

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII (OLD) - EXAMINATION – SUMMER 2017****Subject Code:181303****Date:02/05/2017****Subject Name: Treatment Process Design and Drawing****Time:10:30 AM to 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) Mention the unit operation and unit processes involved in the treatment of wastewater stagewise. **07**

(b) What is MBBR? Draw a neat sketch of the same. **07**

Q.2 (a) Explain the design criteria for membrane bioreactor **07**

(b) Write a short note: Flow measuring devices **07**

OR

(b) Write a short note: Treatment plant hydraulics **07**

Q.3 (a) Design a UASB reactor for the sewage flow of 4000 cu.m per day having BOD and COD of 200 and 500 mg/L respectively. The sewage contains 80 mg/L of sulphate. **14**

OR

Q.3 (a) Explain the design procedure and discuss the role of equalization basin in wastewater treatment **07**

(b) Draw a neat sketch of Bag filter **07**

Q.4 (a) Design a bar screen chamber for average sewage flow 20 MLD, minimum sewage flow of 12 MLD and maximum flow of 30 MLD. **07**

(b) Explain the design procedure for clariflocculator including all the equations **07**

OR

Q.4 (a) Estimate the cut diameter and overall collection efficiency of a cyclone given the particle size distribution of dust from cement kiln. Take gas viscosity as 0.02 Cp. & Sp. gravity of the particle as 3. The diameter of cyclone is 8 ft and inlet width is 2 ft. The Inlet gas velocity of cyclone is 48 ft/sec. Take effective no. of turns within cyclone is 5. Particle size distribution and other pertinent data are given below: **14**

Avg. particle size in range dp, μm	1	5	10	20	30	40	50	60	> 60
Wt. %	3	20	15	20	16	10	6	3	7

Q.5 (a) Give design and operational parameters for activated sludge treatment of municipal wastewater **07**

(b) Design of secondary settling tank of an activated sludge treatment plant for 45 mld operating with an MLSS of 3000 mg/L. **07**

OR

- Q.5** **(a)** An activated sludge system is to be used for secondary treatment of 10000 cu.m per day of municipal wastewater. After primary clarification, the BOD is 150 mg/L, and it is desired to have not more than 5 mg/L of soluble BOD in the effluent. Take $Y = 0.5 \text{ kg/kg}$, $k_d = 0.05 \text{ d}^{-1}$. Assuming MLSS concentration of 3000 mg/L and an underflow concentration of 10000 mg/L from the secondary clarifier, determine the volume of the reactor, the mass and volume of solids that must be wasted each day and the recycle ratio. **07**
- (b)** Design a rotating biological contactor to serve 1000 persons residing in a village. Assume 80 percent BOD removal at an organic load of 20 g BOD/m² day and 3 m diameter discs, spaced 5 cm apart on centres. **07**
