



Manipal Institute of Technology, Manipal

(A Constituent Institute of Manipal University)



I SEMESTER M.TECH (ENVIRONMENTAL ENGINEERING) END SEMESTER EXAMINATIONS, NOV/DEC 2015

SUBJECT: SOLID AND HAZARDOUS WASTE MANAGEMENT [CIE 527]

REVISED CREDIT SYSTEM

Time: 3 Hours

MAX. MARKS: 50

Instructions to Candidates:

✤ Answer ANY FIVE FULL the questions.

Missing data may be suitable assumed.

1A.	Explain how nature of waste affects the decomposition of solid waste	05
18.	A business unit receives about 120 kg of new merchandise every day. Customers who come to buy, leave their old parts behind to be disposed of by the business unit. About 20% of the total amount of metal sold is brought in and left by the customers. Of the total amount of merchandise received, 9% of the weight is packaging material (paper & cardboard). 87% of the packaging material is cardboard, of which 60% is recycled after the merchandise is unpacked. About 7% of paper and 15% of the cardboard is sold with merchandise over the counter. The remaining paper and cardboard is disposed of as waste. The remaining weight of merchandise is metal parts and chemicals. Chemicals make 11% of the total and 10% are sold daily. The remaining 10% is used within business unit for cleaning and disposed as hazardous waste. 78% of the metal parts are sold per day with the remainder stored internally. Perform mass balance and flow diagram.	05
2A.	Explain cradle to grave approach that must be assessed to determine true Environmental Impact	05
2B.	What are the requirements needed at the storage area for in cinerable hazardous waste?	05
3A.	What are the guidelines that should be taken into consideration when laying routes for collection system	05
3B.	A new residential layout is composed of 1000 houses. Assuming two or three trips per day will be made to disposal site, design an appropriate collection system. The following data are applicable. i) Solid waste generation rate - $0.02m^3$ /home/day ii) Compaction ratio - 2.5 iii) Length of workday - 8hr iv) Collection crew - 2 persons v) Round trip haul distance - 30km vi) Haul constants: a = $0.08hr$ /trip and b = $0.015hr$ /km vi) At- site time per trip - 0.083 hr/trip	05

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4A.	What are the different methods of Biological processing of MSW? Explain anyone of
	the method in detail.
4B.	With a schematic diagram, explain steam stripping process in treatment of hazardous
	waste.
5A.	How are landfills classified? What are the key characteristics of sanitary landfill
5B.	Determine the ratio of waste to cover material (volume basis) as a function of the
	initial compacted specific weight for a solid waste stream of 100 tons per day to be
	placed in 3m lifts with a cell width of 4.5m. The slope of the working faces is 3:1.
	Assume that the waste is compacted initially to an average specific weight 350, 470
	and 600 Kg/m^3 . The dairy cover thickness is 15cm.
6A.	What are the main considerations in siting landfills for solid waste? Explain
6B.	Write brief note on i) Transfer station ii) Material Recovery Facility

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