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GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (OLD) EXAMINATION – SUMMER 2019

Subject Code: 181303 **Date: 13/05/2019**

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)**	Explain the terms: Hydraulic Loading Rate, Surface Overflow Rate, Weir Loading Rate, Scour velocity, Sludge Volume Index, Solid Flux, Volumetric Loading Rate.	**07**
	(b)	Enlist and explain the different types of Aeration systems used for wastewater treatment.	**07**
Q.2	**(a)**	Design and draw a bag filter for the flow of $5m^3/s$.	**07**
	(b)	Explain in detail flow measuring devices.	**07**
		OR	
	(b)	Enlist the points to be considered while selecting the treatment process train.	**07**
Q.3	**(a)**	Design a tube settler module of circular cross section (with 50 mm diameter). Assume following conditions. (i) Average output required from settler =8MLD (ii) Length of tube=1m (iii) Angle of inclination=60^0	**07**
	(b)	Enlist the site selection criteria of a wastewater treatment facility.	**07**
		OR	
Q.3	**(a)**	Design a mechanically cleaned bar rack for a peak flow of 80 MLD. Flow condition in incoming sewer is given below: Diameter of sewer: 1.53 m Depth of flow at peak flow: 1 m Velocity at peak design flow: 0.8 m/sec Depth of screen chamber flow with respect to sewer invert is 0.08 m	**14**
Q.4	**(a)**	Design a clariflocculator for the flow of 10 MLD.	**14**
		OR	
Q.4	**(a)**	Define the following terms: (j) Cane Velocity (ii) Velocity Gradient (iii) Air to cloth ratio (iv) Saltation velocity (v) Cut size diameter.	**07**
	(b)	Enlist and explain the advantages and disadvantages of Venturi scrubber.	**07**
Q.5	**(a)**	Write down the purpose & location of following unit in wastewater treatment plant. (a) Ammonia Stripping (b) Equalization Tank (c) Filter (d) Coagulation & Flocculation Tank (e) Grit Chamber (f) Lagoons (g) Sludge concentration and Dewatering System (h) Sludge digestion System (i) Sludge thickening Unit	**07**
	(b)	Write a short note: Plant layout and Hydraulic profile.	**07**
		OR	
Q.5	**(a)**	Enlist the steps required to follow for the design of Rotating biological contactor (RBC).	**07**
	(b)	Design a cyclone separator with following particle size distribution	**07**

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

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Assume the following
Density of particle = 2500 kg/m^3
Gas is essentially nitrogen at 150^o C
Volumetric flow rate = 4000 m^3/hr
90% recovery of particle required
Viscosity of nitrogen at 150^o C = 0.023mμs/m^2 Fc = 0.005 Φ = 0.9

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