Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V (NEW) EXAMINATION – SUMMER 2024

Subject Code:3151303 Date:18-05-2024

Subject Name:Physico-chemical Treatment Technology

Time:02:30 PM TO 05:00 PM Total Marks:70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Why do wastewater flow rates fluctuate? Explain the variations that are significant to the design of the treatment plant.	**03**
	(b)	Explain the procedure for statistical analysis of wastewater flow rate data.	**04**
	(c)	Draw neat sketch and explain Conventional Waste-water Treatment Plant and explain the different units along with their functions.	**07**
Q.2	**(a)**	Define 'Grit Chamber'. State its purpose.	**03**
	(b)	What is unit process? List down different unit processes used for waste water treatment.	**04**
	(c)	Enlist functional zones of sedimentation tank and explain sludge and outlet zone in detail.	**07**
		OR	
	(c)	Explain types of Grit Chambers with neat and labeled sketches.	**07**
Q.3	**(a)**	State the equations of Head-loss across coarse and fine screens.	**03**
	(b)	Discuss in brief: Mechanism of flocculation.	**04**
	(c)	Explain a jar test procedure for determining the optimum dose of chemical coagulant and what is the relationship between pH, alkalinity and the alum dose?	**07**
		OR	
Q.3	**(a)**	Define screens and screenings? State the purpose of screens.	**03**
	(b)	Enlist all the mechanisms of coagulation and explain them.	**04**
	(c)	Prepare a list of different types of chemical coagulants and explain along with chemical reactions involved.	**07**
Q.4	**(a)**	Enlist the assumptions for ideal sedimentation tank.	**03**
	(b)	Describe Newton's law (Stokes law) for settling velocity of discrete particles.	**04**
	(c)	Explain the construction and working of Slow Sand Filter with neat sketch.	**07**
		OR	
Q.4	**(a)**	Write a short note on tube settler.	**03**
	(b)	Find terminal settling velocity of spherical particle with diameter of 0.05mm of specific gravity 2.65 settling through water having kinematic viscosity 1.004 x 10 -4 m^2 /sec.	**04**

	(c)	Draw a neat sketch of Rapid Sand Filter (RSF) and explain its construction and working.	**07**
Q.5	**(a)**	Explain Thickening of waste sludge.	**03**
	(b)	Describe the various factors that affect efficiency of wastewater disinfection.	**04**
	(c)	Explain Sludge Drying bed and its design criteria.	**07**

OR

Q.5	**(a)**	Explain why chlorination is mostly used for disinfection of domestic wastewater.	**03**
	(b)	Explain aerobic and anaerobic sludge digestion.	**04**
	(c)	Explain Break-point chlorination and its significance to determine the chlorine demand	**07**

****