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B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Semester End Main Examinations

Programme: B.E. **Semester: I / II**
Branch: Common to all Branches **Duration: 3 hrs.**
Course Code: 22CV1ESWMT / 22CV2ESWMT **Max Marks: 100**
Course: Waste Management

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

MODULE - I

1 a) What do you mean by Integrated Solid Waste Management (ISWM) and describe the functional elements of ISWM **08**

b) Discuss the detailed classification of different types of wastes with an example. **08**

c) Explain the hierarchy of effective Solid Waste Management (SWM). **04**

MODULE - II

2 a) What do you mean by waste stream assessment (WSA) and why is it important in solid waste management? **04**

b) Explain in detail the physical and chemical characteristics of wastes. **08**

c) A residential area consists of 12,000 houses with an average of 4 residents per house. Three types of trucks were operated for transporting different types of wastes generated as shown in Table 1 below. Determine the unit rate of solid waste generation. **08**

Table 1. for the Question 2c.

Type of vehicle	Number of trips/week	Volume of the vehicle (m^3)	Specific weight of waste (kg/m^3)
Type-1	10	12.5	260
Type-2	6	8.6	200
Type-3	12	5.5	140

MODULE - III

3 a) Explain with neat sketches, Hauled Container System (HCS) and Stationary Container System (SCS) of waste collection and the factors affecting the frequency of waste collection. **08**

b) What do you mean by transfer station? What are the design considerations of transfer stations? **04**

c) A town consists of 12,500 houses and the average rate of waste generation from each house was found to be 300 liters per week (in un-compacted state). What is the volume occupied in landfill by this waste in one year, if density of the waste when collected is 120 kg/m^3 and is 700 kg/m^3 in the landfill. Assume that 10% of the volume is occupied by the cover dirt. **08**

OR

4 a) Write a note on Leachate formation and methods of treating leachate in a landfill. **08**

b) Describe site selection criteria of sanitary landfill. Explain landfill gas recovery and landfill reclamation. **08**

c) Estimate the landfill area required per year for the community having a population of 6,50,000 if the unit rate of waste generation is 1.2 kg/capita/day. Take the specific weight of waste in compacted state as 450 kg/m^3 and average depth of compacted solid waste is 8 m. **04**

MODULE - IV

5 a) Categorize and briefly explain different waste minimization techniques which can be adopted in solid waste management. **08**

b) Differentiate between incineration, composting and pyrolysis processing techniques of solid waste. **08**

c) Explain the importance of Material and Energy Balance in Waste Minimization techniques. **04**

OR

6 a) Explain the impact on the environment due to improper disposal of plastic waste and discuss the recycling of different types of plastic wastes. **08**

b) What are injection wells and explain with a neat sketch, the importance of injection wells in disposing of wastes. **04**

c) Explain briefly the different types of remediation techniques which can be employed in landfill sites. **08**

MODULE - V

7 a) Explain different types of hazardous wastes and health risk associated in handling different types of hazardous wastes. **07**

b) Explain the physical, chemical and biological treatment methods of hazardous wastes. **07**

c) Differentiate between onsite and offsite storage system of hazardous wastes and the criteria for safe storage and disposal site for hazardous wastes. **06**

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