Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER–I(New course)• EXAMINATION – WINTER- 2015

Subject Code: 2711808 **Date: 02/01/2016**

Subject Name: Water &Wastewater Technologies

Time:2:30 pm to 5:00 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)** Define and Explain in detail **14**

(i) Detention Time
(ii) Settling Velocity
(iii) Surface Loading Rate
(iv) Weir Loading Rate
(v) Organic Loading Rate
(vi) Food to Microorganism Ratio
(vii) Solids Retention Time

Q.2 **(a)** Explain following with respect to flow rates and their fluctuations for wastewater. **07**

(i) Daily Variation
(ii) Seasonal Variation

(b) If 6.0 MLD flow of wastewater has 230mg/L BOD and a volumetric loading rate is 2.8Kg BOD/day/m^3, calculate the volume of tank. **07**

OR

(b) Determine the theoretical power requirement and paddle area require to achieve a G value of 50 sec^{-1} in a tank with a volume of 3000 m^3. Assume that the water temperature is 15ºc. CD of rectangular paddle is 1.8. Tip velocity of paddle is $0.75V_T$. Take $\mu=1.139 \times 10^{-3}$ N.S/m^2. **07**

Q.3 **(a)** Give the difference between **07**

(i) Flocculation and Coagulation
(ii) Orthokinetic flocculation and Perikinetic flocculation

(b) Explain the mechanisms of coagulation **07**

OR

Q.3 **(a)** What are stability and instability forces in coagulation process? Discuss the importance of energy barrier in process. **07**

(b) What are different types of coagulants used in water treatment explain with chemical reactions. **07**

Q.4 **(a)** A rapid sand filter has a bed depth of 0.7m. It is composed of sand grains that have a specific gravity of 2.65 and a shape factor of 0.82. The porosity of the bed is 0.45 throughout. The sieve analysis of the sand is shown below. Determine the head loss through the bed if the flow rate is 5.0m/s and water temperature is 17ºc. Take kinematic viscosity is 1.0846 x $10^{-6}m^2/s$ **07**

Sieve no	Mass retained%	Average particle size,mm
14-20	0.87	1.0
20-28	8.63	0.71
28-32	21.30	0.54
32-35	28.10	0.46
35-42	23.64	0.38
42-48	7.09	0.32
48-60	3.19	0.27
60-65	2.16	0.23
65-100	1.02	0.18

(b) Draw a neat sketch of a Rapid sand filter. Explain backwashing and drainage system in RSF. **07**

OR

Q.4 **(a)** Write a short note on pressure sand filter along with diagram. **07**

(b) Explain the adsorption process along with factors affecting it. **07**

Q.5 **(a)** Explain BOD Progression curve with neat sketch. **07**

(b) Giving at least 8 points of difference between **07**

(i) Suspended growth process and attached growth process

(ii) Aerobic processes and anaerobic processes

OR

Q.5 **(a)** Enlist modifications of ASP. Explain any two with sketch in detail. **07**

(b) Enlist and explain optimum environmental conditions for anaerobic treatment process and explain in detail. **07**

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