USN 10CV757

Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019
Solid Waste Management

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer FIVE full questions, selecting at least TWO questions from each part.*
2. *Substantiate with neat sketches, wherever necessary.*

PART — A

1 a. Define the terms : i) Solid waste ii) Solid waste management. (04 Marks)

b. Define Land pollution. What are the causes effects and control methods? (08 Marks)

c. List the methods used to estimate the waste quantities. With a neat sketch, explain the material balance analysis> along with equation. (08 Marks)

2 a. Estimate unit solid waste generation rate for residential area having 1200 houses with 5 persons/house. The observation made for a week at the disposal site revealed following details.

Vehicle	No. of loads	Average volume, m^3	Density kg/m^s
Truck	10	10	350
Tractor	10	1.50	150
Private vehicle	20	0.30	100

(06 Marks)

b. With a neat sketch, explain Garbage chute. (06 Marks)

c. Solid wastes from a commercial area are to be collected using a mechanically self loading compactors stationary collection system having 4m^3 containers. Determine the approximate truck capacity with following data :

i) Container size = $4m^3$
ii) Container utilization factor — 0.75
iii) Average number of containers at each location 2
iv) Collection vehicle compaction ratio = 2.5
v) Container unloading time = 0.1h/container
vi) Average drive time between container locations = 0.1h
vii) One way haul distance 30km
viii) Speed limit 88 kmih
ix) Time from garage to first container location = 0.33h
x) Time from last container location to garage = 0.25h
xi) No. of trips to disposal site per day = 02
xii) Length of work day = 8h

Assume : W --- 0.15, s = 0.1h/trip, a — 0.016, b = 0.011. (08 Marks)

3 a. Define the term 'size reduction' list the common type of devices used to reduce the size of MSW. With a neat sketch, give the salient features of any one. (07 Marks)

b. Enumerate the objectives of components separation of MSW. List the types of devices commonly used for separation of solid waste material. Give the schematic diagram of any one with salient features. (07 Marks)

c. Explain the magnetic separation, hand sorting and air separation component separation techniques. (06 Marks)

4 a. Define Pyrolysis .With a flow diagram, explain the process. **(06 Marks)**
b. What is Incineration? With a neat sketch, explain the process. **(07 Marks)**
c. What are the air pollution control devices used in conjunction with incinerator? Explain. **(07 Marks)**

PART — B

5 a. With a neat sketch, explain mechanical method of composting. **(07 Marks)**
b. With a neat sketch, explain aerated static pile composting. **(07 Marks)**
c. Define `vermicomposting'. Explain the procedure of vermicornposting. **(06 Marks)**

6 a. List and explain the factors governing the selection of a site for sanitary land fill. **(07 Marks)**
b. What is leachate? Discuss the control of leachate movement is a sanitary land fill. **(08 Marks)**
c. Design a sanitary land fill to serve population of 31000 with following data :
i) Solid waste generation : 1.9 kg/capita/day
ii) Compacted density of solid waste in land fill = 474.6 kg/m^3
iii) Uncompacted density of solid waste = 907.2 kg/m^3
iv) Average depth of compacted solid waste = 3.1m
(05 Marks)

7 a. List and explain the methods used for biomedical waste disposal. **(08 Marks)**
b. Discuss the salient features of "The Bio-medical waste (management. and Handling) rules 2000. **(07 Marks)**
c. Discuss the merits and demerits of Hog feeding with solid wastes. **(05 Marks)**

8 a. List and explain the different principal technologies used for material and energy recovery from MSW and also applications in other industries. (10 **Marks)**
b. List and explain the types of plastics found in municipal solid waste. How these plastic are numerically coded with schematics, explain the same. **(10 Marks)**