GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VI(NEW) – EXAMINATION – SUMMER 2019

Subject Code:2161306   **Date:18/05/2019**

Subject Name: Design of Water Treatment Units

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.**

			MARKS
Q.1	**(a)**	Draw the treatment flow diagram for the ground water having considerable amount of iron and manganese.	**03**
	(b)	Define the following terms: (i) Velocity Gradient (ii) Rapid Mix (iii) water treatment plant residuals (iv) Tappered flocculation	**04**
	(c)	Explain the important points of consideration while designing water treatment scheme for any city.	**07**
Q.2	**(a)**	Write down the design criteria for Screen.	**03**
	(b)	The design flow for a water treatment plant is 3.8×10^3 m³/day. The rapid mixing tank will have a mechanical mixtures and the average alum dose will be 30mg/l. the hydraulic detention time of the tank will be 1 min. determine i) the quantity of alum needed on a daily basis in kg/day ii) the dimension of the tank in meter for a tank with equal length, width & depth iii) the power input required for a G of 900 sec-1 in KW.	**04**
	(c)	Make a list of various flow measuring devices used in water treatment plant and explain any one in detail with neat diagram.	**07**

OR

	(c)	Explain the various surface water treatment scheme with proper flow diagram.	**07**
Q.3	**(a)**	The average flow rate at a small municipal treatment plant is 20000 m³/day. Determine the dimension and detention time of rectangular primary clarifier with a channel width of 6m. Assuming SOR is 40m³/m².day. Width to Depth ration is 1.5.	**03**
	(b)	Compare circular and rectangular sedimentation tank. According to you which one is more favorable? Justify your answer.	**04**
	(c)	Assuming all the suitable data design a tube settler for the flow of 10MLD.	**07**

OR

Q.3	**(a)**	Determine the power requirement to achieve a G value of 100/sec in a mixing basin with a volume of 2800m3. Assuming the assuming dynamic viscosity of water at 15C is 1.139x10 -3 N.s/m2.	**03**
	(b)	Enlist the various treatment units which can be used for the removal of suspended & colloidal particles from water. State the advantage & disadvantages of any one.	**04**
	(c)	Assuming all the suitable data design a clariflocculator for the flow of 5 MLD.	**07**
Q.4	**(a)**	A water treatment plant having the capacity to treat a maximum flow of 0.25 m3/day. Calculate the approach velocity for a screen chamber having length of 5 m. depth =0.5m & width to depth ratio is 2.	**03**
	(b)	Make a list of various auxiliary necessary for disinfection and state the application of each.	**04**

(c) Write down detailed note on the process of Coagulation & Flocculation with neat diagram. **07**

OR

Q.4 **(a)** Why it is necessary to prepare plant layout before the actual construction phase of water treatment plant. **03**

(b) State the basic principle involved in Reverse osmosis process and state the design procedure for it. **04**

(c) Design a RSF unit to treat the flow of 500 m3/hr. **07**

Q.5 **(a)** Write a brief note on defloridation process for water. **03**

(b) Make a list of various methods available for softening & explain any one in brief. **04**

(c) The water with the following chemical composition has to be softened using lime-soda process. Calculate the quantities of chemicals required to treat 300m3/h of water. Practical limits of removal for CaCO3 & Mg (OH)2 are 30 & 10mg/l respectively.
CO2 = 10mg/l Ca+ + = 100 mg/l Mg+ + = 13 mg/l Na+ = 12 mg/l Alkalinity = 180 mg/l SO-4= 118.56 mg/l Cl-= 18.46 mg/l. **07**

OR

Q.5 **(a)** Write a brief note on Multimedia filters. **03**

(b) "Why hydraulic profile of treatment plant is necessary?" Explain in detail. **04**

(c) Enlist & explain various unit operations &/or processes which can be used for the processing of water treatment plant residuals. **07**

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