

Exam Date & Time: 01-Jun-2023 (02:30 PM - 05:30 PM)



MANIPAL ACADEMY OF HIGHER EDUCATION

B Tech in Chemical Engineering
VI Semester External Examination May/June 2023

SOLID AND HAZARDOUS WASTE MANAGEMENT [CHE 4058]

Marks: 50

Duration: 180 mins.

Descriptive Questions

Answer all the questions.

Section Duration: 180 mins

- 1) Discuss about the functional elements of solid waste management. (5)
 - A)
 - B) Write a short note on any four thermal disposal options available for solid wastes. (2)
 - C) Write a short note on macro and micro routing. (3)
- 2) The leachate from a municipal landfill has the following characteristics:
COD: 575 kg; BOD: 369 kg; Suspended solids: 125 kg; Cr^{6+} : 6 kg, $\text{NH}_4\text{-N}$: 760 mg/L
 - A) Discuss about the physico-chemical and biological treatment methods which can be used for the treatment of leachate with the above said properties. (5)
 - B) What is the significance of calorific values in solid waste management systems? Compare the calorific value of lipids, wood and paper with cooking oil. (3)
 - C) Is it feasible to use marble waste as a replacement material in clay liners for landfill? Justify your answer. (2)
- 3) The residents of a community have segregated recyclable and non-recyclable wastes at source. Non-recyclable organic wastes are sent to composting facility. Design a model material recovery and processing facility with a neat flowsheet to segregate different types of recyclable materials to be sent to a recycling facility. (5)
 - A)
 - B) Write a short note on inertial separation techniques used in the processing of solid wastes. (2)
 - C) What is life cycle assessment (LCA)? Explain the application of LCA in solid waste management with an example? (3)

- 4) Discuss about the types of biogas digesters with schematic representations. (5)
- A)
- B) Discuss about the biological processes involved in composting. (3)
- C) Suggest a suitable composting technology to handle a homogeneous industrial sludge. Also discuss about the merits and demerits of suggested technology. (2)
- 5) A community produces 600 tons of combustible solid wastes per day which is to be incinerated for energy recovery. Also explain the appropriate incineration technology with a neat sketch. (5)
- A)
- B) Write short notes on any three physico-chemical treatment methods for the processing of hazardous wastes. (3)
- C) Discuss about precautionary labelling to be followed during the transportation of hazardous wastes with an example. (2)

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