

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**ME Semester –I Examination Feb. - 2012**

**Subject code: 711701N****Date: 11/02/2012****Subject Name: Principles of Water Treatment****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) Briefly explain the sources of surface water with the quality of water. **07**  
(b) What is “Water Demand”? Explain the factors water affecting water demand and fluctuation in water demand. **07**

- Q.2** (a) Briefly describe the water quality criteria for industrial, agricultural and fishery. **07**  
(b) List out the important physical utility criteria and briefly explain them. **07**

**OR**

- (b) Why “MPN test is performed?” Explain the steps for Presumptive and confirmative test”. **07**

- Q.3** (a) Draw the layout for surface water treatment plant. Explain the functions for each unit. **07**  
(b) Discuss the principles of settling of discrete particles in water. Derive the formula for finding out settling velocity for Type I settling. **07**

**OR**

- Q.3** (a) A rectangular sedimentation tank following coagulation- flocculation is to treat a flow of 3000 m<sup>3</sup>/day with a detention time of 6 hours. It is to be hand cleaned sludge at 6 weeks intervals. The suspended solids concentration of water is reduced from 250mg/l and 5 mg/l by coagulation- flocculation. The settled sludge includes 40 mg/L of metallic precipitate and has a moisture content of 85% and specific gravity of 1.24. Determine the volume of sludge produced between cleaning and the basic dimensions of the tank if the water depth just before the cleaning is 3 m and its length is twice the width. **07**  
(b) Define coagulation and flocculation. Enumerate the chemicals which are used for coagulation. Discuss their comparative merits and demerits. **07**

- Q.4** (a) Write short note on Aeration of water. **07**  
(b) Explain the chlorination. Chlorine usage in the treatment of 20,000 m<sup>3</sup>/day is 8 kg/day. The residual after 10 min contact is 0.20 mg/l. calculate the dosage in mg/L and chlorine demand. **07**

**OR**

- Q.4** (a) List the methods for softening of water. Describe “zeolite process of water” of softening of water. **07**

(b) The analysis of hard water shows the following compositions: **07**

Free available chlorine = 3 mg/l

Alkalinity = 68 mg/l

Non- carbonate hardness = 92 mg/l

Total magnesium = 15 mg/l

Assume that it is possible to remove all but 35 mg/l of carbonate hardness with lime, and that the treated water is to have a total hardness of 80 mg/l. Determine the amount of hydrated lime and soda required for treatment per million liter of raw water.

**Q.5 (a)** Write short note on defluoridation **07**

**(b)** Explain the desalination of water by Electro dialysis method. **07**

**OR**

**Q.5 (a)** How will you determine the optimum dose of coagulant in laboratory. **07**

Explain the procedure for same. Give the chemical reactions when alum is added as a coagulant along with lime.

**(b)** Write short note on "River Intake". **07**

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