

GUJARAT TECHNOLOGICAL UNIVERSITY**BE- SEMESTER-V (NEW) EXAMINATION – WINTER 2020****Subject Code:3151303****Date:27/01/2021****Subject Name:Physico-chemical Treatment Technology****Time:10:30 AM TO 12:30 PM****Total Marks: 56****Instructions:**

1. Attempt any FOUR questions out of EIGHT questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1** (a) Differentiate between Unit process and unit operations. **03**
(b) Draw neat sketches of Micro-filtration treatment for surface water. **04**
(c) Draw neat sketch and explain Conventional Waste-water Treatment Plant and explain the different units along with their functions. **07**
- Q.2** (a) Explain the procedure for statistical analysis of wastewater flow rate data. **03**
(b) Explain the following terms: **04**
(1) Settling velocity
(2) Surface loading rate
(3) Weir loading rate
(4) Volumetric loading
(c) Prepare a list of different types of chemical coagulants and explain along with chemical reactions involved. **07**
- Q.3** (a) Define screen. State the purpose of screen. **03**
(b) Explain the classification of screens in detail with neat and labeled sketches. **04**
(c) A jar test was done in a Lab on a water sample to determine the optimum chemical dose for clarification. Two liter samples were kept in each jar, after the test showing optimum removal was dosed with 10 ml Alum solution containing 5 mg Al⁺³ per ml and 1 ml polyelectrolyte containing 1mg /ml .If the amount of water to be treated on that day is 45 ml per day. Calculate kg/day of alum and polyelectrolyte that should be added through raw water. **07**
- Q.4** (a) Define 'Grit Chamber'. State its purpose. **03**
(b) Explain different types of Grit Chambers. Explain any one with neat. **04**
(c) In a 50 MLD treatment plant Alum dose of 125 mg/L is applied to raw water, which contains about 15 mg/L of suspended solids estimate the maximum kg/day of dry sludge solids which must be removed from the plant and volume of wet sludge which has concentrated to 2% (by weight). **07**
- Q.5** (a) Write a note on “Operational difficulties of RSF”. **03**
(b) What are the advantages of dual media filters as compared to single media filters? **04**
(c) Draw a neat sketch of Rapid Sand Filter (RSF) and explain its construction and working. **07**
- Q.6** (a) Enlist the assumptions for ideal sedimentation tank. **03**
(b) Explain the phenomenon of flocculation for water and waste-water treatment. **04**
(c) Describe Newton’s law (Stokes law) for settling velocity of discrete particles. **07**

- Q.7** (a) Explain the difference between disinfection and sterilization. Enlist the various methods adopted to disinfect the wastewater. **03**
- (b) Describe the various factors that affect efficiency of wastewater disinfection. **04**
- (c) Explain Break-point chlorination and its significance to determine the chlorine demand. **07**
- Q.8** (a) Discuss the objectives of treatment of sludge. **03**
- (b) Explain Sludge Drying bed and its design criteria. **04**
- (c) Describe the methods normally used to process the sludge before its final disposal. **07**