

National Examination, May 2014

04-Env-A6 – Solid Waste Engineering and Management

3 hours duration

NOTES:

1. There are a total **TWENTY-TWO** (22) examination questions on 2 pages.
2. Each question is of the value indicated. There are **100 possible** marks for the examination.
3. This is a **CLOSED BOOK EXAM**.
4. Candidates are permitted **ONE** (1) letter sized aid sheet (8.5 “x 11”) both sides.
5. No calculator allowed.
6. *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 for the solution of the examination questions.*
7. Clarity and organization of the answers are important.

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POINTS Define

- 5 1.1 Municipal solid waste management
- 1.2 Sustainability
- 1.3 Vermicomposting
- 1.4 Life-cycle analysis
- 1.5 Soil porosity

- 3 2. Name 3 obstacles to solid waste recycling.

- 3 3. Name 3 Federal Acts that are relevant to waste management.

- 3 4. What are some of the site features to look for in a sanitary landfill – name 3

- 3 5. Name 3 strategies you would examine for the management of food wastes

- 5 6. Why is risk perception important? How can you manage it?

- 5 7. Outline in point form how you would conduct an assessment of options to extend the lifespan of an existing landfill.

- 6 8. You have been asked to investigate a composting operation which is emitting an odour. Outline in point form the steps you would take to resolve this problem.

- 20 9. A community of 50,000 permanent residents has commissioned your company to arrive at a solution for managing additional solid waste generated by an international winter sporting event lasting 3 weeks. How would you approach this challenge? Outline your approach in point form as you would for the main and sub-headings in a report.

- 3 10. Identify the prerequisites to the biological process of composting.

- 6 11. What factors affect the composting process and state the reason why.

- 4 12. If solid wastes are to be used as a fuel, what are the 4 most important properties that must you must know?

- 5 13. What factors are important in the design of a landfill leachate collection system?

- 7 14. In siting a new landfill, what are the important considerations?

- 2 15. Why is knowing the hydraulic conductivity of compacted wastes important?

77 ***Sub-total***

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- 5 **16.** In order to assess the leachate formation in a landfill draw a definition sketch for a water balance.
- 4 **17.** Identify 4 landfill leachate management options.
- 4 **18.** Identify how you could maintain an outdoor composting facility during winter.
- 2 **19.** What is the most effective way to eliminate the small quantities of hazardous wastes now found in municipal solid waste?
- 3 **20.** Identify 3 commonly used methods to assess solid waste quantities.
- 2 **21.** What are 2 strategies that allow you to derive energy from municipal wastes?
- 3 **22.** Name 3 commonly used unit operations and facilities for the separation and processing of separated and co-mingled municipal solid wastes.

100 TOTAL