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**CE 1317 E 013**

Roll No. of candidate

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**2018**

**B.Tech. 7th Semester End-Term Examination**

**SOLID WASTE MANAGEMENT**

**(Elective I)**

Full Marks – 100

Time – Three hours

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The figures in the margin indicate full marks  
for the questions.

Answer Question No. 1 and any *six* from the rest.

1. Answer the following : (Fill in the blanks)

(10 × 1 = 10)

- (i) Specific weights of municipal solid waste are required to assess the total \_\_\_\_\_ of waste that must be managed.
- (ii) The choice of combustion process depends on the \_\_\_\_\_ composition of solid waste.
- (iii) MSW containing high percentage of biodegradable wastes are suitable for \_\_\_\_\_.
- (iv) Particle size distribution of wastes affects porosity and \_\_\_\_\_ of waste in the landfill.

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- (v) Incineration is a process based on thermal processing of solid waste by \_\_\_\_\_.
- (vi) Smaller the size of particle \_\_\_\_\_ the biochemical conversion rate during composting.
- (vii) In a landfill, solid wastes \_\_\_\_\_ by physical, chemical and biological processes.
- (viii) Among the soil liners, \_\_\_\_\_ liners are considered to be effective for landfills.
- (ix) The main sources of hazardous water are the \_\_\_\_\_ units.
- (x) \_\_\_\_\_ combustion systems are designed to incinerate the MSW without or with very little prior processing.
2. (a) What are the functional elements of a solid waste management system? (5)
- (b) Name two methods of volume reduction. Why is it required? (5)
- (c) What type of collection service is common for :  
 (i) low and medium rise apartment,  
 (ii) high rise apartment? (5)
3. (a) Discuss types of transportation system of MSW. (5)
- (b) What are the common types of vehicles used in collection and transportation of MSW? (4)
- (c) Explain briefly the process of magnetic separation and air separation. (6)
4. (a) Define incineration. Sketch a typical incinerator. (5)
- (b) What are the factors affecting efficiency of incinerators? (4)
- (c) What is the basic difference between pyrolysis and gasification? (4)
- (d) Name the process to obtain refused derived fuel (RDF). (2)

5. (a) Discuss briefly the method of composting of MSW. (4)
- (b) Name any five critical design parameters of composting and discuss their effects briefly. (6)
- (c) Describe briefly the Bangalore method of composting with a neat diagram. (5)
6. (a) Discuss different methods of disposal of solid wastes. (6)
- (b) Draw a neat sketch of cross-section of an engineered landfill showing its components. (5)
- (c) A colony having a population of 70,000 generates solid wastes at the rate of 2.2 kg /capita/day.  
 The compacted specific weight of solid wastes in landfill is 600 kg/m<sup>3</sup> and the average depth of compacted solid waste in landfill is 5 m. Determine the required landfill area annually. (4)
7. (a) How does the leachate characteristics change with time? What are its environmental implications? (5)
- (b) Where leachate collection systems are provided? Name its components. (4)
- (c) What are the liner systems provided in a landfill site? Discuss briefly. (6)
8. (a) What are the main characteristics of hazardous wastes? Discuss the impact on human health. (5 + 5)
- (b) List any ten number of household hazardous waste. (5)

9. (a) A residential area consisting of 2500 houses has an average of four residents / house. For estimating the quantity of solid waste generated, the following observations were made at disposable site for one week.

Type of Vehicle	No of trips	Vol m <sup>3</sup>	Sp. Weight (kg/m <sup>3</sup> )
I	16	15	300
II	13	2	150
III	40	0.5	100

Determine the unit rate of solid waste generation. (5)

- (b) Estimate the moisture content and density of a solid waste sample that has following Components and properties. (5 + 5)

Component	% of mass	moisture content in %	Density in kg/m <sup>3</sup>
Food waste	20	65	285
Paper	50	7	85
Card board	10	6	48
Tin Cans	9	3	90