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BSc Chemistry, III Semester (FYUP)
End term Examination 2024

Paper Name: Advanced Technologies for Waste water and effluent treatment

Paper Code: BCH-SEC-301

Time: 2.0 hours

Maximum Marks: 45

Note: This paper has 3 sections A, B, and C, Attempt all the three sections

Section A: Answer all the questions; **Section B:** Answer any 2 out of 4; **Section C:** Answer all the questions, each question has an internal choice

Abbreviations Used

CLO- Course Learning Outcome, PLO- Program learning Outcome, BTL- Bloom Taxonomy Level: BT level 1-Remember; BT level 2-Understand; BT level 3-Apply; BT level 4-Analyse; BT level 5-Evaluate, BT level 6-Create

		BTL	CLO	PLO
PART A				
	Short Answer Type Questions (Attempt <u>All</u>)	(10 x 1 = 10 marks)		
1	How does implementing ZLD benefit industries?	2	2-3	3
2	What happens to water recovered after the ZLD process?	3	2-3	3
3	What is a common treatment method for effluents with inorganic impurities?	3-4	3-4	3
4	Name two types of industrial effluents based on their composition.	4	3-5	5
5	What are the three primary stages of municipal wastewater treatment?	4	3-5	5
6	What is one advantage of recycling municipal wastewater?	2	2-3	3
7	Which organization in India regulates municipal wastewater treatment standards?	3	2-3	3
8	What is the primary by-product of anaerobic digestion?	3	3-4	4
9	What is one disadvantage of Membrane Bioreactor technology?	2	1-3	1-2
10	What is one common characteristic of municipal wastewater?	2	1-3	2
PART B				
	Long Answer Type Questions (Attempt <u>Any 2</u>)	(2 x 10 = 20 marks)		
1	a) Explain the various Steps involved in water treatment based on ZLD. b) What is desalination and its role in H ₂ O management plants	3	4-5	3-5
2	a) Discuss briefly various oxidising agents and write the chemical reactions involved in Advanced Oxidation protocols b) Highlight the limitations and challenges associated with the reuse of sewage	2-5	2-6	2-6
3	Explain the various processes used in aerobic wastewater treatment systems. Include the working principles, advantages, and limitations of the following techniques: a) Sequential Batch Reactor (SBR) Process b) Moving Bed Bioreactor (MBBR) c) Rotating Biological Contactor (RBC)	2-5	2-5	3-6
4	Discuss anaerobic treatment methods for wastewater management. Explain the principles, operational setup, and merits of the following: a) Anaerobic Digestion b) Upflow Anaerobic Sludge Blanket (UASB) Reactor c) Membrane Bioreactor (MBR) Technology	2-5	2-6	2-6

PART C

Short Answer type Question (Attempt all the questions)

(3 x 5 = 15 marks)

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| 1 | Define Vermifiltration and highlight its advantages in groundwater replenishment. | 3-5 | 4 | 2-5 |
| | Or | | | |
| | What are various effluents in H ₂ O treatment and policies associated with effluent treatment plant? | 2-5 | 5 | 4 |
| 2 | Compare and contrast the Sequential Batch Reactor (SBR) process with the Moving Bed Biofilm Reactor (MBBR) in terms of operational principles, efficiency, and suitability for different types of wastewaters. | 3-6 | 4 | 4 |
| | Or | | | |
| | Discuss the concept of physico-chemical treatment in wastewater. What is the difference between coagulation and flocculation, and how do these processes contribute to the removal of suspended solids from wastewater? | 2-5 | 5 | 4 |
| 3 | What are the common techniques used for the removal of oil and grease from wastewater? Explain the principle and working of each technique, and discuss their applicability in different wastewater treatment scenarios. | 2-4 | 3-5 | 3-4 |
| | Or | | | |
| | Explain the concept of biological treatment in wastewater management. What are the essential requirements for successful biological treatment, and how do microorganisms play a role in this process? | 2-5 | 3-5 | 2-5 |

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