

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-V EXAMINATION – WINTER 2025****Subject Code:3151303****Date:19-11-2025****Subject Name:Physico-chemical Treatment Technology****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.
4. Simple and non-programmable scientific calculators are allowed.

		MARKS
Q.1	(a) Difference between unit operation and unit process.	03
	(b) Enlist and explain 4 physical parameters of water along with sources and effects of each parameter.	04
	(c) Draw a detailed sketch of surface water (River water) treatment for drinking purpose and explain each unit in detail.	07
Q.2	(a) What is screen? Write importance of screen in Water and wastewater treatment.	03
	(b) Write the different empirical formula for determination of headloss through fine and coarse screen.	04
	(c) Explain the types of Grit chamber with neat sketch.	07
OR		
	(c) Write down chemical reactions involved with Alum, Copperas and Ferric chloride; (i) When bicarbonate alkalinity present and (ii) When Lime added	07
Q.3	(a) Explain the phenomenon of flocculation for water and waste-water treatment.	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) Determine the amount of $\text{Fe}(\text{OH})_3$ produced and amount of alkalinity consumed when 62 mg/L of FeCl_3 is added to water.	03
	(b) Draw a neat sketch of functional zone of sedimentation tank for horizontal flow.	04
	(c) Define following terms along with equation and explain its importance for design of sedimentation tank: (i) Detention time, (ii) Surface overflow rate, (iii) Weir overflow rate and (iv) Scour velocity	07
Q.4	(a) Why dewatering of sludge is required?	03
	(b) Briefly explain the jar test in detail with a diagram.	04
	(c) Derive the Newton's law for settling velocity of discrete particle.	07
OR		
Q.4	(a) Write a short note on Tube settler.	03
	(b) Explain the process of aerobic and anaerobic digestion.	04
	(c) Differentiate between Slow Sand Filter and Rapid Sand Filter.	07

- Q.5 (a)** For a circular clarifier of 22 m diameter and flow rate of 10 MLD. Determine Weir Overflow Rate (WOR). **03**
- (b)** Write down the definitions: **04**
(i) Sludge conditioning, (ii) Leachate, (iii) Bio solid and (iv) Thickening
- (c)** With the help of a neat sketch, explain the construction and working of Rapid Sand Filter. **07**

OR

- Q.5 (a)** Explain disinfection and sterilization. Give an example of each one. **03**
- (b)** Write down the characteristics of an ideal disinfectant. **04**
- (c)** Define and explain following terms: **07**
(i) Free available chlorine, (ii) Super chlorination, (iii) Plain chlorination, (iv) Post chlorination, (v) Pre chlorination and (vi) Double chlorination.
