

(3 Hours)

[ Total Marks : 80 ]

Notes :

Q.P. Code: 10087351

1. Question 1 is compulsory
2. Attempt any 3 out of remaining questions
3. Assume any suitable data wherever required

Q1 Attempt (Any 4)

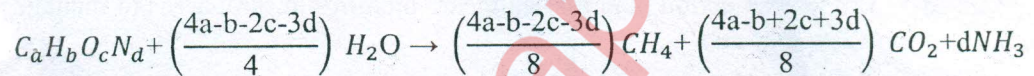
- a Estimate the energy content of solid waste having following composition for waste using Dulong's Method Composition % Mass C 38, H 9.5, O 41.5, N 6, S 2 and Ash 3 05
- b Propose an initiative to promote the reuse of household items within a community. What types of items would you target, and how would you encourage community participation? 05
- c Explain the difference between aerobic and anaerobic composting. 05
- d Propose an action plan for healthcare facilities in rural areas to manage biomedical waste disposal 05
- e Explain how hazardous waste is classified based on its characteristics. 05

Q2 a Calculate the moisture content of typical MSW given in the table below: 10

Item	% by weight	Moisture Content (%)	Item	% by weight	Moisture Content (%)
Food Waste	10	65	Rubber	1	3
Paper	32	7	Leather	0.5	9
Cardboard	5	6	Yard Waste	17	55
Plastic	8	2	Wood	3	15
Textile	3	12	Glass	9	2
Tin Cans	5	4	Aluminium	0.5	2
Other Metals	3	4	Dirt Ashes	3	7

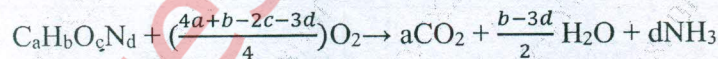
- b Explain the various sources of municipal solid waste. Provide examples for each source. 5
  - c Explain how seasonal events, such as holidays and festivals, impact waste generation. 5
- Q3 a Discuss the importance of volume reduction at the source in solid waste management. What techniques can be employed to achieve this? 10
- b Create a comprehensive recycling program for a university campus. Identify the types of recyclable materials generated and describe the process for collection, sorting, and recycling. 5

- c Explain the wet method of waste processing. What types of waste are best suited for this method, and what are its main advantages? 5
- Q4 a What is the primary differences between the Indore and Bangalore composting methods? 5
- b Describe the pyrolysis process in waste management, including the temperature range and types of materials that can be processed. What are the main products obtained from pyrolysis? Discuss one advantage of using pyrolysis. 10
- c A pyrolysis process converts 250 kg of organic waste into 150 kg of bio-oil, while a gasification process converts the same amount of waste into 100 kg of syngas. Calculate and compare the yield of usable product from both processes. 5
- Q5 a Estimate the theoretical volume of methane gas that could be expected from anaerobic digestion of one tonne of waste having the composition of  $C_{55}H_{110}O_{35}N_2$ . 10



- b Describe the main components of a landfill gas collection and management system. 5
- c Why is managing landfill gas important for both environmental and public health? 5

- Q6 a A pharmaceutical company generates waste that is both toxic and reactive. Propose a waste management strategy, explaining how the characteristics of the waste influence your approach. 10
- b Determine the amount of air required to oxidize one tonne of waste with the chemical composition  $C_{55}H_{100}O_{40}N_1$ . 10



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