Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2024

Subject Code: 3171309 Date:01-06-2024

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.**

			MARKS
Q.1	**(a)**	Enlist advanced wastewater treatment with need of it.	**03**
	(b)	Draw figure of two different configuration of Membrane bioreactor.	**04**
	(c)	Give detailed Classification of advanced oxidation processes.	**07**
Q.2	**(a)**	Define the terms: (i) adsorption, (ii) adsorbate and (iii)adsorbent.	**03**
	(b)	How does MBR process differ from conventional ASP?	**04**
	(c)	What is membrane fouling? Explain membrane cleaning by reverse flow and chemicals.	**07**
		OR	
	(c)	Explain the Langmuir and Frendluich isotherm along with assumptions.	**07**
Q.3	**(a)**	Enlist the various membrane configurations.	**03**
	(b)	Prepare a table showing general characteristics of membrane process.	**04**
	(c)	With the help of neat sketches explain the procedure of membrane cleaning of MBR	**07**
		OR	
Q.3	**(a)**	Summarize the advantages and disadvantages of reverse osmosis treatment of wastewater over nanofiltration process.	**03**
	(b)	Explain the mechanism of adsorption.	**04**
	(c)	Discuss the applications of ion-exchange process in wastewater treatment. .	**07**
Q.4	**(a)**	Explain different forms of phosphorous, along with their sources, which occur in environment.	**03**
	(b)	Explain the working principle of electro flotation process with the help of equations.	**04**
	(c)	Describe the process of regeneration and reactivation of activated carbon.	**07**
		OR	
Q.4	**(a)**	What factors to be considered while selecting electrode material?	**03**
	(b)	Explain the working principle of electro-oxidation process.	**04**
	(c)	Compare electro-coagulation and chemical coagulation process of wastewater treatment.	**07**

Q.5	**(a)**	Highlight the need for removal of nutrients from wastewater.	**03**
	(b)	Write a short note on membrane material.	**04**
	(c)	Discuss chemical precipitation method for phosphorus removal with equations for each chemical. Prepare a sketch of wastewater treatment plant highlighting the points of chemical addition for phosphorus removal.	**07**

OR

Q.5	**(a)**	Highlight the application of membrane technologies in water treatment.	**03**
	(b)	Write down all important ion exchange reactions for synthetic resin.	**04**
	(c)	Explain in brief nitrification and de-nitrification with detailed chemistry process and equations mentioning species of microorganisms involved.	**07**

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