Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE- SEMESTER–VII (NEW) EXAMINATION – WINTER 2020

Subject Code:2171306 **Date:30/01/2021**

Subject Name: Wastewater Engineering

Time:10:30 AM TO 12:30 PM **Total Marks: 47**

Instructions:

1. **Attempt any THREE questions from Q.1 to Q.6.**
2. **Q7 is compulsory.**
3. **Make suitable assumptions wherever necessary.**
4. **Figures to the right indicate full marks.**

MARKS

Q.1 **(a)** Differentiate between domestic wastewater and industrial wastewater. **03**

(b) Design an aerated grit chamber for the treatment of Municipal waste water. The average flow rate is 0.60 m^3/s and the peaking factor is 2.25. **04**

(c) Design a bar rack (mechanically cleaned) for an average flow 40 MLD flow condition in incoming sewer is given by: **07**

a. Diameter of sewer = 1.53 m
b. Depth of flow at peak flow =1 m
c. Velocity at peak design flow = 0.8m/s
d. Drop to screen chamber flow with respect to sewer invert is 0.08
e. Peaking Factor = 2

Q.2 **(a)** Explain the concept of flocculation and the different types of flocculators. **03**

(b) Design an oil and grease trap to remove 180 mg/L of oil and grease from a flow of 43000 m^3/day of wastewater. **04**

(c) For the flow rate data given in the table below, find out the volume of equalization tank. **07**

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

Q.3 **(a)** Enlist various methane precursors in anaerobic decomposition. **03**

(b) Explain volumetric organic loading, upflow velocity and gas collection system. **04**

(c) Explain the UASB process with its design criteria. **07**

Q.4 **(a)** What is Bio tower? Explain its working. **03**

(b) Explain the purpose of following unit operations/processes in a wastewater treatment plant: (i) Grit Chamber, (ii) Attached growth biological process (iii) Secondary Sedimentation and (iv) Nitrification **04**

(c) Design a rotating biological contactor to treat a flow of 50 MLD flow of primary treated wastewater having BOD_5 of 200 mg/L. Desired effluent BOD_5 is 30 mg/L. **07**

Q.5 **(a)** Explain the factors responsible for foaming in ASP. **03**

(b) Enlist and Explain the operational problems of chemical unit operations. **04**

(c) Explain the phases of SBR operational cycle with neat sketch. **07**

Q.6 **(a)** Write a short note on rotating biological contactors. **03**

(b) Differentiate between standard rate and high rate anaerobic digesters. **04**

(c) If 1 MLD flow of domestic wastewater with settled BOD_5 of 250 mg/L is treated in the conventional activated sludge plant at 0.3 F/M ratio to obtain 85% BOD removal efficiency, estimate the net surplus sludge produced per day. Assume suitable reaction constants. **07**

Q.7 (a) Differentiate between extended aeration and tapered aeration. **05**

OR

Q.7 (a) Explain various methods of thickening of sludge. **05**

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