

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER– VII EXAMINATION – SUMMER 2026****Subject Code:3171309****Date:08-06-2026****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.

- 1 (a) Define the terms :(i) Transmembrane pressure (ii) Reject (iii) Flux **03**
- (b) Write the applications of advanced wastewater treatment for wastewater treatment. **04**
- (c) The following laboratory data were collected in batch adsorption study. Plot the data according to Langmuir isotherm and determine the values of constants a and b. A volume of 500 ml is placed in each flask and wastewater has initial COD is 100 mg/L. **07**

Flask No.	Mass of carbon (mg)	Final COD in mg/L
1	960	3.5
2	740	5.2
3	545	8.0
4	385	12.5
5	260	20.5
6	170	33
7	0	100

- Q.2 (a) List the adsorbents and mention their application in wastewater treatment. **03**
- (b) Explain the factors that reduce membrane performance. **04**
- (c) Explain the basic mechanism of cation and anion exchangers along with chemical reactions involved. **07**

OR

- (c) Draw a neat sketch of Electro-oxidation process and explain working principle of Electro-oxidation process with chemical reaction. **07**

- Q.3 (a) List the characteristics of good adsorbent. **03**
- (b) Explain the mechanism of adsorption with a neat sketch. **04**
- (c) Prepare a list of operating parameters to be maintained in the Fenton's process. Also state the Fenton's process reactions. **07**

OR

- Q.3 (a) With the help of a neat diagram, explain the process of Resin regeneration in the Ion exchange process. **03**
- (b) Draw a flow diagram with units in Feonton's treatment process as polishing treatment for wastewater. List the units required for Feonton's treatment. Explain the process in brief. **04**

- (c) Explain the advanced oxidation process (AOP) carried out using Ozone and Hydrogen peroxide with chemical reaction. Compare it with the AOP using Ozone only. **07**
- Q.4** (a) Enlist the methods for chemical precipitation of phosphorous. Draw a flow diagram indicating chemical addition for phosphorus removal at wastewater treatment plant. **03**
- (b) Explain different forms of phosphorous, along with their sources, which occur in environment. **04**
- (c) Write a note biological process for phosphorus removal with a figure. **07**
- OR**
- Q.4** (a) Highlight and explain the advantages of Membrane bioreactor in wastewater treatment. **03**
- (b) Compare nano filtration and ultra filtration considering following points: **04**
i) Membrane driving force, ii) separation mechanism, iii) pore size, iv) operating range
- (c) Explain the biological process for nitrogen removal with the chemical reaction. **07**
- Q.5** (a) Prepare a list of the resins used in the ion exchange process and explain their applications. **03**
- (b) Write a short note on membrane material. **04**
- (c) Draw figure of two different configuration of Membrane bioreactor. Prepare a list of cleaning mechanisms used in them. **07**
- OR**
- Q.5** (a) Enlist the operating parameters to be maintained during electro-coagulation and explain any one parameter. **03**
- (b) Explain the electroflotation process for removal of small size particles. **04**
- (c) Draw a neat labeled diagram of MBR & explain the functions of following **07**
components of MBR
(a) Backpulse pump
(b) Membrane air scour blowers
(c) Permeate pump
(d) Recirculation pump
