

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI (NEW) EXAMINATION – WINTER 2018

Subject Code:2161304

Date:20/11/2018

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) What do you mean by ThOD? Determine the ThOD of Glucose.	03
	(b) Write down the difference between Biological and Physico-chemical analysis.	04
	(c) Draw the BOD progressive curve & explain different phases of the same.	07
Q.2	(a) Enlist the objectives of biological treatment.	03
	(b) The 3 day 37°C BOD of a sample of sewage is 300 ppm. What will be its 10 days 20°C BOD and 5 days 30°C BOD. Assume $K_D = 0.12/\text{Day}$ (Base 10) at 20°C and $\theta = 1.056$	04
	(c) What is BOD, COD & TOC? Deduce an expression for BOD with time.	07
	OR	
	(c) Explain the terms: (i) F/M ratio, (ii) MCRT/SRT, (iii) Specific growth rate, (iv) Specific substrate utilization rate, (v) Growth yield, (vi) Half velocity Constant & (vii) MLVSS.	07
Q.3	(a) Write down set of equations for Least Square method and explain the terminology.	03
	(b) What is the role of microorganism in wastewater treatment?	04
	(c) Enlist and explain the factors affecting the BOD test.	07
	OR	
Q.3	(a) Write a short note on Bio-towers.	03
	(b) Differentiate between Anoxic and Anaerobic process.	04
	(c) Write down the mass balance for CFSTR with recycle and hence Derive the equation for finding biokinetic constant.	07
Q.4	(a) Discuss the problems of bulking and foaming of sludge in ASP.	03
	(b) Explain single stage and two stage trickling filter with sketch.	04
	(c) Explain working of rotating biological contactor with the help of a neat sketch.	07
	OR	
Q.4	(a) Explain when anaerobic conditions will develop in a trickling filter.	03
	(b) How step aeration is differ than tapered aeration in ASP?	04
	(c) Explain the difference between oxidation ditch & oxidation pond.	07
Q.5	(a) Derive the relationship to find the amount of methane per gram of COD.	03
	(b) An anaerobic reactor, operated at 35°C, processes a wastewater stream with a flow of 3500 m ³ /d and a bsCOD conc. of 4600 g/m ³ . At 98% bsCOD removal & a net biomass synthesis yield of 0.038 g VSS/g COD used, what is the amount of methane and total gas produced in m ³ /d? If 70% part of gas is methane.	04
	(c) Write down the fundamental mechanism of anaerobic digestion with Process description & Microbiology.	07
	OR	
Q.5	(a) Enlist the different types of natural treatment system.	03
	(b) Write a short note: constructed wetlands.	04
	(c) Discuss the fundamental considerations in the application of natural treatment systems.	07
