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# MANIPAL INSTITUTE OF TECHNOLOGY

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## VI SEMESTER B.TECH. END SEMESTER EXAMINATIONS APR 2019

## SUBJECT: SOLID WASTE ENGINEERING AND MANAGEMENT

## PE III [CHE 4008]

**REVISED CREDIT SYSTEM**
**(03/05/2019)**

Time: 3 Hours MAX. MARKS: 50

**Instructions to Candidates:**

- Answer **ALL** the questions.
- Missing data may be suitable assumed.

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| **1A.** | Explain about the designs of larger transfer stations. Also mention the advantages and disadvantages of each design. | **6** |
| **1B.** | Write a short note on any four thermal disposal options available for solid wastes. | **2** |
| **1C.** | Classify the following wastes based on its type and source:<br>(i) Boiler house cinders (ii) Coarse screening grit (iii) Pathological wastes (iv) Leather | **2** |
| **2A.** | The leachate from a municipal landfill has the following characteristics:<br>COD: 575 kg; BOD: 369 kg; Suspended solids: 125 kg; $Cr^{6+}$: 6 kg, $NH_4$-N: 760 mg/L<br>Discuss about the physico-chemical and .biological treatment methods which can be used for the treatment of leachate with the above said properties. | **4** |
| **2B.** | What is the composition of landfill gas? Explain the variation in the composition of landfill gas during the four phases of bacterial decomposition. | **4** |
| **2C.** | Write a short note on any four landfill gas emission prediction models with their methane generation rate profile. | **2** |

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| **3A.** | The residents of a community have segregated recyclable and non-recyclable wastes at source. Non-recyclable organic wastes are sent to composting facility. Design of 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. | **7** |
| **3B.** | Explain the working of hammer mills with a neat sketch. | **3** |
| **4A.** | Write a short note on two-stage anaerobic digesters with a neat sketch. | **4** |
| **4B.** | Discuss about influence of any four chemical parameters on composting process. | **4** |
| **4C.** | Mention any four advantages of in-vessel composting over open air composting system. | **2** |
| **5A.** | A community produces 600 tons of combustible solid wastes per day which is to be incinerated for energy recovery. Discuss about the facility ownership options. Also explain the appropriate incineration technology with a neat sketch. | **7** |
| **5B.** | Write a short note on precautionary labelling for transportation of hazardous wastes. Also, make a precautionary labelling for the transportation of diesel fuel. | **3** |

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