

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – III • EXAMINATION – WINTER • 2014****Subject code: 731801****Date: 25-11-2014****Subject Name: Advanced Wastewater Treatment Technologies****Time: 02:30 pm - 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) Enlist the Advanced Biological Treatment systems and write a note on any one type along with neat sketch **10**
 (b) Define and differentiate between Tertiary and Advanced Wastewater Treatment. **04**
- Q.2** (a) Draw a neat sketch and write short notes on any two: **07**
 (i) Plate and frame Filter press (ii) Horizontal Plate filter (iii) Rotary Drum
 (b) Explain the mechanism of Reverse Osmosis and explain the advantage and disadvantages of RO. **07**
- OR**
- (b) Write down the steps for calculating the dose for softening by chemical precipitation. **07**
- Q.3** (a) What are refractory organics? Explain the need for removal of refractory organics and TDS from wastewater. **07**
 (b) Write a note on Removal of COD by Fenton's reagent method. **07**
- OR**
- Q.3** (a) With the help of neat sketches explain the modes of operation in membrane filtration unit of MBR. **07**
 (b) Differentiate between (i) External MBR and Immersed MBR. **07**
 (ii) Maintenance cleaning and recovery cleaning
- Q.4** (a) Differentiate between MBR and MBBR. **07**
 (b) Answer the following questions : **07**
 (i) Explain clearly the difference between Influent, Permeate and reject with reference to membrane filtration process.
 (ii) Define the term flux.
 (iii) What is Trans Membrane Pressure?
- OR**
- Q.4** (a) Water contains 200 mg/L of calcium hardness, 80 mg/L of magnesium hardness and alkalinity of 100mg/L. Find out the dosages of chemical for softening and the final water composition. **10**
 (b) Prepare a list of unit processes and unit operations which fall under the category of Advanced Wastewater Treatment **04**
- Q.5** (a) Explain the process of demineralization of water using ion exchange process. Highlight the applications of ion exchange. **07**
 (b) Prepare a list of types of ion exchange membranes and explain their characteristics. **07**
- OR**
- Q.5** (a) Define Ultra filtration, Micro filtration and Nano filtration and describe the difference between them. **07**
 (b) Explain the mechanism of Electrodialysis and highlight the advantage and disadvantages of RO. **07**
