Reg. No.															

Question Paper Code	13277

B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2024

Fifth Semester

Civil Engineering

20CEPC502 - PUBLIC HEALTH AND SANITATION ENGINEERING

Regulations - 2020

Duration: 3 Hours Max. Marks: 100

PART - A (MCQ) (20 × 1 = 20 Marks)

Answer ALL Questions

		Marks	K – Level	CO
1.	For the calculation of water demand, the term "fire demand" refers to: (a) Daily water usage in industrial areas (b) Water required for firefighting purposes (c) Extra demand for hot water supply (d) Water required during peak summer	1	K1	CO1
2.	Which of the following is a primary source of water for municipal supply? (a) Desalinated seawater (b) Groundwater (c) Rainwater harvesting tanks (d) Recycled wastewater	1	K1	CO1
3.	Which method is commonly used for population forecasting when historical population data shows an increasing growth rate? (a) Arithmetic Increase Method (b) Geometric Increase Method (c) Incremental Increase Method (d) Logistic Growth Model	1	K1	CO1
4.	Hardness of water is caused due to (a) calcium sulphate (b) magnesium sulphate (c) calcium bicarbonates (d) all the above	1	K1	CO2
5.	If pH value of water is (a) 7 water it is said to be neutral (b) less than 7 it is said to be acidic (c) more than 7 it is said to be alkaline (d) all the above	1	K1	CO2
6.	For determining the velocity of flow of underground water, the most commonly used non-empirical formula is (a) Darcy's formula (b) Slichter's formula (c) Hazen's formula (d) Lacy's formula	1	K1	CO2
7.	A treatment plant requires 30 mg/L of alum for coagulation. If the daily water treatment is 10,000 m^3, how much alum is needed per day? (a) 300 grams (b) 300 kg (c) 3 kg (d) 30 kg	1	K2	CO3
8.	Air valves in a water supply system are installed to: (a) Regulate water pressure (b) Release trapped air (c) Prevent water hammer (d) Monitor water quality	1	K1	CO3
9.	The process of defluoridation is mainly used to: (a) Remove dissolved iron from water (b) Reduce fluoride concentration in drinking water (c) Remove pathogens (d) Enhance oxygen levels in water	1	K1	CO3
10.	The hydraulic design of sanitary sewers is primarily based on which parameter? (a) Velocity of flow (b) Material of the pipe (c) Size of the manhole (d) Population density	1	K1	CO4
11.	Corrosion in sewers can be controlled by: (a) Increasing the slope of the sewer (b) Lining the sewer with corrosion-resistant materials (c) Increasing the water flow velocity (d) Introducing more organic waste into the sewer	1	K1	CO4

12.	What is the purpose of sewer appurtenances? (a) To prevent blockages (b) To clean the sewers (c) To regulate sewage flow and provide access for cleaning and maintenance (d) To increase the flow rate of sewage	*1*	*K1*	*CO4*
13.	Which of the following types of screens is used for removing smaller particles in wastewater treatment? (a) Coarse screens (b) Fine screens (c) Micro screens (d) Bar screens	*1*	*K1*	*CO5*
14.	In which of the following processes is biomass separated from treated water using a membrane? (a) Trickling Filter (b) Activated Sludge Process (c) Membrane Bioreactor (MBR) (d) Waste Stabilization Pond	*1*	*K2*	*CO5*
15.	The main construction material for waste stabilization ponds is usually: (a) Concrete only (b) Reinforced steel (c) Earthen embankments with clay lining (d) Plastic lining	*1*	*K1*	*CO5*
16.	The retention period of a typical septic tank for wastewater treatment is designed to be: (a)1-2 days (b) 3-5 days (c) 7-10 days (d) 15-20 days	*1*	*K1*	*CO5*
17.	During self-purification, a "recovery zone" is characterized by: (a) Decreasing BOD and increasing DO (b) Increasing BOD and decreasing DO (c) Constant BOD and DO levels (d) Absence of microbial activity	*1*	*K1*	*CO6*
18.	The addition of polymers in sludge conditioning helps to: (a) Break down organic matter (b) Bind sludge particles for easier dewatering (c) Increase nutrient content (d) Neutralize sludge pH	*1*	*K2*	*CO6*
19.	What is the primary role of microorganisms in sludge digestion? (a) Increase sludge volume (b) Break down organic materials (c) Add nutrients to sludge (d) Reduce water content	*1*	*K1*	*CO6*
20.	Land disposal of sludge is primarily used because: (a) It is cost-effective (b) It reduces nitrogen content in soil (c) It enhances soil fertility by adding nutrients (d) It is the most eco-friendly method of sludge disposal	*1*	*K2*	*CO6*

