

GUJARAT TECHNOLOGICAL UNIVERSITY**B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012****Subject code: 171301****Date: 26/12/2012****Subject Name: Advanced Wastewater Treatment Technologies****Time: 10.30 am - 01.00 pm****Total Marks: 70****Instructions:**

1. Attempt any five questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Explain chemical and physical adsorption in detail. **07**
 (b) Define and differentiate between Advanced Wastewater Treatment and tertiary treatment with appropriate examples. **07**

- Q.2** (a) Explain the mechanism of Reverse Osmosis and high light the advantage and disadvantages of RO. **07**
 (b) What are refractory organics? Highlight the need for removal of refractory organics and TDS from wastewater. **07**

OR

- (b) With the help of neat sketches explain the modes of operation in membrane filtration unit of MBR. **07**
- Q.3** (a) A jar test was conducted using five dosages of PAC on waste water containing initial COD concentration as 200 mg/L. After a sufficient contact time the COD was tested again and following data was obtained. Plot the data according to Langmuir isotherm and determine the constants 'a' and 'b'. **07**

Flask no	PAC concentration (mg/L)	Initial concentration COD (mg/L)	Equilibrium concentration COD (mg/L)
1	1.5	250	55.0
2	7.3	250	19.7
3	11.5	250	8.9
4	11.7	250	6.9
5	17.6	250	5.0

- (b) Prepare a list of unit processes and unit operations which fall under 'Advanced wastewater treatment' along with the purpose of each. **07**

OR

- Q.3** (a) Enlist and explain the factors affecting adsorption **07**
 (b) Explain Freundlich and BET adsorption isotherms. **07**

- Q.4** (a) Write a short note on Membrane Bioreactor highlighting its merits and drawbacks. **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)** Draw a neat sketch and write short notes on: **07**
- (i) Rotary drum filter
 - (ii) Plate and frame Filter press
- (b)** Highlight the advantages and disadvantages of ‘Ultra filtration’ and ‘Micro filtration’. **07**

- Q.5 (a)** Enlist and explain the Advanced Oxidation Processes for treatment of concentrated wastewaters. **07**
- (b)** Write a short note on ‘Water Softening’. Enlist and explain the different types of softening processes. **07**

OR

- Q.5 (a)** With the help of a neat sketch explain the “Electro dialysis” process. **07**
- (b)** Explain the need for removal of nitrogen from wastewater. Explain the process of Nitrification and Denitrification for nitrogen removal. **07**