

National Examination, December 2014

04-Env-A6 – Solid Waste Engineering and Management

3 hours duration

NOTES:

1. There are a total **TWENTY-NINE (29)** 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. One non-communicating calculator.
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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marks

- 5 1. What are the elements of a waste management system?
- 4 2. What do you understand by integrated solid waste management, and what are their components?
- 5 3. In the operation of a solid waste management system name 5 important issues.
- 4 4. Name 4 future challenges and opportunities to solid waste management.
- 5 5. Name 5 important questions that must be answered as part of your information gathering strategy for the development of a solid waste management plan..
- 3 6. How would you determine the composition of municipal solid waste (MSW) in the field?
- 5 7. Name 5 materials that are commonly separated from MSW.
- 2 8. Why are yard wastes commonly collected seperately?
- 3 9. Name the impacts of waste diversion programs on the MSW composition.
- 5 10. Name 5 important physical properties of MSW.
- 3 11. If solid wastes are to be used as fuel what are the most important properties of the waste that you must know?
- 3 12. How would you determine the energy content of solid wastes components?
- 2 13. What is the purpose of measuring the biodegradability of the organic fraction of MSW?
- 2 14. Name two major factors that cause the development of odours in on-site storage facilities.
- 3 15. Name 3 physical and 3 chemical transformation processes that can be used for the management of MSW.

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- 4 16. Name 2 biological transformation processes that can be used for the management of MSW. What are their advantages and disadvantages?
- 3 17. What is the impact of hazardous wastes in solid waste management facilities?
- 2 18. What is the most effective way of managing hazardous wastes in MSW?
- 2 19. How would you estimate waste quantities? Which of the methods (if any) would appear to be the most accurate?
- 3 20. Waste generation rates may differ between communities. Name 3 factors that may be the cause for this difference.
- 3 21. What is the goal of a waste characterization study? What are the major steps you have to take?
- 2 22. What is the role of size reduction (a unit operation) of the collected waste material?
- 3 23. Density separation, magnetic separation and densification are also unit operations. How is each operation accomplished?
- 4 24. Name 4 issues in the implementation of combustion facilities for MSW.
- 3 25. List some of the concerns with the landfilling of solid wastes.
- 5 26. Draw a sketch of a landfill and label all components.
- 4 27. Name 4 leachate management options.
- 4 28. What 4 topics must be addressed when developing a long-term landfill closure plan?
- 4 29. The operation of thermal recovery systems produces several impacts on the environment including gaseous and particulate emissions. What are they?