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B.E (FULL TIME) DEGREE END SEMESTER EXAMINATIONS, NOV/DEC 2013

CIVIL ENGINEERING BRANCH

V SEMESTER

CE 9048 MUNICIPAL SOLID WASTE MANAGEMENT

(REGULATIONS 2008)

Time: 3 Hr

Max.Marks:100

Answer All Questions

Part A (10 X 2 = 20 Marks)

1. What are the effects of improper disposal of solid wastes?
2. What is the role of NGO's?
3. Differentiate between Recycle and Reuse.
4. What is the processing of solid waste at commercial and Industrial facilities?
5. What is the need for Transfer station?
6. Explain some of the heuristics guidelines that should be taken into consideration when laying out the Collection routes.
7. Draw the flow chart for refuse derived fuel.
8. Distinguish between "Destruction and Removal Efficiency" and "Combustion Efficiency" of an incinerator.
9. Explain the key components of an engineered landfill with the help of a neat sketch?
10. What are the design considerations for selection of landfill barrier components?

Part B (5 X 16= 80 Marks)

11. (i) Assess the impact of waste recycling on the percentage distribution of the components found in the collected residential municipal solid waste as shown in Table 1 using the recycled waste composition data presented in Table 2.If 11% of the waste generated is recycled, What is the composition of the generated waste? (6)

Table 1 Composition of Collected data

S.NO	COMPONENT	Collected waste (% Weight)
1.	Food	8
2.	Paper	28
3.	Cardboard	8
4.	Plastics	9
5.	Textiles	1
6.	Rubber	0.8
7.	Leather	0.8
8.	Yard waste	22
9.	Wood	3
10.	Glass	8
11.	Ferrous metal	11.4

Table 2 Composition of Recycled Waste

S.NO	COMPONENT	Recycled (% Weight)
1.	Food	0
2.	Paper	50
3.	Cardboard	10
4.	Plastics	6
5.	Textiles	0
6.	Rubber	0
7.	Leather	0
8.	Yard waste	8
9.	Wood	0
10.	Glass	18
11.	Ferrous metal	8

(ii) Explain in detail about the factors that must be considered in the onsite storage of solid waste. (10)

12. (a) (i) Explain in detail about the compliance criteria and procedure laid down in schedule II of MSW Rules, 2000. (8)

(ii) Determine the energy content of typical residential MSW with chemical composition of the waste including sulfur and water as $C_{760.0}H_{1980.0}O_{874.1}N_{12.7}S$. (8)

(OR)

12. (b) (i) Explain the factors that affect the waste generation rate. (8)

(ii) Explain the sources and types of solid wastes in a community. (8)

13. (a) (i) Explain in detail with a neat sketch about the operational sequence for Hauled container system and Stationary container system (16)

(OR)

13. (b) (i) With a neat Sketch explain about the types of transfer stations . (8)

(ii) Determine the break-even haul time between a direct haul system and a transfer station operation with the following properties:

- Direct haul system uses a 10 m³ container
- Direct haul cost = Rs 20/h
- The transfer trailer has a capacity of 100 m³
- Tractor- trailer haul cost = Rs 40/h

Function of amortized capital cost, capacity, and operating costs

- Cost Rs3,750,000
- Capacity of 300,000 m³ per year
- CRF is 0.08 (function of interest rate and years to pay off)
- TS operating cost is Rs. 225,000/yr

Normalize all costs by capacity (8)

14. (a) (i) Explain with a neat sketch about the unit operations of Material Recovery facility (16)

(OR)

(b) (i) Explain about the factors that affect the composting process. (8)

(ii) Explain in detail about the advantages and limitations of incineration. (8)

15.(a) (i) Explain the principal methods used for the land filling of MSW. (8)

(ii) Explain about the factors affecting the Leachate quality and quantity. (8)

(OR)

(b)(i) Explain about the generation of principle landfill gases that occur in sequential phases. (16)