B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

August 2024 Semester End Main Examinations

Programme: B.E. **Semester: IV**
Branch: Civil Engineering **Duration: 3 hrs.**
Course Code: 22CV4PCENV **Max Marks: 100**
Course: Environmental Engineering-I

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

<div style="writing-mode: vertical">**Important Note:** Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.</div>

				CO	PO	Marks
		UNIT – I				
1	a)	A town water supply is given at 150 lpcd. Suggest a suitable breakup of the consumption on different heads. What allowances should be made in India for loss and wastage in water supply with valid reason.		CO 1	PO1	**06**
	b)	Discuss briefly the various means of estimating fire water demand.		CO 1	PO1	**06**
	c)	Determine the future population of a satellite town by the geometric increase method for the year 2011, given the following data.		CO 1	PO1	**08**

Year	1951	1961	1971	1981
Population in thousands	93	111	132	161

			CO	PO	Marks
		UNIT – II			
2	a)	You are a civil engineer tasked with designing a water supply system for a rapidly growing urban area. Explain the factors that would influence your choice between surface water sources (e.g., rivers and reservoirs) and sub-surface sources (e.g., groundwater wells) for this project. What are the key considerations in making this decision?	CO2	PO2	**06**
	b)	You are a hydraulic engineer tasked with designing the rising main for a water distribution system. Explain the factors and parameters you would consider when determining the economical diameter of the rising main, taking into account both technical and cost-related considerations.	CO2	PO2	**06**

				CO	PO	Marks
		c)	Water has to be supplied to a town with one lakh population at the rate of 150 litres per capita per day from a river 2000 m away. The difference in elevation between the lowest water level in the sump and the reservoir is 36 m. If the demand has to be supplied in 8 hrs, determine the size of the main and brake horse power of the pumps required. Assume the maximum demand as 1.5 times the average demand. Assume f= 0.0075, velocity in the pipe 2.4 m/sec and efficiency of pump 80%.	CO2	PO1	08
			OR			
	3	a)	As a public health officer, you are responsible for ensuring the safety of drinking water in a community. Explain the key differences between safe, wholesome, and palatable water and outline the regulatory measures you would implement to achieve these goals.	CO 2	PO1	06
		b)	Describe the methods used for collecting water samples and the preservation techniques to maintain sample integrity until analysis. Why is proper sampling and preservation crucial for accurate water quality testing?	CO 2	PO1	06
		c)	Describe the multiple fermentation tube (Most Probable Number, MPN) method and the membrane filter test for bacterial examination of water. Compare the principles, procedures, and applications of these two methods. Discuss the advantages and limitations of each method.	CO 2	PO1	08
			UNIT - III			
	4	a)	Illustrate detailed schematic diagram of a typical drinking water treatment plant, including all the key processes involved from source water intake to distribution to consumers	CO 2	PO1	08
		b)	What are the common contaminants in drinking water that can be effectively removed through aeration, and how does the aeration process achieve this removal?	CO 2	PO1	06
		c)	A rectangular settling tank without mechanical equipment is to be designed to treat 1.80 mld. The sedimentation period is 4 hours and the velocity of flow is 8 cm/minute and the depth of water and sediment is 4.2 m. If an allowance of 1.2 m for sediment is made , what should be the length and width of the basin.	CO 2	PO1	06
			OR			
	5	a)	Explain the process of coagulation in water treatment. Discuss the chemical reactions involved when alum (aluminum sulfate) is used as a coagulant. Include in your answer the factors that influence the efficiency of the coagulation process and how these factors can be optimized in a water treatment plant.	CO 1	PO1	10

		b)	Compare and contrast slow sand filters and rapid sand filters, in terms of their design, operation, and suitability for different water treatment scenarios. For each filter type, provide an example of a situation where it would be the most appropriate choice.	*CO* 1	*PO1*	**10**
			UNIT – IV			
	6	a)	Explain Briefly break point and super chlorination.	*CO* 2	*PO1*	**06**
		b)	Describe the steps involved in the lime-soda softening process. Discuss the advantages and disadvantages of the lime-soda process for water softening.	*CO* 2	*PO1*	**06**
		c)	Compare and contrast the four types of membrane technologies in removing pollutants from water. Provide a scenario where each type would be the most appropriate choice.	*CO* 3	*PO1*	**08**
			UNIT – V			
	7	a)	You have been tasked with designing the plumbing system for a new multi-story residential building. Describe the key components and layout of the supply system within the building. Explain how you would ensure adequate water pressure and flow to all fixtures on every floor. Include a discussion on the types of pipe fittings and pipe joints you would use to ensure a reliable and leak-proof system.	*CO* 3	*PO1*	**10**
		b)	Discuss the importance of water conservation in building plumbing systems. Propose three water conservation techniques that can be implemented within the building's plumbing system. Explain the potential impact of each technique on water usage and sustainability.	*CO* 3	*PO1*	**10**

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