Department of Chemical Engineering, MNNIT Allahabad
Mid Semester Examination (VI Sem) (2024-25)
Subject: Solid Waste Management (CHN16267)

Max Marks: 25

Note: ***Solve the questions sequentially***

Q1 Enlist the three R's which form the basic mantra for *Solid Waste Management*. Draw the *schematic representation* of *generalized flow of materials* and the generation of solid wastes in society and discuss the peculiar features. 4

Q2 How do you differentiate between *hazardous wastes* and *commercial activities wastes*? Write *four important characteristics* associated with hazardous wastes. Discuss the precautions that need to be taken while treating hazardous wastes. 4

Q3 Discuss various *indirect activities* that are part of *solid waste management program*. 4

Q4 Name *two important biochemical conversion processes* for utilization of *food wastes*. Discuss the classification of *organic wastes* and *inorganic wastes* in overall municipal solid waste management. 4

Q5 What the major product of *gasification process* employed for treatment of solid waste known as? Enlist and discuss the factors that need to be assessed pertaining to solid waste management. 4

Q6 At what temperature, *volatile matter* content of a waste carbonaceous material is determined? What is the difference between *bio-gas* and *natural gas*? 2

Q7 Write *four principal activities* that lead to the generation of solid wastes. Determine the moisture content and as-discarded density of a solid waste sample containing following components and supporting data given in following table. 3

Component	Percent by mass	Moisture content (%)	Typical density (kg/m^3)
Food waste	12	70	290
Paper	40	6	85
Cardboard	8	5	50
Plastics	4	2	65
Garden trimmings	15	60	105
Wood	5	20	240
Tin cans	16	3	90

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End Semester Examination (VI Sem) (2024-25)

Subject: Solid Waste Management (CHN16267)

Max Marks: 50

Note: ***Solve the questions sequentially***

Q1 Give a stepwise account of production of *residue* obtained as the *bottoms of the VDU* in a petroleum refinery with a *schematic representation*. State *two synonyms* for this residue. In which *unit*, this residue is further processed? 6

Q2 At what *temperature, ash content of a waste carbonaceous material* is determined? What is the *major component* of bio-gas and natural gas? Discuss the operation of *anaerobic digester* with a *schematic representation*. 6

Q3 Enlist the *"Dry Solid Wastes"* and *"Wet Solid Wastes"* and discuss the efficient processes for these two broad categories based on their physico-chemical characteristics. 6

Q4 The Meja Urja power plant is joint venture between which two companies? It is based on which feedstock? Discuss the operation Meja Urja power plant. How the ash produced during the operation is managed? 6

Q5 What the major product of *gasification process* employed for treatment of solid waste known as? Whether gasification comes under "biochemical conversion route" or "thermochemical conversion route"? Discuss the operation of a gasifier for handling solid waste. 6

Q6 At what temperature, *volatile matter* content of a waste carbonaceous material is determined? At what temperature, *ash* content of a waste carbonaceous material is determined? For how much time the sample is kept (holding time) for respective estimation? Which equipment is used for the determination of ash and volatile matter content? 6

Q7 Describe in detail *anaerobic digestion of food wastes* for the production of bio-gas. What is the main component of natural gas? What is the main component of bio-gas? 7

Q8 Enlist the *plastic wastes* and other types of wastes that are generated in your hostel? Name the respective polymer from which plastic wastes are obtained from? Write four important characteristics associated with hazardous wastes. Discuss the *design and operation of a landfill* with a neat diagram. 7