

Reg No :

Name :



MAR ATHANASIUS COLLEGE OF ENGINEERING, KOTHAMANGALAM

(Govt. Aided Autonomous Institution)

Fourth Semester B.Tech. Degree Examination, May, 2026

Course Code: B24CEM42

Course Name: SOLID WASTE MANAGEMENT

Max. Marks: 100

Duration:3 Hours

PART - A: 30 Marks (10 Qns x 3 Marks)

Answer all questions

1. State two major differences between MSW Rules and Hazardous Wastes Rules 2016.
2. State two major amendments to C&D Waste Management Rules since 2016.
3. Explain how population density affects waste generation.
4. Explain how moisture content affects waste processing.
5. Explain why wet waste segregation improves composting efficiency.
6. Explain the advantage of curbside collection over community bins.
7. Discuss landfill gas management strategies, including its composition and techniques for capture and utilization
8. Differentiate between incineration and pyrolysis in terms of process conditions and end products.
9. Discuss the role of extended producer responsibility in recent policy developments for sustainable waste management.
10. Describe two key challenges in paper recycling from mixed waste streams.

PART - B: 70 Marks (5 Qns x 14 Marks)

Answer any One full question from each module.

Module 1

11. a) Outline the main principles of the Basel Convention on hazardous waste. (7 marks)
b) Explain how the Basel Convention regulates transboundary movement of waste with suitable examples. (7 marks)

OR

12. a) Enumerate all five solid waste sources with one feature each. (7 marks)
b) State examples for each source category of solid waste. (7 marks)

Module 2

13. a) Explain the waste management hierarchy with its priority order. (7 marks)
b) Describe sustainable practices linked to recycling in the hierarchy. (7 marks)

OR

14. a) Explain properties and examples of biodegradable solid waste. (7 marks)
b) Describe properties of recyclable solid waste. (7 marks)

Module 3

15. a) Explain role and design features of direct discharge transfer stations. (7 marks)
b) Describe storage-type transfer stations and compaction processes. (7 marks)

OR

16. a) Explain hydraulic design considerations for landfill drainage. (7 marks)
b) Describe structural design procedure for waste compaction equipment. (7 marks)

Module 4

17. a) Evaluate the environmental benefits of resource recovery versus landfilling, quantifying greenhouse gas reductions and landfill diversion rates. (7 marks)
b) Describe policy incentives like extended producer responsibility that promote material recovery facility development and waste-to-energy adoption, with Indian case studies. (7 marks)

OR

18. a) Evaluate the safety and operational challenges in the mechanical shredding of mixed waste streams containing hazardous materials. (7 marks)
b) Describe the evolution of compaction technology from basic baling to automated high-force systems, highlighting sustainability benefits. (7 marks)

Module 5

19. a) Elaborate on design and engineering requirements for TSDF secure landfills. (7 marks)
b) Discuss common biomedical waste treatment technologies, comparing efficacy for Category 1-10 wastes with validation protocols and emission standards. (7 marks)

OR

20. a) Elaborate on the classification of hazardous wastes into listed versus characteristic wastes, explaining generation sources and specific EPA codes for industrial processes. (7 marks)

b) Discuss physical/chemical treatment methods for hazardous waste, evaluating their efficacy for heavy metal stabilization versus organic degradation. (7 marks)
