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B.TECH
(SEM VII) THEORY EXAMINATION 2021-22
SOLID WASTE MANAGEMENT

Time: 3 Hours**Total Marks: 100****Note: 1.** Attempt all Sections. If require any missing data; then choose suitably.

SECTION A

1. Attempt all questions in brief. 2 x 10 = 20

- a. List out the methods for the primary collection of waste stored at various sources of waste generation.
- b. Define landfill?
- c. Classify the collection systems based on mode of operation?
- d. Mention the two separate components for routing procedures?
- e. List out the physical and chemical parameters considered for energy recovery from MSW.
- f. Define cell in landfill?
- g. Define pyrolysis?
- h. Explain corrosivity
- i. Classify the types of Incinerators
- j. What are the major recoverable materials present in the MSW?

SECTION B

2. Attempt any three of the following: 10 x 3 = 30

- a. Explain physical and chemical characteristics of solid wastes?
- b. Explain the different types of transfer stations?
- c. Examine composting process of bio degradable MSW
- d. Examine what are the Harmful Effects /Risks involved due to Hazardous Waste
- e. Explain hammer mills, flail mills and shear shredders in detail.

SECTION C

3. Attempt any one part of the following: 10 x 1 = 10

- (a) Solid waste from a new industrial park is to be collected in large container based on traffic studies at similar park. It is estimated that the average time to derive from garage to the first container (t_1) and from the last container to the garage each day will be 15 and 20 minutes respectively. If the average time require to derive between container 6 minutes and one way distance to disposal site is 25 kms speed limit 88 km/hr. Determine the no. of containers that can be emptied per day based on 8 hrs work day. Haul constant for 88 km/hr. a and b are .016 and .011 respectively. Analyse the above hauled container collection system
- (b) 50 gram of CO₂ and 25 gram of CH₄ are produced of decomposition of municipal solid waste with formula weight of 120 grams. Estimate the average per capita greenhouse gas production in a city of 1 million people with MSW production rate of 500 tonne per day?



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4. Attempt any *one* part of the following: 10 x 1 = 10
- (a) Explain the various means used for Transportation of Solid Waste
 - (b) Explain the objectives & various Processing Techniques used for MSW Disposal
5. Attempt any *one* part of the following: 10 x 1 = 10
- (a) A landfill is to be designed to serve a population of 200000 for 25 years. The solid waste generation is 2kg/person/day. Density of uncompacted solid waste is 100 kg/m³ and a compaction ratio of 4 is suggested. Ratio of compacted fill (Solid waste + cover) to compacted solid waste is 1.5. Determine the landfill volume.
 - (b) A city generates 40X10⁶ kg of MSW per year out of which only 10% is recyclable and rest goes to landfill. Landfill has a single lift of 3m height and its compacted to a density of 550kg/m³. If 80% of landfill is assumed to be MSW, then determine the landfill area in m².
6. Attempt any *one* part of the following: 10 x 1 = 10
- (a) List the various Thermal Conversion Technologies. Explain each of them in detail
 - (b) Explain the various design considerations for Aerobic & Anaerobic Composting
7. Attempt any *one* part of the following: 10 x 1 = 10
- (a) Discuss the various techniques used for Disposal of Hazardous Waste
 - (b) Discuss Classification of Waste Minimization (WM) Techniques

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