Seat No.: _____ Enrolment No._____

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: (i) Rotary drum filter (ii) Plate and frame Filter press	**07**
	(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. Ex[plain the process of Nitrification and Denitrification for nitrogen removal.	**07**