

MANIPAL INSTITUTE OF TECHNOLOGY

## I SEMESTER M.TECH. (ENVIRONMENTAL ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2016

## SUBJECT: SOLID AND HAZARDOUS WASTE MANAGEMENT [CIE 5124] REVISED CREDIT SYSTEM (01/12/2016)

## Time: 3 Hours

## MAX. MARKS: 50

Instructions to Candidates:		
<ul> <li>Answer ALL the questions.</li> <li>Missing data may be suitably assumed</li> </ul>		
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1A.	What are the steps involved to develop a waste management system for MSW? Briefly explain	5
1B.	What is manifest system? Explain its significance	5
2A.	With a schematic diagram, Briefly explain Haul Container system of collection of Solid waste	5
2B.	A new secondary collection system is proposed for a city. Each trip to the disposal site carries and empties one container at a time. It is estimated that the average time to drive from the garage to the first container location and from the last container location to the garage each day will be 20 Olin and 25 min respectively. If the average time required to drive between the containers is 5 min and the one way distance to the disposal site is 17 km (speed limit 60Km/hr.), determine the number of containers that can be emptied per day based on an 8hr workday. Assume off route factor W=1.5, at site time 0.15hr/trip.[a= 0.016hr/trip and b= 0.018 hr./trip] time taken to pick up the loaded container is 0.12hr/trip and time taken to unload the empty container is 0.35hr/trip.	5
3A.	What are transfer stations? How are they classified?	5
3B.	Physical and chemical processes are often used in combination in the treatment of Hazardous waste. Discuss with two common examples	5
4A.	Which are the types of thermal processes that can be adopted for resource recovery through waste processing? Briefly explain	5
<b>4B.</b>	Give the Advantages and Disadvantages of Air Stripping system as applied to Hazardous waste.	5
5A.	Distinguish between a Controlled landfill (dump) and a Sanitary landfill.	5
5B.	Estimate the total theoretical amount of gas that could be produced under anaerobic conditions in a sanitary landfill per unit weight of solid waste. Assume the following data. i) wet weight of the component=35.76Kg ii) dry weight of the component= 26.15 Kg iit) total weight of solid waste = 45Kg iv) overall chemical formula for organic constituents is C <sub>60</sub> H <sub>94.3</sub> O <sub>37.8</sub> N v) assume 5% decomposable material will remain as ash	5
	) ussume 576 decomposation material with remain as ash	