Seat No.:

Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- Vth SEMESTER-EXAMINATION – MAY/JUNE - 2012

Subject code: 151303 **Subject Name: Physico-Chemical Treatment Technologies** Time: 02:30 pm – 05:00 pm

Total Marks: 70

Date: 04/06/2012

Instructions:

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.
- 3. Figures to the right indicate full marks.
- 0.1 (a) Define physical characteristics of water and wastewater. Enlist and explain all 07 the physical parameters along with their sources and effects.
 - (b) Draw a neat sketch of conventional wastewater treatment plant and explain all 07 the treatment units along with their functions.
- (a) Derive the Newton's law for settling velocity of a discrete particle. 07 0.2
 - (b) Prepare a list of different chemical coagulants. Explain the chemical reactions 07 involved when ferrous sulphate and lime are used as coagulants

OR

- (b) Explain the jar test procedure for determining the optimum dose of chemical 07 coagulant. What is the relationship between pH, Alkalinity and the alum dose?
- 0.3 (a) Differentiate between slow sand filter and Rapid Sand Filter giving at least ten 07 points of difference.
 - (b) A 0.65 m deep filter bed has a uniformly sized sand with a diameter of 0.45mm, 07 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 1.003×10^{-6} m^2/s .

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

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 14 depth of 1.3 m.:

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 $210 \text{ m}^3/\text{m}^2$.day.

Q.5	(a)	Why are screens necessary before the treatment of wastewater? How are they	07
		classified? Explain any one in detail.	
	(b)	Write a short note on Aerated Grit Chamber.	07
		OR	
0.5	(a)	Discuss the objectives of treatment of sludge.	07

- **Q.5** (a) Discuss the objectives of treatment of sludge.
 - (b) Specify the significance of the Volume-Weight relationship of the sludge in 07 design of sludge handling facility.
