U.S.N.										

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

Autonomous Institute Affiliated to VTU

January / February 2025 Semester End Main Examinations

Programme: B.E. **Semester: V**

Branch: Civil Engineering **Duration: 3 hrs.**

Course Code: 20CV5PCWWT **Max Marks: 100**

Course: Wastewater Treatment

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)		Explain the separate, partially separate and combined system of sewerage with their merits and demerits	CO1	PO1	10
	b)		The main sewer was designed for an area of 50 sq.km. Density of population of the town is 200 persons/hectare. The average flow is 250 litre/capita/day. The peak discharge is one and half times more than average flow. Rainfall equivalent of 8mm in 24 hours, all of which are runoff. (a) What should be the capacity of the sewer in m3/sec. (b) Find the minimum velocity and gradient required to transport sewage containing coarse sand of 1mm diameter through a sewer of 35cm diameter, spec gr of particles is 2.65 and values of K = 0.06 and f = 0.03	CO1	PO1	10
			OR			
2	a)		Design a sewer to serve a population of 36000, the daily per capita water supply allowance being 135 litres of which 80 % finds its way into the sewer. The slope available for the sewer to be laid is 1 in 625 and the sewer should be designed to carry four times the dry weather flow when running full. What would be the velocity of flow. Take N = 0.012.	CO1	PO1	8
	b)		Define (i) Self cleansing velocity (ii) Non scouring velocity (iii) Sullage	CO1	PO1	6
	c)		Explain the need and importance of sanitation	CO1	PO1	6
			UNIT - II			
3	a)		With a neat diagram explain the working of a Manhole.	CO2	PO1	8
	b)		Explain (i) Gully Trap (ii) Intercepting Trap (ii) Outfall sewer	CO2	PO1	6
	c)		Create a diagram illustrating the house drainage system, including all connections and clearly labeled components.	CO2	PO1	6
			OR			

	4	a)	Provide a detailed explanation of the process involved in laying a sewer pipeline.	*CO2*	*PO1*	**10**
		b)	Describe the different types of materials used in sewer construction and their specific applications.	*CO2*	*PO1*	**10**
			UNIT - III			
	5	a)	Explain the carbon and nitrogen cycles in detail, including a labeled diagram to illustrate the processes.	*CO2*	*PO1*	**10**
		b)	The BOD of a sewage incubated for one day at 30^0C has been found to be 200 mg/l. What will be the 5-day 20^0C BOD? Assume K = 0.12 per day at 20^0C.	*CO2*	*PO1*	**10**
			OR			
	6	a)	Explain in detail how streams undergo the self-purification process, accompanied by a clear and labeled diagram.	*CO2*	*PO1*	**10**
		b)	100 m^3/s of sewage of a city is discharged in a perennial river which is fully saturated with oxygen and flows at a minimum rate of 1250 m^3/s with a minimum velocity of 0.15 m/s. If the 5-day BOD of the sewage is 260 mg/L, find out where the critical DO will occur in the river. Assume (i) f = 4.0, (ii) Co-efficient of DO as 0.11 (iii) Ultimate BOD as 125 % of the 5-day BOD of the mixture of sewage and river water.	*CO2*	*PO1*	**10**
			UNIT - IV			
	7	a)	The Bengaluru Doddabele sewage Treatment Plant receives wastewater from one part of Bengaluru. Summarise the treatment process used at STP with the help of a flow diagram with relevant technical details.	*CO3*	*PO1*	**10**
		b)	Design a low-rate filter to treat 6.0 MLD of sewage of BOD of 210 mg/l. The final effluent should be 30 mg/l and organic loading rate is 320 g/m^3/d.	*CO3*	*PO1*	**10**
			OR			
	8	a)	With the help of neat sketch discuss the principles involved in working of Activated sludge process	*CO3*	*PO1*	**8**
		b)	With the help of neat sketch discuss the principles involved in working of Grit chamber	*CO3*	*PO1*	**8**
		c)	Define (i) Sludge volume index (ii) F/M Ratio	*CO3*	*PO1*	**4**
			UNIT - V			
	9	a)	Distinguish between Ultra Filtration and Microfiltration with merits and demerits.	*CO3*	*PO1*	**10**
		b)	Explain the process of reverse osmosis with neat flow diagram	*CO3*	*PO1*	**10**
			OR			
	10	a)	Discuss a detailed overview of the membrane filtration technique, covering its fundamental principles, different types, and various applications?	*CO3*	*PO1*	**10**
		b)	Briefly explain how the ion exchange process is used in the tertiary treatment of wastewater?	*CO3*	*PO1*	**10**

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