Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI • EXAMINATION – SUMMER • 2014

Subject Code: 163702 **Date: 23-05-2014**

Subject Name: Water and Wastewater Treatment Design

Time: 10:30 am to 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)** Give the difference between **07**

(i) High rate Trickling filter and low rate trickling filter

(ii) Aerobic and anaerobic treatment processes

(b) List out all coagulation equipment with diagram **07**

Q.2 **(a)** Sketch the diagram of conventional RSF and even explain all modification of RSF **07**

(b) Design the approximate of a set of rapid gravity filters for treating water required for a population of 40,000 the rate of supply being 170liters/day/person. The filters are rated to work 4500 lit/hr/m^2 **07**

OR

(b) Design a RBC system for following data **07**

1) BOD_5 of waste water from PST=200mg/l
2) Permissible BOD of effluent=30mg/l
3) Permissible organic loading rate=1.05kg BOD_5 /m^2/day
4) Waste water discharge=10MLD

Q.3 **(a)** Write short notes on design guideline for ASP reactor to be used in treatment of Industrial waste water **07**

(b) An average operating data for conventional activated sludge treatment plant is as follows **07**

1) Waste water flow =60,000m^3/day
2) Volume of tank=1,50,000m^3
3) Influent BOD=200mg/l
4) Effluent BOD=20mg/l
5) MLSS=3500mg/l
6) Effluent SS=40mg/l
7) Waste sludge SS=15000mg/l
8) Quantity of waste sludge=300m^3/day

Based on the information above, determine

1) Aeration period
2) F/M ratio
3) % efficiency of BOD removal
4) Sludge age(Days)

OR

Q.3 **(a)** Enlist and explain the basic steps involved in the overall anaerobic oxidation of a waste water **07**

(b) Describe steps for design of Trickling filter **07**

Q.4	**(a)**	If a 1.0 m^3/s flow water treatment plant uses ten sedimentation basins with a Surface Overflow Rate of 20 m^3/m^2-day, what should be the surface area of each tank	**07**
	(b)	Why sometime any existing treatment plant need upgradation and what are methods of up gradation	**07**

OR

Q.4	**(a)**	The quantity 40 mg/L of alum is added to 40,000 m^3/d of raw water containing 75 mg/L of suspended solids and 152.5 mg/L of HCO_3 (i) Is there sufficient alkalinity in the raw water for chemical precipitation? (ii) If not, how much should be added? (iii) What is the daily consumption of alum and daily production of sludge?	**07**
	(b)	Write the prime objective of following unit (i) Flocculator (ii) Bio reactor (iii) Filtration system	**07**
Q.5	**(a)**	Draw the treatment plant only with the consideration of following (i) Alum and lime dosing tank (ii) Both ASP and RBC are incorporated in secondary treatment (iii) Pressure sand filter with 6 filter bed	**07**
	(b)	Draw and explain of typical diagram of UASB reactor with their all zones	**07**

OR

Q.5	**(a)**	Explain the exchange reaction mechanism of dissolved solids with the cation and anion exchange resins and also explain that how they can be regenerate after the exhausted	**07**
	(b)	Suppose two stage trickling filter is provided with recirculation ratio=1.0, and keeping total volume of two TF is 2000m^3 .What will be the BOD_5 of waste water effluent from 2nd stage filter. If In first filter BOD_5 load in kg/day is 487.5 and flow rate is 3MLD	**07**

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