Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – WINTER 2013

Subject Code: 171301 **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)** Discuss in detail the environmental applications of Membranes **07**

(b) Write a short note: Advanced oxidation processes **07**

Q.2 **(a)** Explain in detail types of ion exchange resins **07**

(b) Enlist and explain in detail membrane bioreactor configurations. **07**

OR

(b) Explain the factors that reduce membrane performance **07**

Q.3 **(a)** Write a short note: Adsorption isotherms **07**

(b) Write a short note: Hybrid Membrane systems **07**

OR

Q.3 **(a)** Discuss atleast seven membrane process terminology **07**

(b) Granular activated carbon (GAC) was tested for its ability to remove soluble organic nitrogen (SON) from treated wastewater. Different masses of GAC were added to 1 liter of the wastewater (initial SON concentration = 0.9 mg/L) and contacted for 2 h at 20 °C and pH = 7.5. using the data given in the table determine whether the Langmuir or Freundlich isotherm best describes the data **07**

Mass GAC added, g	C, mg/L of SON
0.2	0.77
0.5	0.65
2.0	0.32
5.0	0.19
10	0.14
20	0.09
50	0.06

Q.4 **(a)** Write a short note: gravity thickener **07**

(b) Explain the factors affecting chemical conditioning **07**

OR

Q.4 **(a)** Enlist the reasons for dewatering the sludge or biosolids **07**

(b) Write a short note on land treatment **07**

Q.5 **(a)** Write a short note: removal of phosphorus **07**

(b) Write a short note on wet lands **07**

OR

Q.5 **(a)** Write a short note: removal of nitrogen **07**

(b) Prepare a table showing comparison of alternative methods for dewatering various types of sludge and biosolids **07**

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