

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. Sem. - V - Examination – June- 2011

Subject code: 151303

Subject Name: Physico-chemical Treatment Processes

Date: 24/06/2011

Time: 10:30 am – 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.

- Q.1** (a) Differentiate between: **06**
- (i) Suspended Solids & Total Dissolved Solids.
 - (ii) Coagulation and flocculation
 - (iii) Physical treatment and chemical treatment.

- (b) Enlist and explain the different types of settling phenomena. **08**

- Q.2** (a) Explain the sources and effects of following parameters in water and wastewater: **08**
- (i) Hardness (ii) Fluorides (iii) Alkalinity (iv) Nitrates

- (b) Give the classification of different types of filters and explain the multi media filters. **06**

OR

- (b) Draw a neat sketch and write the construction of Rapid Sand Filter **06**

- Q.3** (a) Explain the different types of under drainage systems for RSF. Draw neat sketches. **07**

- (b) With the help of a neat sketch explain the concept of “Break point Chlorination.” **07**

OR

- Q.3** (a) Enlist and explain the mechanisms of filtration in a Rapid Sand filter. **07**

- (b) Write a note on “Intensification of backwashing RSF”. **07**

- Q.4** (a) Settling Column analysis is run on a Type I suspension. The settling column is 3 m deep and the following results were obtained: **08**

Time (min)	0	60	80	100	130	200	240	420
Conc (mg/L)	299	190	179	169	157	110	79	28

What is the percentage removal of particles if the loading rate is $30 \text{ m}^3/\text{m}^2\text{-d}$?

- (b) Explain the terms: **06**
- (i) SOR
 - (ii) WOR
 - (iii) Scour velocity

OR

- Q.4** (a) Explain the ideal sedimentation concept and highlight the chief features of inlet and outlet structures. **07**

- (b) Write a brief note on “Tube Settlers”. **07**

- Q.5 (a)** Enlist and explain the mechanisms by which the colloids are stabilized. **07**
- (b)** To aid sedimentation in primary settling tank 25 g/m^3 of ferrous sulphate ($\text{FeSO}_4 \cdot 7\text{H}_2\text{O}$) is added to the wastewater. Determine the minimum alkalinity required to react initially with ferrous sulphate. How many grams of lime should be added as CaO to react with $\text{Fe}(\text{HCO}_3)_2$ and dissolved oxygen in the waste water to form insoluble $\text{Fe}(\text{OH})_3$? **07**

OR

- Q.5 (a)** Prepare a list of different types of chemical coagulants and explain any two along with chemical reactions. **07**
- (b)** Draw a neat sketch of conventional water treatment plant and explain the function of each unit. **07**
