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

CLASS: M.Sc. **SEMESTER: II**
BRANCH: ENVIRONMENTAL SCIENCE & MANAGEMENT **SESSION: SP/2025**

SUBJECT: ES508 SOLID 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 handbook/Graph paper, etc., to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Using the data given below for a 100 kg MSW (ash 5%), estimate moisture (%), total energy, and energy content on a dry basis (kJ/kg) and ash-free dry basis (kJ/kg).	[5]	1	2

Component	% by Mass	Moisture (%)	Dry Mass (kg)	Energy (kJ/kg)
Food wastes	18	60	7.2	4,700
Paper	32	5	33.25	17,000
Cardboard	8	5	7.6	16,500
Textile	4	3	3.88	18,000
Plastics	12	2	11.76	32,000
Wood	6	20	4.8	19,000
Yard wastes	18	50	7.5	7,000
Metal cans	2	2	1.96	600

Q.1(b)	Explain the physico-chemical characteristics of MSW.	[5]	1	2
Q.2(a)	Describe the primary and secondary waste collection processes.	[5]	2	2
Q.2(b)	Examine the thermochemical waste processing technologies.	[5]	2	4
Q.3(a)	Compute the amount of air required (including the air required to stabilize ammonia) to oxidize 1 ton of solid waste with the chemical formula $C_{150}H_{300}O_{200}N$. $C_aH_bO_CN_d + (4a + b - 2c - 3d)/4\ O_2 \longrightarrow a CO_2 + (b - 3d)/2\ H_2O + d NH_3$	[5]	3	3
Q.3(b)	With the help of a neat sketch, illustrate a sanitary landfill.	[5]	3	4
Q.4(a)	Explain the classification of radioactive waste.	[5]	4	2
Q.4(b)	Identify the categories of biomedical waste and the colour coding scheme used for its segregation.	[5]	4	4
Q.5(a)	Summarize the sources and characteristics of hazardous waste.	[5]	5	2
Q.5(b)	Infer the different physicochemical technologies available for the management of hazardous waste.	[5]	5	4

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