Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
300 level 2nd Semester Examination – December 2017/January 2018
MRT 367-2 Solid Waste Management

Uva Wellassa University

Instructions to Candidates
Duration: Two (02) hours
Number of Questions: Four (04)
Mark Allocation: 100
Answer all Questions

1. a. Define Integrate Solid Waste Management (ISWM). (02 Marks)
   b. How would you determine composition of Municipal Solid Waste (MSW) in field? (04 Marks)
   c. Write down main steps/process for Municipal Solid Waste Management. (05 Marks)
   d. Briefly explain importance of each steps/process of part c. (07 Marks)
   e. Briefly explain requirement for ultimate analysis for Municipal Solid Waste Management process. (04 Marks)
   f. Municipal Solid Waste can be manage using landfill, Anaerobic decomposition or composition techniques. In Sri Lankan situation, which technique is most suitable for Municipal solid waste management? Explain your answer. (03 Marks)

2. a. Explain briefly 3R concept. (04 Marks)
   b. Explain theory of composting techniques. (03 Marks)
   c. Describe how to effect temperature and porosity for composting rate? (05 Marks)
   d. Compare and discuss turned windrow composting and turned & aerated composting technologies. (05 Marks)
   e. Write down main steps of anaerobic decomposition process. (02 Marks)
   f. Describe main function of each steps of part e. (06 Marks)

3. a. What are the main factors to be consider during the landfill siting? (02 Marks)
   b. A number of landfill investigation studies have suggested that the stabilization of waste proceeds in five sequential and distinct phases. Briefly explain each phase. (08 Marks)

(9)

c. Badulla municipal area has 6,500 houses and each house generate 0. 201m^3 container of waste per week. Municipal council of Badulla decide to that waste used for landfill and what volume would this waste is occupied in a Landfill. Assume the density of the waste when collected is 115kg/m^3 and landfilling is 700kg/m^3. 10% of the total volume occupied is taken up by the cover dirt. (05 Marks)

d. Explain briefly overburden and tailing. (04 Marks)

e. Write down method can be used for overburden management. (02 Marks)

f. Compare and discuss pond storage and dry sacking method for tailing disposal. (04 Marks)

4. a. Define leachate of the landfill. (02 Marks)

b. Draw landfill by adding major design component. (04 Marks)

c. What are the main factors effect for leachate generation rate in land fill? (04 Marks)

d. Explain briefly function of liner in landfill process. (02 Marks)

e. How can be made liners for landfill during the operation. (02 Marks)

f. Leachate treatment represent one major expense of landfill operation. Are you agree with this statement? Briefly explain your answer. (02 Marks)

g. A landfill cell is open for three year and receiving 175,600 tons of waste per year. Calculate gas production of landfill for first three year. Assume landfill gas emission is 0.0307yr^{-1} and methane generation potential is 150 m^3/ tone. (07 Marks)

Hint: LandGEM model for total gas emission is

$$Q_T = \sum_{i=1}^{n} 2kL_oM_ie^{-kt_i}$$

Where

Q_T - Total gas emission rate from a landfill, volume/time

n - Total time periods of waste placement

k - Landfill gas emission constant, $time^{-1}$

L_o - Methane generation potential, volume/mass of waste

t_i - Age of the i^{th} section of waste, time

M_i - Mass of wet waste, placed at time i