

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
ME- SEMESTER II- EXAMINATION – SUMMER 2015

Subject Code: 2721802

Date: 26/05/2015

Subject Name: Treatment Process Design And Drawing

Time: 2:30 PM – 5:00 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 following terms with respect to for flocculator and also write design criteria for flocculator. **14**

(i) Velocity Gradient (ii) Relative Velocity (iii) Paddle Tip Velocity (iv) Area of Paddles (v) RPM of paddles

Q.2 (a) What is the purpose of providing V-notches at the outlet of clarifier ? Draw a neat sketch showing the placement of overflow V-notches in rectangular sedimentation tank and circular clarifier **07**

(b) Explain following design parameters **07**
(i) SOR (ii) WOR (iii) Terminal Settling Velocity

OR

(b) Design Tube Settler Module of Square cross section for design flow of 7MLD. Assume suitable data. **07**

Q.3 (a) Design a clarifier for flow of 8 MLD (Design flow). **14**

OR

Q.3 (a) Assume suitable design criteria and design Rectangular Sedimentation Tank for Design flow of 8 MLD **14**

Q.4 (a) Assume suitable design criteria and design a grit chamber with a proportional flow weir treating the wastewater having 750 m³/h average flow. Draw the line sketch of proportional flow weir. **14**

OR

Q.4 (a) A Complete mixed Activated Sludge Process, treating a municipal Wastewater, has a primary Clarifier effluent BOD₅ of 135mg/l. The design MLSS is 4000 mg/L and MLVSS is 75% of the MLSS. The plant permit is for an effluent BOD₅ of 10mg/L and 15 mg/L suspended solids. The effluent suspended solids have a BOD₅ of 0.5mg BOD₅/mg suspended solids. If $\mu_{\max}=3.0\text{day}^{-1}$, $K_s = 60\text{mg/L}$, $Y=0.60\text{mgMLVSS/mg BOD}_5$, $K_d=0.06\text{day}^{-1}$, and the influent flow is 18.9MLD, determine the following **14**

- (i) Recirculation Ratio
- (ii) MCRT
- (iii) HRT
- (iv) Reactor Volume
- (v) Sludge Production

Q.5 (a) A sharp filter sand has the sieve analysis as shown below. The porosity of the stratified Bed is 0.42. Find the head loss if the sand is to be used in a rapid sand filter 75 cm deep to be operated at 0.00135 m/s. **14**

Average Size,mm	1.0	0.7	0.54	0.46	0.38	0.32	0.27	0.23	0.18
X _i	0.01	0.05	0.15	0.18	0.18	0.20	0.15	0.07	0.01

OR

(a) Determine the overall dust removal efficiency of the cyclone separator from the following data: **14**

(i) Composition of dust

dp, μm	50	20	10	05	01
Mass fraction	0.3	0.25	0.2	0.15	0.1

- (ii) Diameter of cyclone=1.4m
- (iii) Temperature=20°C
- (iv) Flow rate=6m³/sec
- (v) Configuration Factor=551.3
- (vi) Density of particle=1700kg/m³
- (vii) Dynamic viscosity=2.1 x 10⁻⁵ kg/m-s