

CIVIL ENGINEERING BRANCH

12

FIFTH SEMESTER

CE 9048 MUNICIPAL SOLID WASTE MANAGEMENT

(REGULATION 2008)

Time: 3 Hr

Max.Marks: 100

Answer All Questions

Part – A (10 X 2 = 20 Marks)

1. A 1000 kg sample of waste has a dry weight of 600 kg. Determine the volatile solids of the sample, if the weight loss on ignition is 500 kg.
2. What are the sources and types of solid wastes?
3. What are the effects of storage of waste in containers?
4. What is the purpose of waste segregation?
5. What are the methods of collection for Residential and commercial waste?
6. What is the purpose of Transfer Station?
7. When will you recommend biomethanation of wastes?
8. What are the objectives of waste processing?
9. What are the functions of daily cover, intermediate cover and final cover of a landfill?
10. What is the purpose of having liners in Landfill?

Part B (5 X 16 = 80 Marks)

11. (a) (i) What are the mandatory requirements regarding management of municipal solid wastes? (8)
- (ii) Explain the steps involved the Characterization of Municipal solid wastes. (8)
12. (a) (i) Explain the onsite storage methods for municipal solid wastes. (16)

(OR)

b (i) Explain the Public Health and economic aspects of Open Storage of solid wastes? (16)

13. (a) (i) A direct haul type Stationery container system of 4 t capacity is having an operating cost of Rs.25/h. A Truck semitrailer combination of 25 t capacity has an operational cost of Rs.55/h and the transfer station cost is Rs 3/t. Determine the breakeven haul time beyond which the direct haul system will be costlier than the semitrailer combination and transfer station. (16)

(OR)

(b) (i) You have bagged the contract to haul the solid wastes from an industrial city where the wastes are stored in large containers located at strategic points. Based on a traffic study, "t<sub>1</sub>", "t<sub>2</sub>" and "dbc" were found to be 20, 25 and 8 minutes respectively. If the round trip haul distance averaged 60 km, how much wastes can be collected on a collection day of 8h. Assume that Off Route Factor = 0.15

- Truck unloading time at disposal site = 7.50 min.

- Delay time at disposal site = 20 min.

- Haul time constants a = 0.016 h/trip

b = 0.018 h/km.

- Container Loading time = 15 min

- Container unloading time = 10 min

- Container Capacity = 15 m<sup>3</sup>

Average Container Utilisation Factor =80%

(16)

14. (a) (i) How many kg of air is required to compost one kg of solid wastes, if 40% of the waste remains after the composting process. Assume that the composition of the waste material is [C<sub>6</sub>H<sub>7</sub>O<sub>2</sub>(OH)<sub>3</sub>]<sub>5</sub> and that of the compost is [C<sub>6</sub>H<sub>7</sub>O<sub>2</sub>(OH)<sub>3</sub>]<sub>2</sub> (16)

(OR)

(b) (i) Explain the steps involved in "Biomethanation" of municipal solid wastes and discuss the factors affecting the process. (16)

15. (a) (i) With the help of a neat sketch explain the essential components of a landfill and their Functions. (8)

(ii) Describe the five phase a landfill undergoes during the stabilization process and the nature of emissions during each phase? (8)

(OR)

(b) (i) Discuss the steps involved in selecting a suitable site for landfill for disposal of municipal solid wastes? (10)

(ii) Suggest a typical treatment scheme for the landfill Leachate. (6)