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## NATIONAL EXAMS DECEMBER 2011

### 04-Env-B1, Environmental Assessment and Management Systems

**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 a CLOSED BOOK EXAM with a 2-sided ( $8\frac{1}{2}'' \times 11''$ ) AID SHEET prepared by the candidate allowed.
3. The candidate may use one of two calculators, the Casio or Sharp approved models. Note that you must indicate the type of calculator being used. Write the name and model designation of the calculator on the first inside left hand sheet of the exam work book.
4. Any five(5) questions constitute a complete paper. Only the first five(5) answers as they appear in your work book(s), will be marked.
5. Each question is equally weighted at twenty (20) points for a total of a possible one-hundred (100) points for a complete paper.

### Problem 1

Provide answers to the following questions related to *analysis of environmental impacts using technical and non-technical parameters* and *applicable federal, territorial or provincial environmental legislation*:

- (5) (i) Use an example to identify and briefly discuss two pre-impact phases and one post-impact phase of an environmental impact assessment. In your discussion, include key stress areas for appropriate action.
- (5) (ii) Describe two *impact indicators* from an environmental impact analysis and show how they may be used to determine the impacts on a cold water fishery due to increased stormwater runoff from intensification in an urban community.
- (10) (iii) Describe two technical and two non-technical features of an existing federal or provincial or territorial environmental legislation that minimizes negative environmental impacts in the atmosphere or hydrosphere or land (select **only one**). In your description, briefly compare the relative effectiveness of technical versus non-technical approaches by taking into account the relative costs and benefits of each approach. Use of a table may be useful to organize your answer.

### Problem 2

Provide answers to the following questions related to following areas: *environmental impact assessment applied to solid waste management, effluent control and air pollution control*:

- (7) (i) Consider the construction of a new landfill to deal with solid waste from an urban population of 100,000 people and associated light industries, commercial establishments and institutions. Describe three (3) key issues as part of an environmental impact assessment that will help municipal planners and engineers to determine the proper location and system design of the facility.
- (7) (ii) Intensification in an urban community has increased the quantity of stormwater runoff with concerns for impacts of erosion and water quality in a nearby receiving river. Briefly explain the use of one (1) on-site and one (1) 'end of pipe' possible solutions to reduce the quantity and improve the quality of stormwater runoff to the river.
- (6) (iii) Briefly compare the benefits of one (1) non-technical solution over one (1) technical solution to the discharge of lead (Pb) or any other toxic substance found in the emissions from mobile combustion sources in urban centres.

### Problem 3

Answer the following questions related to *environmental audits, geographical information systems (GIS)* and *environmental management systems (EMS)*:

- (6) (i) Use an engineering process as an example to explain two (2) key steps in conducting an environmental process audit and the benefits you can provide to your client through your services as an environmental auditor. Assume that the audit was triggered by more stringent regulations controlling the waste product from the engineering process that you have been asked to audit.
- (6) (ii) Briefly define and explain how GIS may be used to assist with environmental management. In your explanation, consider how GIS may improve the quality and reduce costs associated with managing a large and complex environmental project such as a new hydroelectric project.
- (8) (iii) The Ministry of Natural Resources (MNR) has made a commitment to sustainable development in the areas of reforestation. Provide three (3) specific ways in which the integration of an EMS in maintaining a good reforestation program may assist MNR to fulfill their commitments.

### Problem 4

Provide answers to the following questions related to *principles of sustainable development, design of controlled environments* and *protection of natural resources for sustainable development*:

- (6) (i) Briefly explain the implementation of two (2) key principles of sustainable development as applied to one (1) industry of your choosing. In your explanation, discuss how you will measure the effectiveness of the implementation of the principles.
- (7) (ii) Using one (1) example, explain three (3) important differences in the design of controlled environments versus natural environments.
- (7) (iii) A sector of the textile manufacturing industry wants to lead the industry in providing environmentally conscious reduction of their solid and liquid waste production. Provide two (2) ways that the textile sector may integrate the concepts of sustainable development in their operation to achieve their goal over the next five years.

### Problem 5

Provide answers to the following questions related to *resource problems and design* with consideration of *ecological, economic, demographic and social dimensions*:

- (8) (i) It has been advocated that the lease or use principle makes more sense than does the buy or own principle particularly in a rapidly changing technological world. Use an example and provide three (3) ways in which this may reduce our ecological or economic dependence on natural resources.
- (7) (ii) The sprawling city concept (i.e., suburbs expansion from the core city complex) has been compared to central high-rise intensification. Briefly explain two (2) advantages for each approach of city planning and design. In your explanation, consider the ecological, economic, demographic and social dimensions. A table may be useful in answering this question.
- (5) (ii) Explain two (2) potential environmental or resource issues in a city that is experiencing a demographic shift to a senior population base.

### Problem 6

Provide answers to the following questions related to *techniques to integrate knowledge and define policy and risk analysis*.

- (10) (i) Provide an example to explain the use of two (2) techniques to integrate various sources of knowledge to define environmental policy. As an example you may consider the water and energy use planning project in Alberta, Canada, where stakeholder consultations at 10 potential hydroelectric facilities were conducted to ensure that all the stakeholder input was reflected in the final policy adopted.
- (10) (ii) Provide one (1) example to explain two (2) risk analysis techniques or methodologies that may affect regulations to control air toxic emissions from the manufacturing industry (e.g., VOCs) or provincial water quality objectives (PWQOs) (e.g., BOD, TSS, metals). In your explanation, consider how uncertainties in measurements, causality and environmental or human impacts are dealt with.

### Problem 7

Provide answers to the following questions related to *life cycle analysis and risk management*.

- (10) (i) Provide one (1) example to explain how 'Green Design' may be implemented in a life cycle analysis for a production company to improve its environmental profile of their products and processes. In your explanation, identify three (3) challenges of conducting a truly representative analysis and two (2) simplifications that may be used but may limit the use of the conclusions.
- (10) (ii) Provide one (1) example (e.g., hazardous waste contaminated site remediation) to explain the process of environmental risk management. In your explanation, consider site inspection, type of pollution, sampling requirements and data interpretation, regulatory compliance and economic issues.

## Marking Scheme

1. (i) 5, (ii) 5, (iii) 10 marks, 20 marks total
2. (i) 7, (ii) 7, (iii) 6 marks, 20 marks total
3. (i) 6, (ii) 6, (iii) 8 marks, 20 marks total
4. (i) 6, (ii) 7, (iii) 7 marks, 20 marks total
5. (i) 8, (ii) 7, (iii) 5 marks, 20 marks total
6. (i) 10, (ii) 10 marks, 20 marks total
7. (i) 10, (ii) 10 marks, 20 marks total