Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – V (NEW) EXAMINATION – WINTER 2015

Subject Code: 2153509 **Date:14/12/2015**

Subject Name: Liquid Effluent Treatment- I

Time:10:30am to 1:00pm **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)**	A town has an average domestic sewage flow of 31710 m^3/day with a BOD concentration of 250 ppm. A neighboring industrial estate adds about 11325 m^3/day of sewage having 9080 kg of BOD to it. Find out: i) the concentration of BOD in industrial sewage ii) the concentration of BOD in combined sewage	**07**
	(b)	What do you mean by ETP? Draw a process flow diagram of a typical conventional treatment plant.	**07**
Q.2	**(a)**	Differentiate between aerobic and anaerobic treatment of sewage, giving major end products. Briefly explain any one process of anaerobic treatment with flow diagram.	**07**
	(b)	Design a circular settling tank unit for a primary treatment of sewage at 12 MLD. (Assume detention time 2 hours and surface loading 4000 liters/ sq.m/day)	**07**
		OR	
	(b)	What is BOD? Deduce an expression for BOD with time. What are the factors on which the de-oxygenation constant (k) depends?	**07**
Q.3	**(a)**	Explain the importance of determination of solids in sewage. How do you determine the suspended solids in a given sample of waste water?	**07**
	(b)	(i) Distinguish between low rate(standard) trickling filters and high rate filters (ii) Mention the merits and demerits of activated sludge process	**07**
		OR	
Q.3	**(a)**	What is Coagulation and flocculation process? Explain various factors affects the co-agulation process.	**07**
	(b)	Define water and wastewater pollution? Write short notes on water borne disease	**07**
Q.4	**(a)**	What do you mean Advance waste water treatment? Enlist various methods of and explain any one method of it's with example.	**07**
	(b)	The sewage is flowing @ 4.5 MLD from a primary clarifier to a standard rate trickling filter. The 5-day BOD of the influent is 160 mg/l. The value of the	**07**

adopted organic loading is to be 160 gm/m^3/day and surface loading 2000 l/m^2/day. Determine the volume of the filter and its depth. Also calculate the efficiency of this filter unit

OR

Q.4 **(a)** What do you mean by secondary treatment of Effluent? Enlist various methods used for secondary treatment. Briefly explain the working of the activated sludge process with a suitable flow diagram. **07**

(b) A rotating biological contractor plant is receiving a waste water stream of 2.4 MGD for treatment. The RBC specification as as below: **07**

Trains in Service = 2
Contactors in Each Train = 4
Each Contactor Surface Area = 100,000 ft^2 (from manufacturer)
Primary Effluent Soluble BOD = 55 mg/L
Baffles Between All Contactors.

Find out the total surface area, hydraulic loading rate (gpd/ft^2), total organic loading/ 1000 ft2 and first stage organic loading.

Q.5 **(a)** What are the various types of water demands? Explain any two of them in brief with consumption in liter per head per day (l/p/d). **07**

(b) i) Enlist the methods used for population forecasting. **07**
ii) Determine the future population of a satellite town by the geometric increase method for the year 2011, given the following data:

Year	1951	1961	1971	1981	…..	2011
Population in thousand	93	111	132	161	….	?

OR

Q.5 **(a)** What do you mean by "per capita demand"? Write down the factors affect per capita demand. **07**

(b) What do you mean by water distribution system? Explain briefly the layout of distribution network with flow diagram. **07**

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