

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- VIth SEMESTER–EXAMINATION – MAY- 2012****Subject code: 161304****Date: 17/05/2012****Subject Name: Biological Processes for Wastewater Treatment****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) Differentiate between: **07**

- (i) Suspended growth and Attached growth process
- (ii) Aerobic and anaerobic treatment processes

(b) Enlist and explain the factors affecting anaerobic treatment. **07****Q.2 (a)** Draw the BOD progression curve and explain the different phases of the same. **07****(b)** Describe the procedure to estimate the Biokinetic constants in the laboratory. **07****OR****(b)** Explain clearly the difference between BOD, COD and TOC. **07****Q.3 (a)** Prepare a list of chemicals to be added to prepare the dilution water for determination of BOD. Explain the procedure of preparing the Dilution water. **07****(b)** The value of BOD_5^{20} is 185 mg/l. What will be the ultimate BOD? What will be the 10 day demand? If the bottle would have been incubated at 33^o C what would be the 5 day BOD? $K(at\ 20^o\ C) = 0.23\ day^{-1}$ **07****OR****Q.3 (a)** Explain the Thomas method for determination of reaction rate constant and ultimate BOD. **07****(b)** Compute the carbonaceous and nitrogenous oxygen demand of waste represented by formula $C_9N_2H_6O_2$. **07****Q.4 (a)** Define the terms: **07**

- | | |
|-------------------------------|--------------------------------|
| (i) Food to microbe ratio | (v) Substrate utilization rate |
| (ii) Mean cell residence time | (vi) Decay coefficient |
| (iii) Specific growth rate | (vii) Yield |
| (iv) Half velocity constant | |

(b) Write down the mass balance for substrate and biomass for CFSTR without recycle. **07****OR****Q.4 (a)** Determine the values of coefficients k , K_s , Y and k_d using the following data : **08**

Unit no	S_o	S_e	θ	X
1	200	7	3.2	128
2	200	13	2.0	125
3	200	18	1.6	133
4	200	30	1.1	129
5	200	41	1.1	121

- (b) Enlist the modifications of Activated sludge Process and explain any one with sketch. **06**
- Q.5** (a) Write down the experimental procedure to find the reaeration constant in the laboratory. **07**
- (b) Highlight the importance of BOD for environmental engineers **07**
- OR**
- Q.5** (a) Explain anaerobic treatment process as a three stage process. **07**
- (b) (i) From the first principles, prove that 1 kg COD stabilized, under anaerobic conditions yields 0.35 m³ CH₄ at STP. **07**
- (ii) Explain the process of sloughing in Trickling filter.
