Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V EXAMINATION – SUMMER 2025

Subject Code:3151303 Date:15-05-2025

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)**	Give the classification of screen with opening size.	**03**
	(b)	Explain Average daily flows, Maximum dry weather flows, Peak wet weather flows, Minimum hourly flows and Sustained flows.	**04**
	(c)	Draw a detailed sketch of ground water treatment (with high Iron & Manganese conc.) for drinking purpose and explain each unit in detail.	**07**
Q.2	**(a)**	Distinguish between discrete and flocculant settling.	**03**
	(b)	Draw neat sketch and explain Conventional Water Treatment Plant.	**04**
	(c)	Explain various physical and chemical and biological characteristics of water and waste-water.	**07**
		OR	
	(c)	Describe electric double layer theory with neat sketch.	**07**
Q.3	**(a)**	Define effective size and uniformity co-efficient.	**03**
	(b)	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 and velocity approaching 1 m/s. Assume bar shape factor is 1.83.	**04**
	(c)	Enlist and explain the mechanisms of coagulation.	**07**
		OR	
Q.3	**(a)**	Find the settling velocity of a discrete particles in water under conditions when Reynolds's number is less than 0.5. The diameter & specific gravity of particle is 5×10^{-3} cm and 2.65, respectively. Water temperature is 20˚C and kinematic viscosity is 1.01×10^{-6} m^2/sec.	**03**
	(b)	Discuss settling column test of discrete particles.	**04**
	(c)	Enlist and explain filtration mechanisms.	**07**
Q.4	**(a)**	Determine the amount of $Fe(OH)_3$ produced and amount of alkalinity consumed when 65 mg/L of $FeCl_3$ is added to water.	**03**
	(b)	Prepare a list of different chemical coagulants. Explain chemical reactions when alum is used as coagulants.	**04**
	(c)	Define and explain following terms: (i) Free available chlorine, (ii) Super chlorination, (iii) Plain chlorination, (iv) Post chlorination, (v) Pre chlorination and (vi) Double chlorination.	**07**

OR

Q.4	**(a)**	Write a note on operational difficulties of Rapid Sand Filter.	**03**
	(b)	Write a short not on Break-point chlorination.	**04**
	(c)	With the help of a neat sketch, explain the construction and working of Slow Sand Filter.	**07**
Q.5	**(a)**	What materials do include in Grit? Write the purpose of Grit Removal.	**03**
	(b)	Write down the definitions: (i) Sludge conditioning, (ii) Leachate, (iii) Bio solid and (iv) Thickening	**04**
	(c)	Derive the Newton's law for settling velocity of discrete particle.	**07**

OR

Q.5	**(a)**	Enlist sources of sludge in water and wastewater treatment separately.	**03**
	(b)	Explain aerobic and anaerobic sludge digestion.	**04**
	(c)	With the help of a neat sketch explain the concept of "Break point Chlorination."	**07**

****