Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2016

Subject Code:2161304 **Date:09/05/2016**

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.**

Q.1 **(a)** Draw the BOD progression curve and explain the different phases of the Same **07**

(b) Enlist and explain the factors affecting the BOD test. **07**

Q.2 **(a)** Derive the relationship to find the amount of methane per gram of COD. **07**

(b) Explain the objectives of biological treatment **07**

OR

(b) Explain role of microorganisms in wastewater treatment. **07**

Q.3 **(a)** Explain in detail anaerobic sludge digestion. **07**

(b) Determine the values of bio kinetic constants using the data given in table derived from the laboratory experiments carried out on CFSTR model of an activated sludge process without recycle. **07**

Unit no.	Influent substrate conc. S (mg/L)	Rector substrate conc. S (mg/L)	Detention time θ (days)	Rector biomass conc. X (mg/L)
1	350	12	3.8	132
2	350	20	2.6	130
3	350	34	1.8	132
4	350	60	1.3	123
5	350	70	1.2	119

OR

Q.3 **(a)** Explain in detail mechanism of high rate anaerobic digester. **07**

(b) A series of BOD determination was made on a sample to calculate ultimate BOD and rate constant. Incubation was carried out on a 5% dilution of the sample at 20 ºC when initial DO for the samples and blank was 9.17 mg/l. ,determine L & K by using least square method. **07**

Day	Final DO in sample, mg/l	Blank BOD in mg/l
1	7.1	9.0
2	6.1	9.0
3	5.1	8.9
4	4.2	8.9
5	3.9	8.8
6	3.5	8.7
7	3.0	8.6

Q.4 **(a)** With the help of a neat sketch explain working of rotating biological contactor **07**

(b) Explain the mechanism by which substrate removal takes place in an attached growth process **07**

OR

Q.4	**(a)**	(i) Explain single stage and two stage trickling filter with sketch. (ii) Explain when anaerobic conditions are developed in a trickling filter.	**07**
	(b)	Define: (1) Specific growth rate (2) Yield coefficient (3) Endogenous decay coefficient (4) Maximum substrate utilization rate constant	**07**
Q.5	**(a)**	Write a differentiate between oxidation ditch & oxidation pond.	**07**
	(b)	Discuss the fundamental considerations in the application of natural treatment systems.	**07**

OR

Q.5	**(a)**	Write a short note: constructed wetlands	**07**
	(b)	Write down the mass balance for CFSTR with recycle and hence Derive the equation for finding biokinetic constant.	**07**

****