Seat No:__ **Enrolment No:_____**

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E.Sem – VI - Examination SUMMER 2015

Subject code: 161304 **Date:14/5/2015**

Subject Name: Biological Processes for Wastewater Treatment

Time:10.30AM-01.00PM **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) Write a note on Photosynthesis and Symbiosis. **07**

(b) Differentiate between: **07**

1) Chemical Oxygen Demand (COD) and Biochemical Oxygen demand (BOD)
2) Low-rate degradation and High-rate degradation

Q-2 (a) Enlist and explain factors affecting Biochemical Oxygen Demand. **07**

(b) Explain the role of micro-organisms in wastewater treatment. **07**

OR

(b) 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**

Q-3 (a) Differentiate between Biological and Physicochemical analysis. **07**

(b) Define the following terms. Also derive equations as may be necessary: **07**

1) Specific growth rate
2) Yield co-efficient
3) Endogenous decay co-efficient
4) Maximum substrate utilization rate constant

OR

Q-3 (a) Enlist the objectives of Biological treatment of wastewater. **07**

(b) Write down the mass balance for substrate for CFSTR without recycle. **07**

Q-4 (a) Enlist the modifications of Activated Sludge Process and explain any one in detail alongwith a neat sketch. **07**

(b) Draw the BOD progression curve and explain the different phases of the same. **07**

OR

Q-4 (a) Write short note on Bio Towers. **07**

(b) A tapered aeration system is used to treat 12500 m^3/day of municipal wastewater. The wastewater has received a primary treatment and has a BOD_5 of 140 mg/l and suspended solids of 125 mg/l. the system has to be operated in such a way that soluble BOD_5 in treated effluent = 5 mg/l and average MLSS in reactor is 2000 mg/l, MCRT = 10 days, Y = 0.55 and K_d = 0.05. Determine the length of the reactor if it is 5m wide and 5m deep. Assume effluent SS concentration of 30 mg/l BOD_5 of the solids is 0.65 mg/1mg of SS. Therefore, determine the total BOD of treated effluent. **07**

Q-5 (a) Enlist various Anaerobic digesters used for sludge digestion and explain any one in detail along with a neat sketch. **07**

(b) Enlist the different types of Natural Treatment Systems and explain any two. **07**

OR

Q-5 (a) Write a short note on Constructed Wetlands. **07**

(b) Explain anaerobic treatment as a three stage process. **07**

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