

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VI (New) EXAMINATION – WINTER 2019

Subject Code: 2161304

Date: 06/12/2019

Subject Name: Biological Processes for Wastewater Treatment

Time: 02:30 PM TO 05:00 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- | | MARKS |
|--|-----------|
| Q.1 (a) “Value of BOD test is not reliable”, is the statement true or false? Justify your answer | 03 |
| (b) Write a short note on bacterial growth curve with neat sketch. | 04 |
| (c) Enlist and explain factors affecting BOD test. | 07 |
| Q.2 (a) Explain with neat sketch subsurface flow system | 03 |
| (b) A sample of wastewater was incubated for 7-days at 20°C and showed a BOD of 208 mg/L. assuming $k=0.15/\text{day}$ calculate: <ol style="list-style-type: none"> 1. Its 5-day BOD 2. Ultimate BOD | 04 |
| (c) Establish Mass balance equation for CFSTR type activated sludge process. | 07 |

OR

- (c)** Determine Bio-Kinetic constants Y & K_d for following bench scale experiment. **07**

Sr. No.	Influent substrate concentration, mg/L	Effluent substrate concentration, mg/L	Detention Time, day	Rector biomass, 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

- Q.3 (a)** Draw a neat sketch of UASB and highlight its components. **03**
- (b)** Explain in brief on overland flow treatment system **04**
- (c)** Explain the relationship between different types of bacteria present in the anaerobic treatment. **07**

OR

- Q.3 (a)** Draw a sketch showing 4 sequential steps in anaerobic treatment process **03**
- (b)** Determine the volume in liters of methane gas generated per kg COD consumed at STP **04**
- (c)** Enlist fundamental considerations in the application of natural treatment system. Explain effect of any three characteristics of wastewater on natural treatment system **07**

- Q.4 (a)** Give the difference between extended aeration and tapered aeration. **03**

- (b) Differentiate between Attached growth process and suspended growth process. **04**
www.FirstRanker.com www.FirstRanker.com
- (c) Write a short note on Rotating biological contactor with neat sketch. **07**

OR

- Q.4** (a) Define following terms: **03**
 1. k_s 2. F/M ratio 3. SVI
- (b) Explain in detail how nitrifying bacteria affect the BOD test result? What should be done to overcome its effect? **04**
- (c) Write a mechanism of Activated Sludge with detail chemistry. **07**
- Q.5** (a) Give the difference between Coarse bubble and fine bubble diffused aeration. **03**
- (b) Differentiate between conventional treatment system and natural treatment system of wastewater. (give 4 points) **04**
- (c) BOD results of sewage at 37°C **07**

T, day	0	1	2	3	4	5	6	7	8	9	10
Y, mg/L	0	170	235	275	300	322	335	342	348	351	354

Determine the values of rate constant and ultimate BOD using Thomas method.

OR

- Q.5** (a) Differentiate between anaerobic and aerobic process. **03**
- (b) Highlight the points in design of rapid infiltration system. **04**
- (c) Explain the operational problems of conventional activated sludge process with its occurrence and control measures. **07**

www.FirstRanker.com