Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – II • EXAMINATION – WINTER 2012

Subject code: 1721802 Date: 31-12-2012

Subject Name: Treatment Process Design and Drawing

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)** Design a clariflocculator for a flow of 10 MLD. **14**

Q.2 **(a)** Explain filteration in detail with neat sketch. **07**

(b) Define the following terms ,with it's unit **07**
(i)Surface overflow rate
(ii)Weir Overflow rate

OR

(b) Write the working principle of cyclone separator. **07**

Q.3 **(a)** Design a bar rack for a peak flow 95 MLD. Assume suitable data for incoming sewer **14**

OR

Q.3 **(a)** Design Rapid Sand Filter for the town of 1.5 lakh population. The rate of water supply is 200 L/day. Take peaking factor =1.5. Assume all necessary data. **14**

Q.4 **(a)** Design an equalization basin for the following data of wastewater flow : **14**

Time h	00	01	02	03	04	05	06	07	08	09	10	11
Flow m3/s	0.038	0.025	0.012	0.013	0.014	0.019	0.026	0.039	0.051	0.064	0.068	0.069

Time h	12	13	14	15	16	17	18	19	20	21	22	23
Flow m3/s	0.071	0.074	0.070	0.078	0.080	0.084	0.083	0.082	0.079	0.067	0.054	0.053

OR

Q.4 **(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=1.6m
(iii) Temperature=20^0C
(iv)Flow rate=$6m^3$/sec
(v) Configuration Factor=551.3
(vi)Density of particle=$1700kg/m^3$
(vii) Dynamic viscosity=2.1×10^{-5} kg/m-s.

Q.5 **(a)** Design a conventional ASP for treating industrial wastewater for a flow of 5MLD with COD of 250 mg/L The design should be include: **14**

(i) Total sludge production
(ii) Dimensions of the Aeration tank
(iii)Air Requirement
(iv) Recirculation Ratio

Assume Y=0.4, Ks= 20, K_d= 0. 12,µm=6.0, fd=0.15, nbvss=20mg/L, SRT=5days.

OR

(a) Design a grit chamber (rectangular channel with sutro weir) for a flow of $0.5m^3$/sec. **14**

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