PART - B (10 × 2 = 20 Marks)

Answer ALL Questions

21.	Outline the factors which are affecting the water demand.	*2*	*K2*	*CO1*
22.	What is design period? List any two factors influencing it.	*2*	*K1*	*CO1*
23.	Recall the factors which contribute to corrosion in pipes.	*2*	*K2*	*CO2*
24.	Show the components of water supply scheme with sketch.	*2*	*K1*	*CO2*
25.	What is the health effects associated with excess fluorosis?	*2*	*K1*	*CO3*
26.	What is zeolite process?	*2*	*K1*	*CO3*
27.	Compare unit operations and unit processes in wastewater treatment. Give at least two examples in each.	*2*	*K2*	*CO4*
28.	List the sewer materials used in sewerage system.	*2*	*K1*	*CO4*
29.	Define sludge volume index.	*2*	*K1*	*CO5*
30.	List out any 5 standards for discharge of sewage in surface water source.	*2*	*K1*	*CO6*

PART - C (6 × 10 = 60 Marks)

Answer ALL Questions

31.	a)	Summarize the various methods of population forecasting of a city or a town in detail.	*10*	*K2*	*CO1*

OR

	b)	The population of a city in three consecutive years i.e. 1991, 2001 and 2011 is 80,000; 250,000 and 480,000, respectively. Show the following (a) The saturation population, (b) The equation of logistic curve, (c) The expected population in 2021.	*10*	*K2*	*CO1*
32.	a)	Classify the different pipe joints used in the conveyance system with their merits and demerits.	*10*	*K2*	*CO2*
		OR			
	b)	Explain the layout of water distribution system in detail with neat sketch.	*10*	*K2*	*CO2*
33.	a)	Outline the working principle and function of rapid sand filter with neat sketch.	*10*	*K2*	*CO3*
		OR			
	b)	Explain the process of chlorination in water treatment and its types in detail.	*10*	*K2*	*CO3*
34.	a)	Illustrate the chemical and biological characteristics of sewage in detail.	*10*	*K2*	*CO4*
		OR			
	b)	A combined severs designed to serve an area of 60 sq.km with an average population of 185 persons / hectare. The average rate of sewage flow is 350 L/Capita/day. The maximum flow is 50 % in excess of the average sewage flow. The rainfall equivalent of 12 mm in 24 hr can be considered for all the design, all of which is contributing to surface runoff. What will be the discharge in sewer? Find the diameter of sewer if running full at maximum discharge and velocity of 0.9m/s.	*10*	*K2*	*CO4*
35.	a)	Explain in detail about the construction, design aspects and disposal of effluent of septic tank with neat sketch.	*10*	*K2*	*CO5*
		OR			
	b)	Illustrate the working principle and function of UASB reactor with neat sketch.	*10*	*K2*	*CO5*
36.	a)	Show the various zones of pollution in river stream and also draw the typical oxygen sag curve with physical indices.	*10*	*K2*	*CO6*
		OR			
	b)	With help of a diagram, explain the working of a standard rate sludge digester.	*10*	*K2*	*CO6*