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

CLASS: MTECH/MUP/MSC **SEMESTER : II**
BRANCH: BT/EEE/AMS/ARCH/BT/CHEMISTRY **SESSION : SP/19**

SUBJECT: CE578 WASTE MANAGEMENT

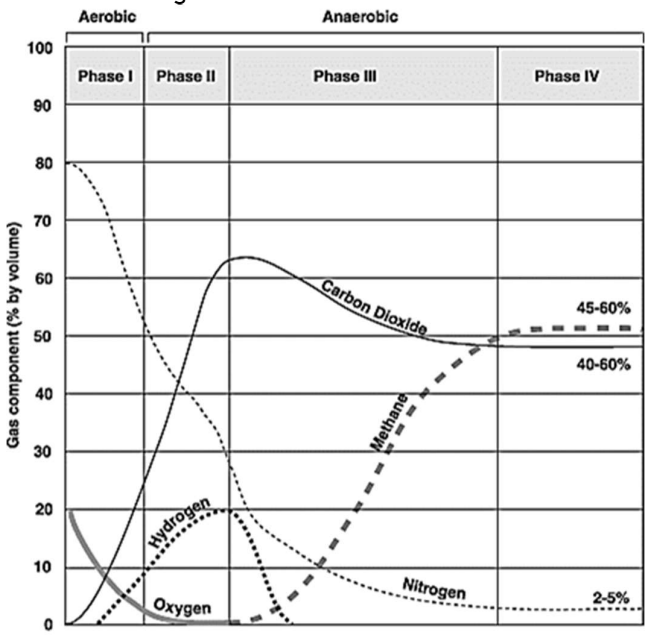
TIME: 3:00 HOURS **FULL MARKS: 50**

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.

Q.1(a) Based on the data given in the table below for 1,000 kg MSW (ash content 4.5%), estimate moisture (%), total energy, energy (kJ/kg) on dry basis and ash-free dry basis (kJ/kg). [5]

Component	% by Mass	Moisture (%)	Energy (kJ/kg)
Food Wastes	20	50	4,700
Paper	23	10	16,000
Cardboard	12	10	17,000
Plastics	18	4	30,000
Garden trimmings	14	40	7,000
Wood	8	15	18,000
Tin cans	5	3	600

Q.1(b) Analyze the diagram below and explain the different phases of gas production in a sanitary landfill. Also, explain how the movement of gases can be controlled? [5]



Q.2(a) Describe classification of hazardous wastes. Illustrate how hazardous wastes can be managed? [5]
Q.2(b) Identify the properties which makes the wastes hazardous. Summarize the physical hazards and health hazards due to hazardous wastes. [5]

Q.3(a) Summarize the health effects due to radioactive wastes. [5]
Q.3(b) Represent the color coding scheme and treatment options used for biomedical waste management. [5]

Q.4(a) Explain how anaerobic digestion can be used for conversion of wastes to energy? [5]
Q.4(b) Describe thermochemical and biochemical process for hydrogen production. [5]

Q.5(a) Distinguish between attached growth and suspended growth processes for wastewater treatment. [5]
Q.5(b) With the help of a neat flow chart explain municipal wastewater treatment. [5]

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