

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2022****Subject Code:3171309****Date:12-01-2023****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.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) Define the terms: adsorption, adsorbate and adsorbent. **03**  
(b) Write the applications of advanced wastewater treatment for water treatment. **04**  
(c) Highlight the advantages and disadvantages of 'Ultra filtration' and 'Micro filtration' **07**

- Q.2** (a) Define the terms : (i) Permeate (ii) Reject (iii) Flux **03**  
(b) Explain the principle involved in ion exchange process with neat sketch **04**  
(c) With the help of neat sketches explain the modes of operation in membrane filtration unit of MBR. **07**

**OR**

- (c) Prepare list of advantages and disadvantages of Ultrafiltration and Reverse osmosis. **07**

- Q.3** (a) Explain the treatment process of wastewater with powdered activated carbon. **03**  
(b) Explain the mechanism of adsorption with neat sketch. **04**  
(c) Explain the Langmuir and Freundlich isotherm along with assumptions. **07**

**OR**

- Q.3** (a) Explain the AOP in which ozone is used at elevated pH along with equation. **03**  
(b) Enlist photochemical advanced oxidation processes. Explain any one in brief. **04**  
(c) Explain Fenton process in detail. **07**

- Q.4** (a) Enlist the methods for chemical precipitation of phosphorous. Explain any one method with equation. **03**  
(b) Explain different forms of phosphorous, along with their sources, which occur in environment. **04**  
(c) Write a note biological process for Nitrogen removal. **07**

**OR**

- Q.4** (a) Highlight and explain the advantages of Membrane bio-reactor in wastewater treatment. **03**  
(b) Enlist the sources of nitrogen in wastewater. Mention the forms in which nitrogen occur. **04**  
(c) Write a note on "air stripping" as chemical process for nitrogen removal from wastewater with neat sketch. **07**

- Q.5** (a) Differentiate between cross flow and dead end filtration process configuration. **03**  
(b) Highlight applications of ion-exchange process in wastewater treatment. **04**  
(c) Highlight and explain the application of membrane technologies in wastewater treatment. **07**

**OR**

- Q.5** (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) Enlist three different types of electro-oxidation mechanism and explain them in brief. **07**

\*\*\*\*\*