

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – I • EXAMINATION – WINTER 2012****Subject code: 711806N****Date: 16-01-2013****Subject Name: Water and Wastewater 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) Enlist and explain the factors affecting anaerobic treatment. **08**
(b) Differentiate between: **06**
(i) Dilute suspension and concentrated suspension
(ii) Scour velocity and horizontal velocity
(iii) Discrete settling and flocculent settling

- Q.2** (a) With the help of a neat sketch explain the different types of under drainage systems in Rapid Sand Filter. **07**
(b) Prepare a list of different methods to find BOD reaction rate constant and explain any one in detail. **07**

OR

- (b) Prepare a chart to show the classification of different types of solids present in water and wastewater. Give the definition of all the types of solids in water and wastewater. **07**

- Q.3** (a) Give the classification of filters based on the flow rate control and explain the Variable Declining Rate filtration in detail. **07**
(b) Water at 20⁰ C is passed through a bed of uniform sand at a filtering velocity of 5.0 m/h. The sand grains are 0.4 mm in diameter with a shape factor of 0.85 and a Specific gravity of 2.65. The depth of the bed is 0.67 m and porosity is 0.4. Determine the head loss through the sand bed. Take kinematic viscosity as 1.002×10^{-6} m²/sec. Use Carman- Kozeny equation. **07**

OR

- Q.3** (a) Prepare a list of different types of coagulants used in treatment of water and wastewater. Explain with the help of chemical reactions, the role of alkalinity in coagulation process. **08**
(b) Differentiate between: **06**
(i) Coagulation and flocculation
(ii) Primary treatment and secondary treatment.

- Q.4** (a) Write a short note on horizontal flow Grit chamber with sketch **07**
(b) Write a short note on “Variations in wastewater flow rates.” **07**

OR

- Q.4** (a) Explain the different zones of sedimentation tank in detail. **07**
Q.4 (b) Particles having settling velocity V_s 0.7 mm/s are to be settled in a circular section upward flow tube settler 0.6m long by 50 mm deep inclined at 60⁰ to the horizontal. Calculate the maximum theoretical flow to the tube in L/sec. **07**

- Q.5 (a)** Define : **06**
- (i) Specific growth rate
 - (ii) Maximum specific substrate utilization rate
 - (iii) Specific substrate utilization rate
 - (iv) Food to microbe ratio
 - (v) Sludge Retention Time
 - (vi) Half velocity constant
- (b)** For a continuous flow stirred tank reactor without recycle write down the mass balance for substrate and biomass. **08**

OR

- Q.5 (a)** Write a short note on construction and working of a Trickling filter. Also explain the process of sloughing. **07**
- (b)** Explain anaerobic treatment process as a three stage process **07**
