Programme: B. Tech

Course Name: Environmental Engineering - I

Course Code: ECE 358

Tutorial – 4

Topics Covered – Unit 3 (CO3)

Tutorial –4

Assume suitable data wherever necessary

1. A town has a population of 50,000 with a rate of demand of 140lpcd. The dose of chlorine is 0.5ppm and the disinfection is done by bleaching powder with 60% purity. Determine the annual requirement of the bleaching powder.

2. The chlorine requirement for treating a flow of 25000 m^3/d is 10 kg/day. The residual chlorine concentration after appropriate contact time is 0.22 ppm. Determine the dosage (mg/l) and chlorine demand of water.

3. In a disinfection experiment, it was observed that free available chlorine concentration of 0.2 mg/l killed 99% of pathogens in 10 minutes. Determine the contact time required to kill 99.9% pathogens with a free available chlorine concentration of 0.6 mg/l. Use Chicks and Watsons law with n = 1.

4. Using Chick and Watson Law, (a) determine R-log removal value for 99.99% (b) the remaining pathogen concentration at this removal after 1.5 minutes of contact time (Assume k = 0.05/min)

5. Discuss the different methods of disinfection with their advantages and disadvantages.

6. Discuss the suitability of chlorine as a disinfectant and in this context, explain chlorine demand, dosage and residual concentration. Also discuss the relationship of chlorine concentration in water and the corresponding pH values.

7. With a neat sketch, explain the breakpoint chlorination technique for disinfection process. Why is this method considered to be most suitable? Also discuss some of the other forms of chlorination and their suitability. Also discuss the relationship of chloramines in water and the corresponding pH values.

8. Write short notes on (a) suitability of chemical as a disinfectant and (b) factors affecting the chlorination process.

9. Briefly explain the importance of pH in the entire disinfection process and also how it relates to proportion of free chlorine available in water for disinfection.

10. The results of a chlorine demand test on raw water samples is shown in the following table. Sketch the chlorine demand curve and determine the breakpoint dose of chlorine. Also determine the chlorine demand at a dose of 1.2mg/l

Sample number	Chlorine dosage (mg/l)	Residual Chlorine (mg/l)
1	0.3	0.29
2	0.5	0.46
3	0.7	0.60
4	0.9	0.58
5	1.1	0.30
6	1.3	0.5
7	1.5	0.7
8	1.7	0.9