Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–IV(NEW) EXAMINATION – WINTER 2022

Subject Code:3141311 Date:16-12-2022

Subject Name:Municipal & Industrial Solid Waste Management

Time:10:30 AM TO 01:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Write a short note on storage and handling of incinerable solid waste.	**03**
	(b)	What is E-waste? Explain the classification of E-waste.	**04**
	(c)	Explain color coding of bags for Bio-medical waste collection.	**07**
Q.2	**(a)**	Enlist properties of Hazardous waste.	**03**
	(b)	Enlist chemical properties of municipal solid waste explain any one.	**04**
	(c)	Explain factors that should be considered in the on-site storage of solid waste.	**07**
		OR	
	(c)	Explain the transfer and transport of hazardous waste with manifest system.	**07**
Q.3	**(a)**	Draw the flowchart of material flow and solid waste generation.	**03**
	(b)	Write down the hierarchy of integrated solid waste management.	**04**
	(c)	Define pick up, haul, at site & off-route with reference to the stationary Container System. Draw a net diagram of operational sequences of the system.	**07**
		OR	
Q.3	**(a)**	Describe the need for transfer operations.	**03**
	(b)	What do you mean by the following service terms with reference to collection of solid waste: Curb, alley, setout-setback and backyard carry?	**04**
	(c)	Solid wastes is collected from a locality using hauled container collection system. The data pertaining to the collection activities, are as follows: Time taken by the vehicle to reach to first container location from garage= 15 min; Time taken by the vehicle to reach to garage from last container location= 20 min; Average time required to drive the vehicle b/w consecutive containers= 6 min; Round trip haul distance= 31 Km; Time required to pick up loaded container and to unload empty container= 0.4 hr/trip; At-site time (per trip)= 8 min and Haul constant coefficient: a= 0.016 h/trip and b= 0.018 h/km Determine the number of trips of the collection vehicle per day and actual length of the work day, assuming 8 hour workday and off-route factor equal to 0.15.	**07**

Q.4	**(a)**	Write down the means of transport of MSW.	**03**
	(b)	What are the guidelines for selection of collection routes?	**04**
	(c)	Describe process of methane generation by anaerobic digester.	**07**

OR

Q.4	**(a)**	What is the role of size separation? Enlist different equipment can be used for size separation.	**03**
	(b)	What is composting? Explain its process and microbiology.	**04**
	(c)	Enlist and explain design and operational consideration of Aerobic composting.	**07**
Q.5	**(a)**	What do you mean by Refused Derive Fuel (RDF)?	**03**
	(b)	Which are the important criteria for Landfill siting?	**04**
	(c)	Discuss in detail landfill gas management.	**07**

OR

Q.5	**(a)**	Discuss the characteristics of landfill leachate.	**03**
	(b)	Categorize Landfill Liner system.	**04**
	(c)	Write down the advantages and disadvantages of sanitary landfill.	**07**

****