

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:2181308

Date:09/05/2019

Subject Name:Advanced Wastewater Treatment Technologies

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) Define the terms : flux, permeate and reject in context of membrane systems **03**
- (b) Enlist and explain the advantages and disadvantages of a membrane bio reactor. **04**
- (c) Enlist and explain the factors affecting adsorption process. **07**

- Q.2**
- (a) Differentiate between physical adsorption and chemical adsorption **03**
- (b) Differentiate between Nitrification and denitrification **04**
- (c) Explain Biological Nitrification process including its process description, microbiology and environmental factors. **07**

OR

- (c) A wastewater containing $C_0=25$ mg/L of phenol is to be treated using PAC to produce effluent concentration $C_e=0.1$ mg/L The constants for Langmuir isotherm are to be determined using results given below. The volume of waste in each beaker is 1 L. If the flow rate of $0.11\text{m}^3/\text{s}$ is to be treated , calculate the quantity of PAC needed per day. **07**

Test	PAC added (g)	Concentration remaining mg/L	Test	PAC added (g)	Concentration remaining mg/L
1	0.25	6.0	5	1.5	0.06
2	0.32	1.0	6	2.0	0.06
3	0.5	0.25	7	2.6	0.06
4	1.0	0.09			

- Q.3**
- (a) Differentiate between external MBR and immersed MBR. **03**
- (b) Explain the terms: Trans Membrane Pressure, Membrane Fouling. **04**
- (c) With the help of a neat sketch explain the components of a membrane bioreactor **07**

OR

- Q.3**
- (a) Explain the steps in production of Activated Carbon and its regeneration. **03**
- (b) Enlist and explain the advantages and disadvantages of Micro filtration. **04**
- (c) Explain the concept of Reverse Osmosis along with its advantages and disadvantages. Draw a neat sketch. **07**

- Q.4**
- (a) Highlight the need for removal of nutrients from wastewater. **03**
- (b) Explain the chemical methods for removal of phosphorus from waste water. **04**
- (c) Enlist the suspended growth processes for nitrogen removal and explain any three. **07**

- Q.4** (a) Enlist the types of membrane configurations and explain any one in detail. **03**
(b) Enlist and explain the factors affecting electro coagulation process. **04**
(c) Write a short note on Electro dialysis along with a neat sketch. **07**

- Q.5** (a) Differentiate between Powdered Activated Carbon and Granular Activated Carbon. **03**
(b) Write a note on Need of Advanced wastewater treatment. **04**
(c) Explain adsorption isotherms along with assumptions for each isotherm. **07**

OR

- Q.5** (a) Differentiate between chemical coagulation and electrocoagulation. **03**
(b) Explain the basic mechanism of cation and anion exchangers along with chemical reactions involved. **04**
(c) What are Advanced Oxidation Processes(AOP)? Highlight the need of AOPs. Enlist the different AOPs and explain any one in detail. **07**

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