Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–V • EXAMINATION – WINTER 2013

Subject Code: 151303 **Date: 04-12-2013**

Subject Name: Physico-Chemical Treatment Processes

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)** Explain the terms: **06**

(i) Primary , secondary and tertiary treatment.

(ii) Physical, chemical and Biological processes

(b) Derive the Stokes law for finding the terminal settling velocity of discrete particles. Which relationship will be used if the type of flow is turbulent flow? **08**

Q.2 **(a)** Define and explain the sources and effects of **08**

(i) Total solids (ii) Volatile solids (iii) Total Dissolved Solids

(iv) Suspended Solids

(b) Prepare a list of different chemical coagulants and explain the chemical reactions when alum is used as a coagulant. **06**

OR

(b) Explain the concept of "Break point Chlorination." **06**

Q.3 **(a)** Draw a neat sketch of Rapid Sand Filter and explain its construction and working. **07**

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

OR

Q.3 **(a)** Give the classification of RSF based on **07**

(i) Direction of flow

(ii) Driving force

(b) Write a note on "Operational difficulties of RSF". **07**

Q.4 **(a)** Settling Column tests on a discrete suspension gave the following results from a depth of 2.0 m **08**

Sampling Time(min.)	5	10	20	40	60	80
% of S.S. in Sample	56	48	37	19	05	02

Determine the theoretical removal of solids from this suspension in a horizontal flow tank with Surface Overflow Rate of 250 m^3/day.

(b) Enlist and explain the different types of settling phenomena observed in a sedimentation tank **06**

OR

Q.4 **(a)** If a 1.0 m^3/s flow water treatment plant uses ten sedimentation basins with a Surface Overflow Rate of 15 m^3/m^2-d, what should be the surface area of each tank? **07**

Q.4 **(b)** Write a brief note on "Tube Settlers". **07**

Q.5 **(a)** Write a short note on "Mechanisms of Coagulation" **07**

(b) In a 50 MLD treatment plant, an alum dose of 125 mg/L is being applied to the raw water which contains about 15 mg/L SS. Estimate the maximum dry sludgein Kg/day which must be removed from the plant and volume of wet sludge which has concentrated to 2% (by weight) **07**

OR

Q.5 **(a)** Differentiate between: (i) Coagulation and Flocculation **07**

(ii) Unit process and unit operations

(b) Draw a neat sketch of conventional waste water treatment plant and explain the function of each unit. **07**

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