Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M.E Sem-II Examination July 2010

Subject code: 721802

Subject Name: Treatment Process Design & Drawing

Date: 06/07/2010 **Time : 11.00 am – 01.30pm**

Total Marks: 60

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q-1 Design a screen for average flow 25MLD. Also draw a neat sketch of the designed unit. Assume suitable design criteria **12**

Q-2 The data of wastewater on an hourly bases is recorded as shown in following table. **06**

(a) Determine the volume of an equalization tank for a treatment plant.

Time (h)	1	2	3	4	5	6	7	8	9	10	11	12
Flow (m^3/h)	90	116	225	231	249	310	640	750	830	825	720	700
Time (h)	13	14	15	16	17	18	19	20	21	22	23	24
Flow (m^3/h)	650	570	450	320	230	225	210	194	165	135	105	60

(b) Prepare a list of different types of aeration devices. Describe any one diffused aeration with advantages and disadvantages. **06**

OR

(b) Explain extended aeration oxidation ditch with sketch. **06**

Q-3 Assume suitable criteria and design two stage Trickling filter system for 15 MLD flow based on NRC equation using following data: **12**

Influent BOD : 250 mg/L
Effluent BOD:10 mg/L
Recycle ratio :1.5
Packing factor:2.25

OR

Q-3 Design a grit chamber (parabolic channel with rectangular weir) for 16 MLD flow. Assume following data : **12**

(i) Grit particle size=150µm
(ii) Specific gravity= 2.65

Q -4 Design a Clariflocculator to treat a flow of 12 MLD and also draw line sketch of designed unit. **12**

OR

Q -4 Design an anaerobic high rate digester system for an urban population (forecasted) 1.0×10^5 which receives water supply at the rate of 120 L/capita/day Make suitable assumptions. The design should include the following: **12**

(i) The dimensions of the reactor

(ii) The mixing requirement
(iii) Biogas generation, m^3/day

Q -5 Design an ASP for a flow of 0.06 m3/s and influent BOD of 250 mg/L. Assume MLVSS= 1800 mg/L,Y=0.6,kd=0.06,permissible Effluent BOD_5=40 mg/l with SS of 30 mg/l. Also find sludge wasting rate and recycle ratio. **12**

OR

Q-5 Determine the overall dust removal efficiency of the cyclone separator from the following data: **12**

(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=1.5m
(iii) Temperature=20^0C
(iv) Flow rate=$5m^3$/sec
(v) Configuration Factor=551.3
(vi) Density of particle=1700kg/m^3
(vii) Dynamic viscosity=2.1 x 10^{-5} kg/m-s.

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