

GUJARAT TECHNOLOGICAL UNIVERSITY
M. E. - SEMESTER – III • EXAMINATION – WINTER 2012

Subject code: 731801**Date: 30/12/2012****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 in your own words, why the need for 'Reuse and recycling' of industrial wastewaters is becoming more important in present scenario. **07**
- (b) Enlist and briefly explain, any two sludge dewatering techniques, highlighting advantages and disadvantages.. **07**

- Q.2** (a) Compare and establish the contrast between conventional ASP and MBR. When and why would you like to adopt MBR? **07**
- (b) Enlist and explain the objections to discharge of the industrial wastewaters with residual oxygen demand to the surface water sources. **07**

OR

- (b) Define and differentiate between : **07**
- (i) Preliminary and primary treatment
 - (ii) Tertiary and advanced wastewater treatment
- Support your answer with appropriate examples.

- Q.3** (a) Under which circumstances would you prefer to adopt Advanced Oxidation system? Justify your answer. **07**
- (b) Briefly explain the chemistry involved in the removal of COD by Fenton's reagent method. Also describe the process in brief. **07**

OR

- Q.3** (a) Design the battery of Sludge Drying beds for the data given hereunder: **10**
- (i) $Q = 10\text{MLD}$
 - (ii) $SS = 400\text{mg/L}$
 - (iii) $BOD_3^{27} = 250\text{ mg/L}$
 - (iv) BOD_3^{27} in the outlet = 30mg/L
- Draw a neat sketch showing all the calculated dimensions.
- (b) Differentiate between External MBR and Immersed MBR. **04**

- Q.4** (a) With the help of a neat sketch, explain the construction and working of a Membrane Bio Reactor. **10**
- (b) Explain 'Maintenance Cleaning' and 'Recovery cleaning' in MBR. **04**

OR

- 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?

- Q.5** (a) Enlist the applications of ion exchange in water and wastewater treatment. **06**
 Highlight and discuss about the pretreatment requirements for ion exchange.
- (b) Determine the exchange capacity of a resin characterized by the data given in **08**
 the table below:

Throughput volume, L	Cl ⁻ mg/L	Ca ⁺² mg/L	Throughput volume, L	Cl ⁻ mg/L	Ca ⁺² mg/L
0	0	0	35	71	6
5	2	0	40	71	20
10	8	0	45		34
15	44	0	50		39
20	65	0	55		40
25	70	0	60		40
30	71	0			

How much resin would be required to treat a flow rate of 4000 m³/d to reduce the concentration of Ca⁺² from 125 to 45 mg/L?

OR

- Q.5** (a) Explain the difference between: Ultra filtration, Micro filtration and nano filtration. **06**
- (b) Explain the mechanism of Reverse Osmosis and high light the advantage and disadvantages of RO. **08**
