

DEPARTMENT OF CHEMISTRY
SCHOOL OF CHEMICAL & LIFE SCIENCES
B.Sc (Hons.) with Research in CHEMISTRY
SEMESTER-III Examination 2024

PAPER TITLE: Advanced Technologies for wastewater and effluent treatment;
PAPER CODE: BCH SEC 301

Time 2 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 3 out of 5; **Section C:** Answer all the questions, each question has an internal choice

Abbreviations Used

CLO- Course Outcome, PLO- Program 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

SECTION A

Very Short Type Questions (Attempt any ten)

(10*1= 10 marks)

Q. No	Question	CLO	PLO	BTL
1.	What are the stages involved in the treatment of wastewater?	1	1-2	1
2.	Explain the concept of physico-chemical treatment.	1-2	2	2
3.	What is the primary requirement for biological treatment in wastewater treatment?	1	1-2	1
4.	What is the primary principle behind anaerobic treatment?	1-2	2	2
5.	List one requirement of a zero liquid discharge system.	2	2	1
6.	What are the characteristics of industrial effluent?	2	1-2	1
7.	What is the primary purpose of coagulation in physico-chemical treatment?	2-3	3	2
8.	Which type of treatment removes pathogens from wastewater?	2	2	1
9.	What is the purpose of upflow anaerobic sludge blanket (UASB) in anaerobic treatment?	3	3	3
10.	Which technology is used for membrane-based treatment in zero liquid discharge systems?	3-4	3-4	3-4
11.	Which stage in wastewater treatment involves the removal of large objects and debris?	3	3-4	4
12.	What is the primary advantage of using a membrane bioreactor (MBR) in wastewater treatment?	2-3	3	4

SECTION B

Long type Questions (Attempt any two out of four)

(2*10=20 marks)

Q. No	Question	CLO	PLO	BTL
B1.	Discuss the principles and applications of biological treatment in wastewater treatment plants. Explain the role of microorganisms in the degradation of organic pollutants and the conversion of nutrients in	4	3-4	4-6

	wastewater. Compare different biological treatment processes such as 3activated sludge, trickling filters, and sequencing batch reactors, highlighting their advantages and limitations.			
B2.	Discuss the various treatment techniques used for municipal wastewater treatment, including physical, chemical, and biological processes. Explain the objectives and mechanisms of primary, secondary, and tertiary treatment processes in removing pollutants from municipal wastewater.	3	4	3-5
B3.	Describe the key components and processes involved in a Zero Liquid Discharge (ZLD) system. Explain how each component contributes to achieving the goal of complete wastewater elimination.	4	4	3-6
B4.	Explore the principles underlying industrial wastewater treatment, focusing on the key physico-chemical and biological processes involved in pollutant removal and remediation. Briefly explain Gutzeit method for evaluating presence of any three metals in industrial waste water	4	3-4	3-6

SECTION C

Short-type Questions. (Attempt any 5 questions)

(5*3=15 marks)

Q. No	Question	CLO	PLO	BTL
C 1.	Write the difference between coagulation and flocculation processes.	3-4	3-4	3-4
C 2.	What are three key components necessary for the successful implementation of a Zero Liquid Discharge (ZLD) system?	4	4	4-5
C 3.	What are three advantages and three disadvantages of various biological treatment processes used in wastewater treatment?	2-4	4	3-4
C 4.	Discuss the working principle and advantages of the Sequential Batch Reactor (SBR) process in wastewater treatment.	3	3-4	4
C 5.	Outline three different treatment techniques commonly used for municipal wastewater and discuss their respective advantages and limitations.	4	4	3-4
C 6.	What are the strategies for protecting surface water bodies from pollution caused by industrial sewage discharge?	4	4	5-6
C 7.	Discuss the role of pH adjustment in physico-chemical treatment.	4	4	4-5