Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

M. E. - SEMESTER – III • EXAMINATION – WINTER • 2013

Subject code: 731801 **Date: 26-11-2013**

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)**	Define Advanced Oxidation Processes (AOP). Prepare a list of different AOPs and explain any one in detail.	**07**
	(b)	Enlist the advantages and limitations of MBR as compared to conventional treatment systems. What according to you is the main limitation in Indian context?	**07**
Q.2	**(a)**	Write a short note on construction and working of "Filter press".	**07**
	(b)	Express your views on 'increasing demand for reuse of treated wastewater in industry'	**07**
		OR	
	(b)	Explain in brief the construction and working of "Rotary Drum filter"	**07**
Q.3	**(a)**	Explain the mechanism of Reverse Osmosis and high light the advantage and disadvantages of RO.	**07**
	(b)	Prepare a list of common Advanced Wastewater Treatment Processes and the pollutant they remove.	**07**
		OR	
Q.3	**(a)**	With the help of a neat diagram explain the 'Ion exchange' process for removal of hardness. Highlight its applications and limitations.	**10**
	(b)	Briefly explain the reason why it is not possible to achieve zero hardness by chemical precipitation. Is zero hardness required?	**04**
Q.4	**(a)**	With the help of neat sketch , write a brief note on (i) Moving bed biological reactor. (ii) Static aerobic fixed film reactor	**10**
	(b)	Define the terms: Influent, Permeate, reject, flux	**04**
		OR	
Q.4	**(a)**	Define and differentiate between Advanced Wastewater Treatment and tertiary treatment with appropriate examples.	**08**
	(b)	Explain the applications of membrane technologies in wastewater treatment.	**06**
Q.5	**(a)**	With the help of neat sketches explain the modes of operation in membrane filtration unit of MBR.	**06**
	(b)	Draw a neat sketch of Membrane Bioreactor (MBR) and explain its various components.	**08**
		OR	
Q.5	**(a)**	Prepare a list of sources of sludge at the Sewage Treatment Plant and briefly describe the characteristics of each.	**08**
	(b)	Differentiate between : (i) External MBR and immersed MBR (ii) Maintenance cleaning and recovery cleaning of MBR	**06**

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