Seat No.: \_\_\_\_\_

Enrolment No.\_\_\_\_\_

Date: 10/12/2015

**Total Marks: 70** 

07

# GUJARAT TECHNOLOGICAL UNIVERSITY ME - SEMESTER- II(Old course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 1721802 Subject Name: Treatment Process Design And Drawing

## Time:2:30 pm to 5:00 pm Instructions:

- 1. Attempt all questions.
- 2. Make suitable assumptions wherever necessary.

Q.2 (b) Write the working principle and cleaning mechanism of fabric filter.

- 3. Figures to the right indicate full marks.
- Q.1 (a) Design a bar rack for a average flow 45 MLD. Assume suitable data for incoming 14 sewer. Also draw line sketch for it.
- Q.2 (a) Write design criteria for Rapid Sand Filter (including under drainage system). 07
- Q.2 (b) Determine the efficiency of the cyclone for modified cyclone flow while considering 07 the following conditions :
  - $P_P = 2365$
  - Q = 4m3/s
  - $\mu = 0.0000184$
  - H or W= 0.5 m
  - $R_2 = 0.5$
  - $r_1 = 0.25$
  - =12

#### OR

- Q.3 (a) Design a grit chamber (parabolic channel with rectangular weir) for 12 MLD flow. Also 14 draw line sketch of it indicating dimensions in sketch. Assume following data :
  Grit particle size=150μm
  Specific gravity= 2.65 OR
  Q.3 (a) Using the value give below, determine (i) The aeration tank volume, (ii) the amount 14
- Q.3 (a) Using the value give below, determine (1) The aeration tank volume, (11) the amount 14 of sludge wasted daily in kg/d for activated sludge system designed to treat a 6000m<sup>3</sup>/d waste water flow with influent BOD concentration of 160 mg/l Assume following data :

- SRT= 6 days
- MLSS = 3000 mg/l
- MLVSS= 2500 mg/l
- Y=0.4 g VSS/ g BOD
- Cell Debris  $f_d = 0.15 \text{ g VSS} / \text{ g VSS}$
- Endogeneous Decay  $K_d = 0.08$
- nb VSS = 40 mg/l
- Q.4 (a) Design a clariflocculator for a flow of 9.0 MLD.

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### OR

Q.4 (a) Design an Equalization Basin for following Cyclic flow pattern. Provide a 25% excess 14 capacity for unexpected flow variations :

Time, h	Flow, m <sup>3</sup> /s	Time, h	Flow, m <sup>3</sup> /s
0	0.0481	12	0.0718
1	0.0359	13	0.0744
2	0.0226	14	0.0750
3	0.0187	15	0.0781
4	0.0187	16	0.0806
5	0.0198	17	0.0843
6	0.0226	18	0.0854
7	0.0359	19	0.0806
8	0.0509	20	0.0781
9	0.0631	21	0.0670
10	0.0670	22	0.0583
11	0.0682	23	0.0526

Q.5 (a) Design an anaerobic digester system for an urban population 1,50,000 which receives 14 water supply at the rate of 140 L/capita/day Make suitable assumptions. The design should include the following: (i) The dimensions of the reactor (ii)The mixing requirement (iii) Biogas generation, m<sup>3</sup>/day

#### OR

- Q.5 (a) Define and Explain in detail
  - (i) Weir Loading Rate
  - (ii) Settling Velocity
  - (iii) Surface Loading Rate
  - (iv) Solids Retention Time
  - (v) Detention Time
  - (vi) Organic Loading Rate
  - (vii) Food to Microorganism Ratio

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