Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – WINTER 2012

Subject code: 731701 Date: 26/12/2012

Subject Name: Design of Water and Wastewater System

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)**	Discuss physical and chemical characteristics of wastewater.	**07**
	(b)	Differentiate between unit operations and unit processes used in treatment of wastewater.	**07**
Q.2	**(a)**	What are the major types and sources of grit in municipal wastewater? Describe treatment methods used to remove grit.	**07**
	(b)	Describe the most common method of quantifying biomass.	**07**
		OR	
	(b)	Explain the basic concept of activated sludge process. Also discuss its advantages and disadvantages.	**07**
Q.3	**(a)**	Enlist different types of reactors and explain any one of them in detail.	**07**
	(b)	If the concentration of reactant A in 1.30 MLD flow of wastewater passing through a CFSTR is reduced from 280 mg/L to 20 mg/L. determine the volume of the reactor. Assume that the reaction rate is first order having a rate constant of 0.5 day^{-1}.	**07**
		OR	
Q.3	**(a)**	With a neat diagram explain the operational steps of a Sequencing Batch Reactor.	**07**
	(b)	A reactor system reduces the influent reactant concentration from 250 mg/L to 30 mg/L with a detention time of 23 days. Assuming that the reaction rate is of first order, determine the value of K for (i) CFSTR and (ii) PFR. Give your comments on the results.	**07**
Q.4	**(a)**	Describe different methods of disposing of wastewater effluent from treatment plants.	
	(b)	Describe the primary methods of removing suspended and dissolved solids during tertiary treatment of wastewater.	**07**
		OR	
Q.4	**(a)**	Discuss the various stages of sludge digestion.	**07**
	(b)	A grit chamber is designed to remove particles with a diameter of 0.2 mm, specific gravity 2.65. Settling velocity for these particles has been found to range from 0.016 to 0.022 m/s, depending on their shape factor. A flow-through velocity of 0.3 m/s will be maintained by a proportioning weir. Determine the channel dimensions for a maximum wastewater flow of 10,000 m^3/d. Assume rectangular section with depth = 1.5 width.	**07**
Q.5	**(a)**	How wastewater can be reused for domestic purpose.	**07**
	(b)	Discuss the uses of gray water in brief.	**07**
		OR	
Q.5	**(a)**	Describe different industrial processes where wastewater can be reused.	**07**
	(b)	Explain green house effects and remedial measures.	**07**

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