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| Question Paper Code | 13952 |
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B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2025
 Fifth Semester
Civil Engineering
20CEPC502 - PUBLIC HEALTH AND SANITATION ENGINEERING
 Regulations - 2020

Duration: 3 Hours

Max. Marks: 100

PART - A (MCQ) (10 × 1 = 10 Marks)

Answer ALL Questions

| | <i>Marks</i> | <i>K- Level</i> | <i>CO</i> |
|--|--------------|---------------------|-----------|
| 1. The design period for water supply projects is generally taken as (a) 10 -15 Years (b) 15–30 years (c) 30–50 years (d) 50–75 years | 1 | K1 | CO1 |
| 2. The desirable pH of drinking water as per BIS (IS 10500) standards is: (a) 6.0 – 7.0 (b) 6.5 – 8.5 (c) 7.0 – 9.0 (d) 6.0 – 8.0 | 1 | K1 | CO1 |
| 3. The most commonly used method for analyzing water distribution networks is (a) Hardy Cross method (b) Newton-Raphson method (c) Graphical method (d) Moment distribution method | 1 | K1 | CO2 |
| 4. Centrifugal pumps are generally used for (a) Low discharge and high head (b) High discharge and low head (c) Low discharge and low head (d) High discharge and high head | 1 | K1 | CO2 |
| 5. The principle of sedimentation in a water treatment plant is based on (a) Difference in particle size (b) Difference in specific gravity between water and suspended solids (c) Chemical reaction between coagulant and water (d) Adsorption of impurities on sand grains | 1 | K1 | CO3 |
| 6. The primary function of a disinfection unit is to: (a) Remove dissolved solids (b) Destroy disease-causing microorganisms (c) Remove color and odor (d) Reduce hardness | 1 | K1 | CO3 |
| 7. The Biochemical Oxygen Demand (BOD) of typical domestic sewage lies in the range of: (a) 10–30 mg/L (b) 50–300 mg/L (c) 400–700 mg/L (d) 1000–2000 mg/L | 1 | K1 | CO4 |
| 8. Infiltration into sewers is caused by (a) Leakage through pipe joints and cracks (b) Excessive rainfall (c) Industrial discharge (d) Overflow of manholes | 1 | K1 | CO4 |
| 9. The function of an activated sludge process is to: (a) Remove coarse solids (b) Convert dissolved and colloidal organic matter into biomass (c) Remove toxic gases (d) Disinfect treated water | 1 | K1 | CO5 |
| 10. Anaerobic digestion of sludge results in the production of: (a) Carbon monoxide (b) Methane-rich biogas (c) Ammonia (d) Nitric oxide | 1 | K1 | CO6 |

PART - B (12 × 2 = 24 Marks)

Answer ALL Questions

| | | | |
|--|---|----|-----|
| 11. List four factors affecting per capita water demand. | 2 | K1 | CO1 |
| 12. State the effects when each of the following substances exceeds the prescribed limits in a water sample. A) Nitrates B) Fluorides. | 2 | K1 | CO1 |
| 13. What are the two type of Intake according to their position? | 2 | K1 | CO2 |
| 14. Enumerate the various types of joints used in cast iron pipes. | 2 | K2 | CO2 |
| 15. What are the various methods of disinfection available? | 2 | K1 | CO3 |
| 16. Enumerate the chemicals which are used for coagulation. | 2 | K2 | CO3 |
| 17. What is meant by appurtenances? | 2 | K1 | CO4 |
| 18. Under what circumstances, pumping is required for sewerage system. | 2 | K1 | CO4 |

19. List the treatment technologies functions under the “Attached Growth” principle. 2 K1 CO5
20. In a BOD test, initial DO of the 2% diluted sample is 6 mg/l and after 5 days incubation, final DO is 2 mg/l. Estimate the BOD of the sewage sample. 2 K2 CO5
21. Why it is necessary to find sludge volume index in sewage disposal? 2 K1 CO6
22. Define the term ‘sludge conditioning’. 2 K1 CO6

PART - C (6 × 11 = 66 Marks)

Answer ALL Questions

23. a) Explain the way to analyze the physical characteristics of water sample. Give the desirable and permissible limits from IS10500-2012. 11 K2 CO1

OR

- b) A master plan is to be developed for a town before 2025. Predict the population for the years 2020 and 2025 using arithmetic and geometrical increase methods. Comment on the differences in results and implications for the town. 11 K2 CO1

| Year | 1970 | 1980 | 1990 | 2000 | 2010 |
|------------|----------|----------|----------|-----------|-----------|
| Population | 3,50,450 | 4,65,500 | 9,96,000 | 16,60,000 | 18,25,000 |

24. a) Explain in details the factors to be considered for selection of pumps and Pipe materials. 11 K2 CO2

OR

- b) In a water supply scheme to be designed for serving a population of 12 lakhs. The storage reservoir is situated at 9 km away from the city and the loss of head from the source to city is 19.5 m. Calculate the size of the supply main by using Darcy – Weisbach formula. Assuming a maximum demand of 150 lpcd and 2/3 of the daily supply to be pumped in 10 hours. Assume friction factor (4f) for the pipe material as 0.02 in weisbach formula. 11 K2 CO2

25. a) Explain the working principle of trickling filters with a neat sketch and give the formula for finding efficiency. 11 K2 CO3

OR

- b) Explain the working principles and design considerations of primary sedimentation tanks. 11 K2 CO3

26. a) Describe different types of sewer materials, their properties, advantages, and limitations. 11 K2 CO4

OR

- b) Discuss in detail sewer appurtenances with neat sketches. 11 K2 CO4

27. a) Illustrate the construction, operation and maintenance of waste stabilization ponds. 11 K2 CO5

OR

- b) Explain about the construction and working principle of UASB with a sketch. 11 K2 CO5

28. a) Compare various sludge disposal methods with their advantages and limitations. 11 K2 CO6

OR

- b) Explain how sludge management can contribute to sustainable sanitation in urban areas. 11 K2 CO6