

**BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)**

CLASS: MSC/IMSC
BRANCH: PHYSICS/BIOTECH/CHEMISTRY

SEMESTER : II/VIII
SESSION : SP/2025

SUBJECT: CE578 WASTE MANAGEMENT

TIME: 3 Hours

FULL MARKS: 50

INSTRUCTIONS:

1. The question paper contains 5 questions each of 10 marks and total 50 marks.
 2. Attempt all questions.
 3. The missing data, if any, may be assumed suitably.
 4. Before attempting the question paper, be sure that you have got the correct question paper.
 5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.
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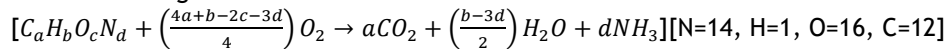
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| Q.1(a) Discuss the functional elements of solid waste management. | [5] | 1 2 |
| Q.1(b) Estimate the average moisture and average density of a 100 kg solid waste sample with the following composition: | [5] | 1 3 |

| Component | % by mass | Moisture content % | Typical density kg/m ³ |
|------------------|-----------|--------------------|-----------------------------------|
| Food wastes | 15 | 70 | 290 |
| Paper | 45 | 6 | 85 |
| Cardboard | 10 | 5 | 50 |
| Plastics | 10 | 2 | 65 |
| Garden trimmings | 10 | 60 | 105 |
| Wood | 5 | 20 | 240 |
| Tin cans | 5 | 3 | 90 |

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| Q.2(a) Discuss the hazards of Hazardous Waste. | [5] | 2 2 |
| Q.2(b) Discuss Hazardous waste biological treatment methods. | [5] | 3 3 |

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| Q.3(a) Discuss the prevalent methods of Radioactive Waste Management in India | [5] | 3 2 |
| Q.3(b) Summarise the highlights of Bio-Medical Waste Management Rules, 2016 under the Environment (Protection) Act, 1986 (29 of 1986); | [5] | 2 3 |

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| Q.4(a) Discuss methanol production, synthesis and generation from biomass. | [5] | 4 3 |
| Q.4(b) Determine the amount of oxygen required to oxidise 100 kg of MSW through composting completely. The chemical composition of waste is C ₆₀ H ₉₅ O ₄₀ N. Assuming the density of the air as 1.2928 Kg/m ³ . | [5] | 4 3 |



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| Q.5(a) Discuss the activated sludge process with a labelled flow diagram. | [5] | 5 2 |
| Q.5(b) Discuss the pollution characteristics of Paper and pulp mills and suggest possible treatment with a flow chart. | [5] | 5 3 |

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