Register No : _____

THE KAVERY ENGINEERING COLLEGE

(An Autonomous Institution)

M.E DEGREE END SEMESTER THEORY EXAMINATIONS, APRIL-MAY 2025

First Semester

Environmental Engineering

EV4103/PEVT2403 - Physical and Chemical Treatment Systems for Water and Waste Water

Regulations – 2021/2024

Duration : 3 Hrs ***Maximum : 100 Marks***

PART – A (ANSWER ALL QUESTIONS) (Marks 10*2=20)

Q.No	Questions	BLT	CO	Marks
1.	Enumerate the different parameters to measure different types of solids in wastewater.	L 2	1	2
2.	Specify the standards of performance of waste water treatment plants with reference to four key physico-chemical parameters.	L 1	1	2
3.	What are adsorption isotherms?	L 1	2	2
4.	What is the principle of electro-dialysis?	L 1	2	2
5.	What is the purpose of increasing the number of media types in a filter?	L 2	3	2
6.	State the mechanisms of disinfection process.	L 3	3	2
7.	Distinguish between hydraulic profile and PID.	L 2	4	2
8.	Why pre-treatment is required for RO process?	L 2	4	2
9.	What is the basic principle in the design of grit chamber?	L 1	5	2
10.	Determine the chlorine feed rate required to maintain a 1.0 mg/l residual in a 30 MLD flow if the chlorine demand was determined to be 4.5 mg/l.	L 4	5	2

PART – B (ANSWER ALL QUESTIONS) (Marks 5*16 = 80)

Q.No			Questions	BLT	CO	Marks
11.	a	i	Compare batch and continuous reactors in terms of reactor kinetics.	L 2	1	8
		ii	With the help of neat sketch compare complete mix, plug flow and packed bed reactors.	L 2	1	8
			Or			
	b	i	Compare ideal and Non Ideal flow tracer performance curves for complete mix and plug flow reactors.	L4	1	8
		ii	Explain the criteria for reactor selection for a given application.	L4	1	8
12.	a	i	Explain the principles and environmental engineering applications of Equalization.	L 3	2	8

	ii	Compare the different types and applications of membrane filtration in water Treatment.	L 3	2	8
		Or			
	b	Explain the principle and environmental engineering applications of solvent extraction and advanced oxidation processes.	L 2	2	16
13.	a i	Five parallel flocculation basins are to be used to treat a water flow of 0.15 m^3/s. If the design detention time is 30 minutes, what is the volume of each tank?	L 4	3	8
	ii	Draw the process flow diagram of a conventional water treatment plant and explain the functions and design criteria of each unit.	L 4	3	8
		Or			
	b i	Two spherical particles have diameters of 0.6 mm and 0.9 mm, respectively. The particles have the same specific gravities of 2.65. Assume that the settling is type I and the temperature of the water is 22°C. Determine the ratio of their terminal settling velocities.	L 4	3	8
	ii	A rapid mix tank blends 35 mg/L of alum with a raw water flow rate of alum added per day, the dimensions of the tank, and the power input necessary for40000 m^3/day. The detention time is to be 2 min. Determine the quantity of alum added per day, the dimensions of tank and the power input necessary for a G value of 900 s^{-1}. The water temperature is 20 ° C.	L 4	3	8
14.	a i	Draw the process flow diagram of a water treatment plant to feed an industrial boiler and explain the functions and design criteria of each unit.	L 2	4	8
	ii	Explain the principles and operation of different demineralization techniques.	L 2	4	8
		Or			
	b	Describe the Lime soda process for water softening with suitable equations.	L 3	4	16
15.	a i	Chlorination is the usual method for disinfecting water. Name the two parameters that Control the extent of disinfection and explain how does the Presence of ammonia in water affects the efficiency of chlorine.	L3	5	8
	ii	Describe the data requirements to design neutralization and grit Chamber.	L3	5	8
		Or			
	b i	Discuss the construction and 0 and M aspects of physico-chemical treatment systems.	L4	5	8

ii	A domestic wastewater contains 350 mg/L of suspended solids. Primary Sedimentation facilities remove 30% of these solids. Approximately how much sludge containing 2% solids by weight will be produced per million liters of wastewater handled? How to improve the solids content to 30%?	L4	5	8