U.S.N.										

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

Autonomous Institute Affiliated to VTU

June 2025 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.

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.

		UNIT - I	*CO*	*PO*	Marks
1	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.	*CO1*	*PO1*	**06**
	b)	Discuss briefly the various means of estimating fire water demand.	*CO1*	*PO1*	**06**
	c)	The population of 5 decades from 1930 to 1970 are given below in table. Estimate the population after one, two and three decades beyond last known decade, by arithmetic increase and geometric increase method. Year: 1930, 1940, 1950, 1960, 1970 Population: 25000, 28000, 34000, 42000, 47000	*CO1*	*PO2*	**08**
		OR			
2	a)	Explain the factors effective Per Capita demand.	CO1	*PO1*	6
	b)	What is fire demand? Compute fire demand for a city having population 1,40000 by various formula	CO 1	*PO1*	6
	c)	The following population data are available for a town estimate the probable population in the year 2031 by geometric increase method , arithmetic increase method and incremental increase method year: 1971, 1981, 1991, 2001 Population: 80000, 120000, 168000, 2,28000	CO 1	*PO 1*	8
		UNIT - II			
3	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.,	*CO1*	*PO1*	**06**

			rivers and reservoirs) and sub-surface sources (e.g., groundwater wells) for this project. What are the key considerations in making this decision?			
		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.	*CO1*	*PO1*	**06**
		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%.	*CO1*	*PO2*	**08**
			OR			
	4	a)	Explain the significance of the following from the point of view of water quality criteria: i) Nitrates ii) Arsenic iii) Chromium.	*CO1*	*PO1*	**06**
		b)	You are a water quality scientist responsible for monitoring a groundwater well for bacteriological contamination. Describe the bacteriological analysis methods you would use, including the differences between the multiple fermentation tube test and the membrane filter test (MPN). Discuss the advantages and limitations of each method.	*CO1*	*PO1*	**08**
		c)	Describe the process of collecting grab samples versus composite samples for water quality analysis. What factors influence the decision to use one method over the other?	*CO1*	*PO1*	**06**
			UNIT - III			
	5	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.	*CO2*	*PO1*	**06**
		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?	*CO2*	*PO1*	**06**
		c)	The maximum daily demand at a water purification plant has been estimated as 12 million litres per day. Design the dimensions of a suitable sedimentation tank (fitted with mechanical sludge removal arrangements) for the raw supplies, assuming a detention period of 6 hours and the velocity of flow as 20 cm per minute.	*CO2*	*PO3*	**08**
			OR			
	6	a)	With the help of the neat labelled diagram explain the working of circular sedimentation tank.	*CO2*	*PO1*	**06**

		b)	Compare and contrast the various types of coagulants used in water treatment processes, such as aluminum sulfate (alum) and ferric chloride. Discuss the factors that influence the choice of coagulant for a specific water source.	*CO2*	*PO1*	**06**
		c)	With the help of the neat labelled diagram explain the working of Rapid Sand Filter.	*CO2*	*PO3*	**08**
			UNIT - IV			
	7	a)	In a distribution network, the residual chlorine levels are consistently below the recommended threshold. Describe the potential causes of low residual chlorine and the health risks associated with inadequate disinfection. Outline the corrective actions you would take to address this issue.	*CO2*	*PO1*	**06**
		b)	Explain Briefly break point and super chlorination.	*CO2*	*PO1*	**06**
		c)	Describe reverse osmosis process in detail.	*CO2*	*PO1*	**08**
			OR			
	8	a)	Discuss the characteristics of ideal disinfectants and explain the mechanism of disinfection.	*CO3*	*PO1*	**06**
		b)	What is softening of water? Discuss the lime soda process of water softening with chemical equations.	*CO3*	*PO1*	**10**
		c)	Define Microfiltration and Nano - Filtration	*CO3*	*PO1*	**04**
			UNIT - V			
	9	a)	Illustrate with sketches the different types of layouts of pipe systems in distributing water and compare their merits and demerits.	*CO3*	*PO1*	**10**
		b)	Discuss the various types of water piping systems that may be employed in buildings for fulfilling the water demands of its residents, giving merits and demerits of each system.	*CO3*	*PO1*	**10**
			OR			
	10	a)	Illustrate and explain with diagram Radial and dead end distribution network systems	*CO3*	*PO1*	**08**
		b)	Explain requirements of a good sewer joint.	*CO3*	*PO1*	**06**
		c)	Explain any two water conservation Techniques.	*CO3*	*PO1*	**06**

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