

B.E/B.TECH (FULL TIME) DEGREE END SEMESTER EXAMINATIONS

APRIL / MAY 2013

CIVIL ENGINEERING BRANCH (SEMESTER V)

CE 9048 – MUNICIPAL SOLID WASTE MANAGEMENT

(REGULATIONS 2008)

Max.Time – 3 hours

Max. Marks – 100

Instructions

- Answer all Questions in Part A
- Answer Question 11 and (a) OR (b) of Questions 12 to 15 in Part B
- Assume suitable data wherever necessary.
- Each Question in Part A carry 2 marks and that in Part B carry 16 marks.

Part A (10 x 2 = 20 marks)

- 1 List the factors affecting per capita waste generation rate?
- 2 What are the public health impacts of improper management of wastes?
- 3 Distinguish between Source reduction and Recycling with the help of an example?
- 4 What is expected by “ source segregation” of solid wastes?.
- 5 Provide two reasons to justify the need for transfer stations?
- 6 When to use “Stationery Container System” of waste collection?
- 7 Suggest two options for thermal processing of wastes
- 8 List four objectives of waste processing?.
- 9 What is the advantage of landfill bioreactor?
- 10 Determine the time required for the leachate to percolate through the clay layer of a sanitary landfill ?

Part B (5 x 16 = 80 marks)

- 11 (i) Discuss the important aspects to be considered in the site selection for a waste processing and disposal facility (8)
- (ii) With the help of a neat sketch explain the functions of the essential components of a Landfill (8)

12a) i) Explain the different types and sources of solid wastes and compare their Characteristics (8)

ii) List the factors that constrain effective public participation in Waste Management and explain the principles to encourage public participation. (8)

(OR)

12 b)i) Explain the mandatory requirements and other salient features of the Municipal Solid Waste (Management and handling) Rules in India. (16)

13 a) (i) Leaves with a C/N ratio of 50 are to be blended with solid wastes having a C/N ratio of 8.3. Determine the proportions of each component to achieve a blended C/N ratio of 25. What will be the moisture content of the blended mix.

Moisture content of solid wastes = 60%

Moisture content of leaves = 40%

Nitrogen content of solid wastes = 6%

Nitrogen content of leaves = 0.75% (8)

ii) Explain the process of "Windrow Composting" and discuss the factors controlling its performance? (8)

(OR)

13 b) (i) Describe the steps involved in Biomethanation of wastes with the help of a Process Flow Diagram (8)

(ii) Explain the applications and performance criteria of different techniques for mechanical processing of wastes (8)

14 a)(i) Briefly discuss the factors to be considered while designing a collection route and location of a Transfer station. (8)

(ii) Discuss the different options for source reduction of wastes? (8)

(OR)

14 b)(i) Determine the number of containers that can be emptied per day based on 8 h work day to collect the solid waste from a new commercial area in large containers based on the following data from studies at similar areas.

$t_1 = 15 \text{ min.}; t_2 = 15 \text{ min.};$ Off route factor = 0.15

Time required to drive between containers = 6 min.

Average one way distance to disposal site = 25 km

Time required to pick up loaded container = 0.2 h/trip

Time required to unload empty container = 0.2 h/trip

At site time = 8 min/trip

Haul time constants , $a = 0.016 \text{ h/trip}; b = 0.11 \text{ h/km}$ (16)

15 a) i) Discuss the need for an Integrated approach to solid waste management, clearly and bring out the key elements, different aspects and major stakeholders .

(16)

(OR)

15b) Present an approach for Dumpsite Rehabilitation and discuss the expected benefits and constraints of the approach. (8)

(ii) Discuss the issues associated with plastic wastes and suggest different measures to address the key issues? (8)