

National Exams May 2018

04-Geol-B3, Site Investigation

3 hours duration

NOTES:

1. If doubt exists as to the interpretation of any question, the candidate is asked 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 use of sketches and diagrams may add value to the response of the candidate.
7. The examination has an overall value of 100 Marks: 4 questions consisting of 25 Marks each.

Value

25 Marks Question #1

Answer the following questions as fully as possible:

- 5 Marks a. What is a site investigation?
- 5 Marks b. Why is it important to conduct a site investigation (state at least 5 reasons)?
- 5 Marks c. What is the overall design process associated with a site investigation (i.e. steps)?
A diagram of the steps and how they are inter-related may help.
- 5 Marks d. In terms of the execution of a site investigation, how is contracting between the client and the contractor usually conducted? What are the industry-standard types of contracts that are used for this purpose?
- 5 Marks e. What resources would one acquire during the desk study portion of the site investigation? i.e. where and how to obtain these materials. A table that summarizes these may be useful.
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25 Marks Question #2

During a site investigation, it is important to evaluate the in-situ soils and rocks that are present. As such,

- 15 Marks a. What are the main site investigation components and test methods associated with field and in-situ testing of soils?
- 10 Marks b. What are the main site investigation components and test methods associated with field and in-situ testing of rocks?
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25 Marks Question #3

Risk is a large component of the site investigation.

- 10 Marks a. Define risk as it applies to site investigations. How does one include the level or risk at the site investigation stage? What model would be employed? i.e. Certain activities and testing procedures can be employed depending on low, moderate or high risk.

10 Marks

- b. One never has the amount of resources in order to complete a comprehensive site investigation (this carries a certain amount of risk). As such, what are the main priorities of such an investigation. Create a list of 10 priorities that must be addressed during a site investigation.

5 Marks

- c. What are the various ways that one can co-relate (combine) the information obtained from multiple boreholes on site? What is the risk involved with interpreting such results?

25 Marks Question #4

Groundwater is a critical factor in underground as well as 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, specifically, are the geo-mechanical mechanisms of interest that are associated with groundwater and its influence on the ground conditions?

5 Marks

- b. What are the main factors of importance when setting-up and conducting a groundwater investigation?

5 Marks

- c. 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

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