Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:2151303 Date:27/11/2018

Subject Name:Physico - Chemical Treatment Technologies

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 Primary Treatment and Advanced Treatment.	**03**
	(b)	Differentiate between Surface Water Treatment & Ground Water Treatment.	**04**
	(c)	Write a Short note on "Aerated Grit Chamber". Draw a line sketch of it.	**07**
Q.2	**(a)**	Which factors affect on Headloss of Screens. Explain each in detail.	**03**
	(b)	Explain the importance of Alkalinity in Coagulation.	**04**
	(c)	Estimate the headloss for a clean bar rack and 50% blockage of bar rack. Assume following data: 1. Approach Velocity in channel = 0.53 m/s 2. Velocity through Clean Screen = 0.93 m/s 3. Empirical discharge coefficient when bar rack is clean & blocked = 1.67& 1.43 respectively.	**07**

OR

Q.2	**(a)**	Enlist different types of Flocculators. Explain any one.	**03**
	(b)	Explain the term "Zeta Potential" with neat sketch.	**04**
	(c)	A bar screen is inclined at 60˚ angle from horizontal. The rectangular bars have width 15 mm & spacing 20 mm. Total Number of spacing are 25. Determine the headloss when the bars are clean & Velocity approaching the screen is 1 m/s. Assume bar shape factor is 1.83	**07**
Q.3	**(a)**	A rectangular sedimentation tank has a length of 8 m and a width of 5 m. For a flow rate of 1 MLD, calculate the Weir Overflow Rate.	**03**
	(b)	Assuming the diameter of a clarifier to be 18 m and the wastewater flowrate 9 MLD. Calculate the detention time and Surface Loading Rate of the clarifier having a wastewater depth of 2.4 m	**04**
	(c)	Derive Stock's Law for settling of discrete particle when flow pattern is Laminar.	**07**

OR

Q.3	**(a)**	Define: Scour Velocity & Terminal Velocity.	**03**
	(b)	Write a short note on Tube Settler.	**04**
	(c)	Find the terminal settling velocity of spherical particle with a diameter 0.5 mm and specific gravity 2.65 settling through water. Assume that Kinematic Viscosity 1.004×10^{-6} m^2/s.	**07**

Q.4 **(a)** Define Effective Sand Size & Write it's importance in Rapid Sand Filter (RSF). **03**

(b) Explain mechanism of Suspended Solid removal in filter. **04**

(c) Write the working of Rapid Sand Filter with neat sketch. **07**

OR

Q.4 **(a)** Explain the Chlorine reactions with Ammonia at different pH and define combined chlorine. **03**

(b) Explain the term Pre-Chlorination and Super Chlorination. **04**

(c) Give the comparison between Chlorine and Ozone as a disinfectant. **07**

Q.5 **(a)** Define: Sludge Dewatering & Sludge Thickening. Mention the %solids content of Dewatered Sludge & Thickened Sludge. **03**

(b) Highlight the components of Filter Press in a sketch. Explain the process & Enlist advantages & disadvantages of it. **04**

(c) Explain reaction Chemistry of following Coagulants: **07**

i. Alum and ii. Lime

OR

Q.5 **(a)** Give the Drinking Water Permissible Limit and explain the importance of following parameters: **03**

i. Fluoride ii. Total Dissolved Solids iii. Nitrates

(b) Explain the Principle on which Decanter works. Enlist the components & explain purpose of each component with neat sketch. **04**

(c) Settling Column Tests on a Discrete Particle Suspension gave the following results from a depth to 1.3m. **07**

Sampling Time (min)	5	10	20	40	60	80
% of SS in sample	56	48	37	19	5	2

Determine the theoretical removal of solids from this suspension in a horizontal flow sedimentation tank with Surface Overflow Rate of 200 m^3/m^2 day.

****