Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3161304 Date:01/06/2022

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 objectives of a biological treatment for wastewater.	**03**
	(b)	Classify of various types of microorganisms used for biological	**04**
	(c)	Differentiate between COD & BOD and highlight the factors affecting BOD test.	**07**
Q.2	**(a)**	Classify various types of biological treatment technologies with examples.	**03**
	(b)	Define the following terms; I. Biomass yield II. Half velocity constant III. Sludge volume index IV. Maximum substrate utilization rate	**04**
	(c)	Draw the bacterial growth curve & define each stages in detail.	**07**
		OR	
	(c)	Write a short note on bio – towers along with its applications.	**07**
Q.3	**(a)**	Discuss the purposes of the aeration in activated sludge process.	**03**
	(b)	Make a list of possible modifications in activated sludge process.	**04**
	(c)	Draw a neat sketch of UASB reactor and explain its operation in detail.	**07**
		OR	
Q.3	**(a)**	Write down the terminology used in BOD test Ultimate BOD 2. BOD exerted 3. BOD remaining	**03**
	(b)	Compare fine bubble & coarse bubble aeration system.	**04**
	(c)	Draw a neat sketch of activated sludge process & explain the process in detail.	**07**
Q.4	**(a)**	Write down merits & demerits of anaerobic treatment technology over an aerobic biological treatment.	**03**
	(b)	Explain the difference between oxidation ditch & oxidation pond	**04**
	(c)	Explain Anaerobic process as a four sequential steps treatment technology along with environmental factors affecting anaerobic process.	**07**
		OR	
Q.4	**(a)**	Explain the " Bio sloughing" phenomena of trickling filter.	**03**
	(b)	Explain with neat sketch subsurface flow system.	**04**
	(c)	Determine the volume in liters of methane gas generated per kg COD consumed at STP.	**07**
Q.5	**(a)**	Define reaction rates & explain first & second order types of reaction rates.	**03**
	(b)	Briefly explain on overland flow treatment system	**04**
	(c)	Write down the mass balance for CFSTR with recycle and hence Derive the equation for finding bio kinetic constant.	**07**

OR

Q.5	**(a)**	Explain with neat sketch subsurface flow system.	**03**
	(b)	Name the types of reactors & explain any one type with neat sketch.	**04**
	(c)	Explain working of rotating biological contactor with the help of a neat sketch .	**07**

****