

Seat No.: \_\_\_\_\_

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VIII (NEW) EXAMINATION – WINTER 2018****Subject Code: 2181308****Date: 15/11/2018****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.

- Q.1** (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) 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
- Q.2** (a) Define the terms: adsorption, adsorbate and adsorbent. **03**  
(b) Write the applications of advanced wastewater treatment for water treatment. **04**  
(c) What is hardness. Explain the zeolite process for removal of hardness. **07**
- OR**
- (c) Prepare list of advantages and disadvantages of Ultrafiltration and Reverse osmosis. **07**
- Q.3** (a) Write down the application of Activated carbon treatment process. **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) Give a list of photochemical process of advanced oxidation process. Explain any one. **03**  
(b) Write a note on advanced oxidation process carried out using Ozone and Hydrogen peroxide. **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) Draw figure of two different configuration of Membrane bioreactor. 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) 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

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