Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE SEM-VII Examination-Nov/Dec.-2011

Subject code: 171301 **Date: 19/11/2011**

Subject Name: Advanced Wastewater Treatment Technologies

Time: 10.30 am-01.00 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)** Explain the difference between 'Tertiary treatment' and 'Advanced wastewater treatment' with the help of neat sketch. **07**

(b) Enlist and explain the factors affecting adsorption **07**

Q.2 **(a)** Enlist and explain the circumstances under which Advanced wastewater treatment becomes necessary. **07**

(b) An adsorption study is set up in the laboratory by adding a known amount of activated carbon to six flasks which contain 500 mL of wastewater. An additional flask containing 500 mL sample but no carbon is run as blank. Plot the data as per Langmuir isotherm and determine the values of constants a and b. **07**

Flask no	Weight of Activated carbon mg	Volume in flask mL	Final COD , mg/L
1	965	500	3.5
2	740	500	5.2
3	548	500	8.0
4	398	500	12.5
5	265	500	20.5
6	168	500	33
7	0	500	100

OR

(b) Highlight the importance of adsorption isotherms stating their applications. **07**

Q.3 **(a)** Define the terms : **07**

(i) Permeate (ii) Retentate (iii) Membrane fouling (iv) Recovery
(v) Trans membrane pressure (vi) Flux (vii) Influent

(b) Enlist and explain the modes of operation of membrane filtration. **07**

OR

Q.3 **(a)** Differentiate between : **06**

(i) Maintenance cleaning and Recovery cleaning.
(ii) External MBR and Immersed MBR

	(b)	Enlist and explain the Advanced oxidation processes for treatment of concentrated wastewaters.	**08**
Q.4	**(a)**	Enlist the unit processes and unit operations which fall under 'Advanced wastewater treatment'. High light the purpose of each.	**07**
	(b)	With the help of a neat diagram explain the concept of 'Reverse Osmosis' and 'Electro dialysis'.	**07**

OR

Q.4	**(a)**	Enlist the advantages and disadvantages of 'Ultra filtration' and 'Micro filtration'.	**07**
	(b)	Enlist the sludge dewatering methods and explain any one.	**07**
Q.5	**(a)**	Enlist and indicate the suitability of different chemical precipitation softening methods.(Write chemical equations).	**07**
	(b)	Explain the mechanism involved in the softening of Non carbonate hardness of magnesium.	**07**

OR

Q.5	**(a)**	Enlist the different processes for biological nitrogen removal and explain any one in detail.	**07**
	(b)	Explain the chemical precipitation method for phosphorus removal.	**07**

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