Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (OLD) EXAMINATION – WINTER 2018

Subject Code: 181303 **Date: 19/11/2018**

Subject Name: Treatment Process Design And Drawing

Time: 02:30 PM TO 05:00 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) Write a short note: Flow measuring devices. 07

(b) Write a short note on MBBR. 07

Q-2 (a) Enlist the design steps of cyclone separator with all the necessary equations. 07

(b) Design a tube settler module of circular cross section (with 50 mm diameter). 07
Assume following conditions.
(i) Average output required from settler = 8MLD
(ii) Length of tube = 1m
(iii) Angle of inclination = 60^0

OR

(b) Explain the terms: Hydraulic Loading Rate, Surface Overflow Rate, Weir Loading Rate, Scour velocity, Sludge Volume Index, Solid Flux, Volumetric Loading Rate. 07

Q-3 (a) Enlist and explain the different types of Aeration systems used for wastewater treatment. 07

(b) Design and draw a bag filter for the flow of $5m^3/s$. 07

OR

Q-3 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 m^3/hr
90% recovery of particle required
Viscosity of nitrogen at 150° C = 0.023mµs/m^2
Fc = 0.005, ϕ = 0.9

Q-4 (a) Enlist the points to be considered while selecting the treatment process train. 07

(b) Draw a neat process flow diagram of sewage treatment plant and show unit operations and unit processes. 07

OR

Q-4 (a) Design a Clariflocculator to treat a flow of 100 MLD. 14

Q-5 (a) Explain the operational problems involved with Venturi scrubber. 07

(b) Explain the design criteria for Membrane Bioreactor. 07

OR

Q-5 (a) Design two identical bar rack screens for a treatment plant handling the peak flow of 210 MLD. Assume the other conditions as follows: 14
Velocity through screen at peak flow = 1.2 m/s
Clear spacing between bars = 25 mm
Bar size = 50 mm * 10 mm
Angle of bars with horizontal = 80°
Peak factor = 2
Depth of flow in chamber = 1.1 m

****