

**GUJARAT TECHNOLOGICAL UNIVERSITY****M. E. - SEMESTER – III • EXAMINATION – WINTER • 2014****Subject code: 731701****Date: 25-11-2014****Subject Name: Design of Water and Wastewater System****Time: 02:30 pm - 05:00 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)** Answer the Following : **07**

- (1) Justify the 1 PPM=1 mg/lit for Liquid.
- (2) Differentiate among Total Solids , Total Volatile Solids and Total Fixed Solids
- (3) Define Food to Microorganism Ratio
- (4) What is Greywater? Enlist any two uses of Greywater.
- (5) Why is the value of COD always higher than the value of BOD?

**(b)** Draw a neat sketch of Wastewater Treatment plant showing its various preliminary, primary, secondary units. Also mention the uses of each unit in brief. **07****Q.2 (a)** Describe the terms Neutralization and Equalization in wastewater treatment. **07****(b)** Determine the reaction order of reactant removal process for the data given below **07**

Concentration of Reactant in (mg/lit)	230	150	100	50	30	20
Time (min)	0	7	15	25	35	40

**OR****(b)** State the Monod's equation for the Microbial Growth with neat sketch **07****Q.3 (a)** Differentiate and describe Suspended Growth and Attached Growth Treatment with suitable examples **07****(b)** Describe the unit operation of Floatation and focus on Air floatation, Vacuum floatation. **07****OR****Q.3 (a)** Describe the process of designing Primary Settling Tank and its design criteria **07****(b)** Explain the process of Single stage and Two Stage Anaerobic digester with neat line sketches. **07****Q.4 (a)** Enlighten the use of Oxidation ditch with sketch. Enlist various design criteria for oxidation ditch. **07****(b)** Write short note on stream pollution and self purification **07****OR****Q.4 (a)** Enlist various aspects to be considered for the design of activated sludge processes along with various design criteria for the activated sludge process. **07****(b)** Describe the process description of Biological Nitrification and Biological Denitrification **07****Q.5 (a)** Classify various types of reactors with their suitabilities. **07****(b)** What does the performance evaluation of waste water treatment plant mean? How does it carry out? **07****OR****Q.5 (a)** Describe the DO and BOD testing using conventional laboratory methods **07****(b)** Write Short note on: (1) Step Aeration and Kraus Process (2) NRC Equations to determine efficiency of filters **07**

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