he would like you to conduct the initial planning for the construction project. As a first step in this process, you are to conduct a desk study and subsequent site investigation.

5 Marks

- a. State clearly the main objectives of your site investigation.
- b. Once a scope of work has been determined for your project, what should the site characterization considerations entail?

5 Marks

- c. What codes, guidelines, laws etc. (i.e. design / legislative framework) will you have to cite in order to include as a consideration within your site investigation?

5 Marks

- d. What are the primary objectives of the field exploration component?

5 Marks

- e. In terms of reporting for your site investigation, what should the major headings of your report be?

25 Marks

Question #2

When conducting a site investigation, how thorough or “in depth” does the site investigation have to be? Provide recommendations or guidelines as to how one can ascertain the thoroughness of the depth of the investigation. Include in your answer the delineation of Low, Moderate and High Risk factors and how one can differentiate between these levels of risk.

25 Marks

Question #3

List and describe at least 5 industry accepted in-situ testing techniques for soil. Describe each technique, its method, equipment used, effectiveness, limitations and the specific soil parameters (or properties) that can be obtained or inferred.

25 Marks

Question #4

Groundwater is a critical factor in foundation design and construction. Many infrastructure related problems stem from groundwater, hence groundwater conditions, both physical and chemical are an important component of any site characterisation. Answer the following groundwater –related questions:

10 Marks

- a. What are the main factors of importance when conducting a groundwater investigation?

10 Marks

- b. How would one go about organizing a physical investigation of groundwater? What type of equipment would be required? What factors must be considered in the set-up of one's borehole spacing and distribution?

5 Marks

- c. When should piezometers be installed and what are their function within the groundwater investigation?