BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: MSC/IMSC **SEMESTER : II/VIII**
BRANCH: MGI/BT/MATHS **SESSION : SP/2024**

SUBJECT: CE578 WASTE MANAGEMENT

TIME: 3 Hours **FULL MARKS: 50**

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
***4*. Before attempting the question paper, be sure that you have got the correct question paper.**
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Discuss the main characteristics of the municipal solid wastes.	[5]	1	2
Q.1(b)	Determine the municipal solid waste's average density and moisture content for the given data set.	[5]	1	4

Description	Weight, %	Typical density, kg/m3	Moisture, %
Food wastes	39.5.	290	70
Yard wastes	3.8	240	60
Paper	0.85	85	6
Plastic	0.7	65	2
Glass/ceramic	0.5	195	2
Metal	0.65	160	2
Textile	2	65	8
Leather	2.5	160	10
Stone/brick	40.5	480	10
Misc	9	240	8

Q.2(a)	Discuss biological treatment methods of hazardous waste management.	[5]	2	2
Q.2(b)	Discuss hazardous waste's environmental and health effects considering toxicity, LD_{50}, LC_{50}, and other parameters.	[5]	2	3
Q.3(a)	Discuss the biomedical waste types and their legal aspects per Biomedical Waste (Management and Handling) Rules 1998, 2016.	[5]	2	3
Q.3(b)	Discuss the treatment and disposal options for biomedical wastes with respect to their categories.	[5]	2	3
Q.4(a)	The garden trim will be composted with activated sludge from the sewage treatment plant. The composition of yard waste and that of the sludge are as follows:	[5]	2	4

Components	C/N ratio	Moisture (%)	N (%)
Garden trim	50	60	1
Sludge	6	85	6

Determine the garden trim and activated sludge proportions to achieve a blended C/N ratio of 30.

Q.4(b)	Determine the amount of oxygen required to oxidise 1000 kg of MSW through composting completely. The chemical composition of wastes is $C_{60}H_{95}O_{40}N$. Air contains 23% of oxygen by weight. The density of air is 1.3 kg/m^3.	[5]	2	4
Q.5(a)	Describe the aerobic suspended growth process considering the activated sludge process as an example with a neat, labelled flow diagram.	[5]	2	3
Q.5(b)	Describe the anaerobic suspended growth process using an up-flow anaerobic sludge blanket process.	[5]	2	3

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