

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- Vth SEMESTER-EXAMINATION – MAY/JUNE - 2012****Subject code: 151303****Date: 04/06/2012****Subject Name: Physico-Chemical Treatment Technologies****Time: 02:30 pm – 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.

- Q.1 (a)** Define physical characteristics of water and wastewater. Enlist and explain all the physical parameters along with their sources and effects. **07**
- (b)** Draw a neat sketch of conventional wastewater treatment plant and explain all the treatment units along with their functions. **07**

- Q.2 (a)** Derive the Newton's law for settling velocity of a discrete particle. **07**
- (b)** Prepare a list of different chemical coagulants. Explain the chemical reactions involved when ferrous sulphate and lime are used as coagulants **07**

OR

- (b)** Explain the jar test procedure for determining the optimum dose of chemical coagulant. What is the relationship between pH, Alkalinity and the alum dose? **07**

- Q.3 (a)** Differentiate between slow sand filter and Rapid Sand Filter giving at least ten points of difference. **07**
- (b)** A 0.65 m deep filter bed has a uniformly sized sand with a diameter of 0.45mm, Specific gravity 2.65 and shape factor 0.87. If the head loss is 0.8 m determine the rate of filtration. Take porosity as 0.4 and kinematic viscosity as $1.003 \times 10^{-6} \text{ m}^2/\text{s}$. **07**

OR

- Q.3 (a)** Enlist and explain the factors affecting the process of chlorination. **07**
- (b)** Enlist and explain the different types of under drainage systems for Rapid Sand Filter. **07**

- Q.4** Test on a flocculant suspension in a settling column with three sampling ports gave following results. Determine the probable removal of solids from this suspension with a detention time of 50 minutes. **14**

Sampling time	% SS removed at		
	1m	2m	3m
0	0	0	0
10	25	20	15
20	55	50	40
30	60	55	50
40	70	60	55
60	75	70	60

OR

- Q.4** Settling column test on a discrete suspension gave the following results from a depth of 1.3 m.: **14**

Sampling time , min	5	10	20	40	60	80
% SS in the sample	60	50	40	20	10	5

Determine the theoretical removal of solids from this suspension in a horizontal flow tank with Surface Overflow Rate of $210 \text{ m}^3/\text{m}^2.\text{day}$.

- Q.5 (a)** Why are screens necessary before the treatment of wastewater? How are they classified? Explain any one in detail. **07**
- (b)** Write a short note on Aerated Grit Chamber. **07**
- OR**
- Q.5 (a)** Discuss the objectives of treatment of sludge. **07**
- (b)** Specify the significance of the Volume-Weight relationship of the sludge in design of sludge handling facility. **07**
