Seat No.: _____ Enrolment No._____

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 = 10MLD

(ii) SS = 400mg/L

(iii) BOD_3^{27} =250 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. Highlight and discuss about the pretreatment requirements for ion exchange. **06**

(b) Determine the exchange capacity of a resin characterized by the data given in the table below: **08**

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 m^3/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**

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