Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2022

Subject Code:3171309 Date:10/06/2022

Subject Name:Advanced Wastewater Treatment Technologies

Time:02:30 PM TO 05:00 PM Total Marks: 70

Instructions:

1. **Attempt all questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**
4. **Simple and non-programmable scientific calculators are allowed.**

Q.1 **(a)** Write a note on need of advanced wastewater treatment. **03**

(b) Define the terms: adsorption and adsorption capacity. Write equation to find Adsorption capacity. **04**

(c) Explain the process of electrodialysis with neat sketch. Also summarize its advantages and disadvantages. **07**

Q.2 **(a)** Summarize the advantages and disadvantages of reverse osmosis treatment of wastewater over nanofiltration process. **03**

(b) Draw figure of external and internal MBR. **04**

(c) With the help of neat sketches explain the procedure of membrane cleaning of MBR **07**

OR

(c) With the help of neat diagram explain the concept of RO for wastewater treatment. **07**

Q.3 **(a)** Enlist the advanced oxidation processes for wastewater treatment. **03**

(b) Explain the process of manufacturing Activated carbon. **04**

(c) An adsorption study is set up in laboratory by adding a known amount of activated carbon to six flasks which contain 200 mL of an industrial waste. An additional flask containing 200 mL of waste but no carbon is run as a blank. Plot the Langmuir isotherm and determine the values of the constants. **07**

Carbon dose, mg	804	668	512	393	313	238	0
Residual Conc, mg/L	4.7	7.0	9.31	16.6	12.2	62.8	250

OR

Q.3 **(a)** Explain advantage and disadvantages of Advanced oxidation process which use combination of hydrogen peroxide and ozone. **03**

(b) What is mass transfer zone? Explain with figure. **04**

(c) Describe the process of regeneration and reactivation of activated carbon. **07**

Q.4 **(a)** Differentiate between cross flow and dead end filtration process configuration. **03**

(b) Explain in brief ion-exchange process applications in wastewater treatment. **04**

(c) Prepare list of advantages and disadvantages of Ultrafiltration and Micro filtration. **07**

OR

Q.4 **(a)** Enlist the operating parameters to be maintained during electro-coagulation and explain any one parameter. **03**

(b) Give difference between electro-coagulation and chemical coagulation. **04**

	(c)	Explain the process of ion-exchange for nitrogen removal from wastewater.	**07**
Q.5	**(a)**	Highlight and explain the advantages of Membrane bio-reactor in wastewater treatment.	**03**
	(b)	Enlist the sources of phosphorous in wastewater. Mention the forms in which phosphorous occur.	**04**
	(c)	Write a note on "air stripping" as chemical process for nitrogen removal from wastewater with neat sketch.	**07**

OR

Q.5	**(a)**	Draw a figure depicting microbiology of biological phosphorous removal.	**03**
	(b)	Enlist the methods for chemical precipitation of phosphorous. Explain any one method with equation.	**04**
	(c)	Explain nitrification and denitrification processes with equations.	**07**

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