

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. Sem- IInd - Examination – June/July- 2011

Subject code:1721802

Subject Name: Treatment Process Design And Drawing

Date: 24/6/2011

Total Marks: 70

Time: 10:30 am-1:00pm

Instructions:

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

Q.1 (a) Design a bar rack for a peak flow 85 MLD. Flow conditions in incoming trunk sewer is given by **14**

- Diameter of Sewer = 1.5 m
- Depth of flow at peak flow = 1m
- Velocity at peak designed flow = 0.8 m/s
- Drop of screen chamber flow with respect to sewer invert = 0.08m

Q.2 (a) Give the difference between: **07**

- (i) SOR and WOR
- (ii) settling velocity and horizontal velocity

(b) Design a grit chamber (parabolic channel with rectangular weir) for 12 MLD flow. Assume following data : **07**

- Grit particle size=150 μ m
- Specific gravity= 2.65

OR

(b) Design a grit chamber (rectangular channel with sutro weir) for a flow of 0.6m³/sec. Assume $a=0.03$, $C_d=0.62$, depth=1m. **07**

Q.3 (a) Design a two stage Trickling Filter system for a flow of 12 MLD to produce an effluent of BOD 20 mg/L **14**

OR

Q.3 (a) Design cyclone with following particle size distribution

14

Particle size in μm	50	40	30	20	10	5	2
Particle by wt. less than	90	75	65	55	30	10	4

Assume the following

Density of particle = 2500 kg/m^3

Gas is essentially nitrogen at 150°C

Volumetric flow rate = $4000 \text{ m}^3/\text{hr}$

90% recovery of particle required

Viscosity of nitrogen at 150°C = $0.023 \text{ mPa}\cdot\text{s}$

$F_c = 0.005$, $\Phi = 0.9$

Q.4 (a) Design a clariflocculator for a flow of 12 MLD. Prepare a line sketch of the designed unit.

14

OR

Q.4 (a) Design Rapid Sand Filter for the town of 1 lakh population. The rate of water supply is 250 L/day. Take peaking factor = 1.5. Assume all necessary data.

14

Q.5 (a) Design a complete mix type ASP to treat 15 MLD domestic waste water having BOD of 250 mg/l and BOD of treated effluent should be 30 mg/l, with following assumptions :

14

- MLVSS = 3500mg/l
- Conc. of recycle sludge = 8000mg./l
- MCRT= 10 days
- Effluent contains 25mg/l of biological solids of which 65% is biodegradable
- $Y = 0.5$, $K_d = 0.06$

OR

(a) Design Tube Settler module of square cross section with following data : **14**

- Average output from tube settler = 6 MLD
- Loss of water in desludging = 2% of output
- Cross sectional square are = 50 x50 mm
- Length of tube = 1 m
- Angle of inclination = 60°
