

GUJARAT TECHNOLOGICAL UNIVERSITY**B. E. Sem-VI Examination May- 2011****Subject code: 161304****Subject Name: Biological Processes for Wastewater Treatment****Date: 21/05/2011****Time: 10.30 am – 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) Enlist and explain the factors affecting the BOD test. **07**
 (b) Differentiate between; **07**
 1. Suspended Growth Process
 2. Attached Growth Process

- Q.2** (a) Enlist and explain the advantages and disadvantages of anaerobic treatment processes. **07**
 (b) Derive the relationship to find the amount of methane per gram of COD. **07**

OR

- (b) A sample of wastewater was incubated for 7 days at 20 °C and BOD result is 208 mg/l, BOD rate constant $K = 0.15 \text{ day}^{-1}$. Calculate (i) 5 – day BOD **07**
 (ii) 10 – Day BOD
 (iii) Ultimate BOD

- Q.3** (a) Explain any one method for determination of reaction rate constant and ultimate BOD. **07**
 (b) Determine the theoretical oxygen demand of 500mg/L of **07**
 (1) Phenol
 (2) Butanol

OR

- Q.3** (a) 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 °C when initial DO for the samples and blank was 9.17 mg/l. ,determine L & K by appropriate method. **10**

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

- (b) Explain the mechanism by which substrate removal takes place in an attached growth process. **04**

- Q.4 (a)** Define **06**
1. Yield Coefficient
 2. Sludge Retention Time (SRT)
 3. Specific Growth Rate
 4. Endogenous decay of co-efficient
 5. F/M Ratio
 6. Half Velocity Constant

- (b)** Laboratory test reactors have been operated at different SRT values. The reactors are CFSTR with recycle. The values of $\Theta = 0.167\text{d}$ and the other data are as given in table below: **08**

Reactor No.	SRT, d	S_o	S_e	X
1	3.1	400	10	3950
2	2.1	400	14.3	2865
3	1.6	400	21.0	2100
4	0.8	400	49.5	1050
5	0.6	400	101.6	660

Determine the bio kinetic constants k , K_s , μ_m , Y and k_d .

OR

- Q.4 (a)** Write down the mass balance for CFSTR without recycle and hence derive the equation for finding biokinetic constant. **07**
- (b)** Give the classification of trickling filter and application of each type. **07**

- Q.5 (a)** Write short notes on **07**
1. Step Feed Process
 2. Contact Stabilization
- (b)** Enlist the different types of natural treatment systems and describe any two. **07**

OR

- Q.5 (a)** Differentiate between oxidation ditch and oxidation ponds. **07**
- (b)** Enlist and explain the special problems of waste water treatment specific to small communities **07**
