Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2024

Subject Code:3161304 Date:15-05-2024

Subject Name: Biological Processes for Wastewater Treatment

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)**	Explain the role of microorganism in wastewater treatment.	**03**
	(b)	Make a list of possible modifications in activated sludge process.	**04**
	(c)	Differentiate between aerobic and anaerobic process of wastewater treatment.	**07**
Q.2	**(a)**	Draw the BOD progression curve.	**03**
	(b)	Describe in brief the operating problems involved with following: (i) Trickling Filter and (ii) Rotating Biological Contactor	**04**
	(c)	Describe three basic steps involved in the overall anaerobic oxidation of a waste.	**07**
		OR	
	(c)	Discuss the fundamental considerations in the application of natural treatment systems.	**07**
Q.3	**(a)**	Write a short note on Bio-towers.	**03**
	(b)	Define: (1) F/M ratio, (2) MCRT/SRT (3) Endogenous decay coefficient (4) Maximum substrate utilization rate constant	**04**
	(c)	Write down the mass balance for CFSTR without recycle.	**07**
		OR	
Q.3	**(a)**	Write a short note: constructed wetlands.	**03**
	(b)	A sample of wastewater was incubated for 7 days at 20°C and showed a BOD of 208 mg/L. assuming k = 0.15/day calculate: (1) Its 5 day BOD, (2) Ultimate BOD	**04**
	(c)	What is the difference between BOD, COD, TOC?	**07**
Q.4	**(a)**	What do you mean by ThOD? Determine the ThOD of Glucose.	**03**
	(b)	Discuss the mechanism of working of UASB with neat sketch.	**04**
	(c)	Determine the values of coefficients k, k_S, Y, k_d and μ_m using the following data derived from a bench scale study using CFSTR without recycle.	**07**

Unit No	**S_0, mg/L BOD_5**	**S, mg/L BOD_5**	**$\theta = \theta_C$, days**	**X, mg/L**
1	300	7	3.2	128
2	300	13	2.0	125
3	300	18	1.6	133
4	300	30	1.1	129
5	300	41	1.1	121

		OR	
Q.4	**(a)**	Explain with neat sketch subsurface flow system.	**03**
	(b)	Differentiate between plug flow reactor and continuous flow stirred tank reactor.	**04**
	(c)	Draw a neat sketch of activated sludge process & explain the process in detail.	**07**
Q.5	**(a)**	Differentiate between homogeneous and heterogeneous reactions with example.	**03**
	(b)	Differentiate between the Oxidation Ditch & oxidation Ponds.	**04**
	(c)	Enlist the factors affecting the performance of aerators and describe anyone in brief.	**07**
		OR	
Q.5	**(a)**	Classify various types of biological treatment technologies with examples.	**03**
	(b)	Differentiate between conventional treatment system and natural treatment system of wastewater.	**04**
	(c)	Draw a neat sketch of Sequential batch Reactor and explain it	**07**