UPES
End Semester Examination, May 2025

Course: Water Supply and Sanitation   **Semester: IVth**
Program: B.Tech Civil Engineering   **Time: 03 hrs.**
Course Code: CIVL2032   **Max. Marks: 100**

Instructions: <u>**All questions are compulsory to attempt.**</u>

SECTION A
(5Qx4M=20Marks)

S. No.		Marks	CO
Q 1	State the various components of water supply scheme along with their purpose.	04	CO1
Q 2	Analyze the types of sewerage system along with their critical points.	04	CO3
Q 3	Examine the various additions and subtractions from the water works to be done for determining the precise quantity of wastewater production from a city.	04	CO3
Q 4	Interpret the concept of the threshold number in a water sample and explain its significance.	04	CO2
Q 5	Differentiate between hardness and alkalinity in raw water with respect to their composition and significance.	04	CO2
	SECTION B **(4Qx10M= 40 Marks)**		
Q 6	Explain the mechanism of chlorine disinfection in water treatment, emphasizing its chemical interactions and critical points. OR Discuss the relevance of "Chlorine demand" and "Optimum Chlorine dose" in raw water treatment. Also, analyze Break point chlorination along with its critical points.	10 05+05	CO2
Q 7	a. Interpret the relevance of displacement efficiency in continuous type sedimentation tank. b. A circular sedimentation tank fitted with standard mechanical sludge remover equipment is to handle 5.5 MLD of raw water. If the detention period of the tank is 4 hours and the depth of the tank is 3 m, estimate the diameter of the tank.	03+07	CO2
Q 8	Explain the various types of water demand in a typical Indian city. Also, explain the key factors influencing per capita water consumption.	06+04	CO1

Q 9	a). In a water treatment plant, the pH values of incoming and outgoing waters are 7.1 and 8.5 respectively. Assuming a linear variation of pH with time, determine the average pH value of water. b). Examine the TS, TDS, TSS parameters in raw water along with their determination procedure in laboratory.	05+05	CO2

SECTION-C
(2Qx20M=40 Marks)

Q 10	A city has a population of 1,20,000 and average daily water demand of 125 lpcd. Design a rapid sand filter for the above city requirement with details of under drainage system and back water washing including wash water trough arrangement. Assume suitable data and figures wherever needed according to design guidelines. OR Design a coagulation-cum-sedimentation tank with continuous flow for a population of 1,00,000 persons with a daily per capita water allowance of 115 liters. Also, sketch the clear diagram of the designed tank. Make suitable assumptions where needed in accordance to design guidelines.	20	CO4
Q 11	A rectangular sedimentation tank is to handle 9 MLD of raw water. A detention tank of width to length ratio of 1/3 is proposed to trap all particles larger than 0.04 mm in size. Assuming a relative density of 2.60 for the particles and 20ºC as the average temperature, evaluate the tank dimensions. If the depth of the tank is 3.5 m, estimate the detention time.	20	CO4