

SRM Institute of Science and Technology Tiruchirappalli - 621 105

Faculty of Engineering and Technology

Continuous Learning Assessment - I, V Semester, September-2025

School of Biosciences and Technology

2 BT01061 & WASTE TO WEALTH TO WHEELS

B. Tech Computer Science and Engineering (Regulations 2021)

SET 2

Date & Session: 10.09.2025/FN Time: 90 Min. Max. Marks: 50

Answer ALL Questions

PART - A (5 x 10 = 50 Marks)

1. A mid-sized Indian city is experiencing rapid urbanization. As a consultant, you are asked to prepare an integrated strategy for municipal solid waste (MSW) management for the next five years.

a) Identify and justify the likely dominant waste categories and their causes in such a city.

(Identification of categories (2) + Justification with urbanization link (1) = 3 marks)

b) Propose an operationally feasible doorstep segregation and collection scheme.

(Two aspects of collection (1.5) + Collection scheme and its creative effectiveness element (1.5) = 3 marks)

c) Design a high-level technology & routing solution using two modern tools/technologies to maximize collection efficiency and explain why you chose them.

(Selection of two tools (2) + Justification of efficiency/ environmental benefit (2) = 4 marks)

CO 1 BL 2

2. a) Critically analyze the waste management pyramid (hierarchy) and the 4R principle in the context of urban sustainability. List two limitations when applied in rapidly urbanizing Indian cities.

(Hierarchy & 4Rs (2) + Critical evaluation (strengths/limitations) (2) + Two specific limitations in Indian cities (1) = 5 marks)

b) Based on your analysis, propose a prioritized (ex-p community program (policy and technology) that moves a ward towards zero waste and briefly explain expected environmental outcomes.

(Listing & prioritization of 6 steps (3) + Environmental outcomes explained (2) = 5 marks)

CO 1 BL 4

3. a) How smart bins (IoT-based waste management) can be applied to address key problems of urban waste handling in India?

(Key problem 1 (2) + Key problem 2 (2) + Conclusion (1) = 5 marks)

b) Explain the "food vs fuel vs feed" dilemma associated with first-generation biofuels.

(Food (2), Fuel (1), Feed (2) = 5 marks)

CO 1 BL 3

4. Anaerobic digestion (AD) is considered a cornerstone of waste-to-energy.

a) Outline the stages of microbial action in AD. (Stages of AD = 4 marks)

b) Explain a centralized AD system for a village with 300 cattle, ensuring integration with local energy and fertilizer needs.

(System design = 6 marks)

CO 2 BL 3

5. Hydrogen is called the "fuel of the future."

a) Differentiate fermentative vs photosynthetic microbial hydrogen production, giving one organism for each, highlighting key photosynthetic differences. (4 marks)

b) Discuss advantages and limitations of using **Chlamydomonas reinhardtii** as a model organism for biohydrogen research. (Chlamydomonas assessment = 6 marks)

CO 2 BL 3