
NATIONAL EXAMS MAY 2013

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 *resource problems and design* with consideration of *ecological, economic, demographic and social dimensions*:

- (10) (i) It has been advocated that sustainability depends on designs for optimal use and recycling of resources. Give one (1) example where environmental engineers have demonstrated optimization in design with integration of ecological, economic, demographic and social dimensions. A table of 1-column and 4-rows may be used to answer this question.
- (10) (ii) Municipal engineers and planners have given preliminary approval for the expansion of an industrial park zone subject to the submission of a development impact assessment. Briefly explain four (4) key issues (one (1) each from ecological, economic, demographic and social dimension) that should be included in the impact assessment report to facilitate the final approval of the industrial park expansion by the municipality. A table of 1-column and 4-rows may be used to answer this question.

Problem 2

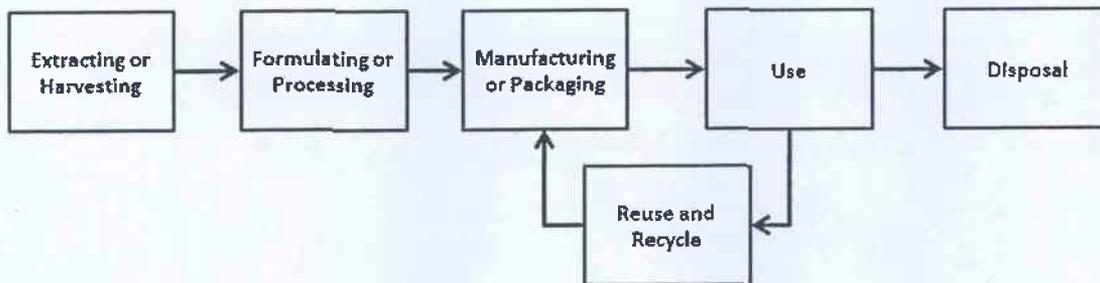
Provide answers to the following questions related to *techniques to integrate knowledge and define policy and risk analysis*:

- (10) (i) Provide and explain the use of three (3) techniques to integrate various sources of knowledge to define environmental policy. In your explanation, consider water or energy use planning in Quebec, Canada, where stakeholder consultations at 10 hydroelectric facilities were conducted to ensure that all the stakeholder input was reflected in the final policy adopted.
- (10) (ii) Explain how risk analysis techniques or methodologies may affect regulations to control provincial effluent standards from industrial discharges directly to nearby lakes. In your explanation, include three (3) important aspects of risk analysis.

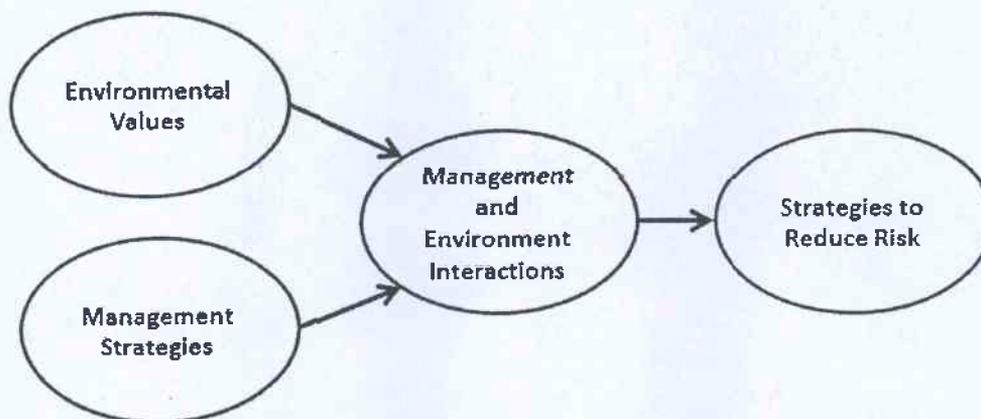
Problem 3

Provide answers to the following questions related to *life cycle analysis (LCA)* and *risk management (RM)*.

- (10) (i) Using the diagram below provide an illustrative example to explain how using a life cycle analysis (LCA) makes sense from a business perspective as well as an environmental one. In your explanation, identify three (3) important areas that need to be addressed in conducting a truly representative LCA.



- (10) (ii) Using the figure below, provide an illustrative example to explain how using risk management (RM) analysis can help identify appropriate strategies to reduce environmental risks. In your explanation, identify three (3) important areas that need to be addressed in RM to ensure a sustainable approach.



Problem 4

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

- (7) (i) Environmental audits are an independent examination of how processes are being or have been performing to ensure compliance with environmental requirements. Explain three (3) key steps in conducting an environmental audit and the benefits you can provide to your client through your services as an environmental auditor. For your explanation, you may choose an example of your choice.
- (6) (ii) The main purposes of sustainability in environmental engineering includes understanding, integrating and modelling nature and society. Provide three (3) ways in which GIS can assist to achieve the above goals.
- (7) (iii) In order to address environmental issues, the corporate sector has recently increased the use of EMS. Provide three (3) ways in which sustainability may be integrated with product commercialization within an EMS.

Problem 5

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 three (3) important interactions among three (3) key principles of sustainable development. You may select an example of your choice to answer this question.
- (7) (ii) Explain three (3) primary design principles for controlled environments versus natural environments. You may select an example of your choice to answer this question and a matrix may be useful to organize your answer.
- (7) (iii) Sustainable development has been defined as, "Development that meets the needs of the present without compromising the ability of future generations to meet their own needs". Canada's minerals and metals, energy resources and forest industries have recently (due in part to national legislation) met the sustainable development challenge. Select one (1) of the above mentioned industries and describe three (3) ways in which they comply with the definition of sustainable development.

Problem 6

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 a landfill site for solid waste from an industrial plastic piping plant expected to double its production over the next five (5) years. Describe three (3) key issues in an environmental impact assessment that will help the industrial managers and engineers to minimize environmental impacts.
- (7) (ii) Sanitary sewer overflows (SSOs) are a major environmental concern that commonly occur at pumping stations in older systems due to elevated infiltration and inflow. Briefly provide two (2) possible solutions to reduce the quantity of SSOs in older systems, giving the respective benefits and challenges for each solution.
- (6) (iii) Provide an example of a technical and a non-technical solution to the discharge of one (1) common industrial volatile organic compound (VOC). Assume that the VOC is being discharged close to a residential community.

Problem 7

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*:

- (10) (i) Describe the use of two (2) indicators from an environmental impact analysis to show the impacts on the hydrosphere and atmosphere due to a large scale tree harvesting operation in northern British Columbia. Consider that potential valuable water resources and natural habitats may be impacted. In your description, briefly compare the relative effectiveness of technical versus non-technical approaches by taking into account the costs and benefits of each approach. A matrix to organize your answer is recommended.
- (10) (iii) Provide one (1) example, of a federal, territorial or provincial environmental legislation framework and how it has been applied to ensure minimum disruption to the environment. In your example, identify three (3) important criteria in the framework and describe one (1) benefit and one (1) cost associated with the application of each criteria.

Marking Scheme

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