



Fourth Semester B.E. Degree Examination, Dec.2024/Jan.2025
Water Supply and Treatment Engineering

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Assume any suitable missing data.

Module-1

- 1 a. Justify the need for protected water supply. (05 Marks)
- b. Explain Master Plan method or zoning method of forecasting population. (05 Marks)
- c. If the design population of a town is 1,50,000 having average water consumption rate of 150 LPCD, estimate the maximum daily demand, hourly demand, fix demand and coincident demand. (10 Marks)

OR

- 2 a. Write a note on design period and factors governing the design period. (06 Marks)
- b. Define per Capita demand. Also list the factors affecting the per capita demand. (04 Marks)
- c. The population of a certain town from 1970 to 2010 is as given below. Find out the population after two and three decades beyond the last known decade by :
 (i) Arithmetical increase method
 (ii) Geometrical increase method and
 (iii) Incremental Increase method :

Year	1970	1980	1990	2000	2010
Population	45000	48000	54000	62000	67000

(10 Marks)

Module-2

- 3 a. Enumerate the difference between surface and sub surface sources. (04 Marks)
- b. Give the acceptable and permissible limits as per IS 10500 : 2012 drinking water quality standards for below :
 (i) pH
 (ii) Total Hardness
 (iii) Chlorides
 (iv) Nitrates
 (06 Marks)
- c. With the aid of neat sketches, explain the following :
 (i) River Intakes
 (ii) Canal Intakes
 (10 Marks)

OR

- 4 a. List the types of aerators. Explain any one type in detail. (06 Marks)
- b. Mention the factors governing the selection of a particular source of water. (04 Marks)
- c. Write down a flow chart of a typical water treatment plant and explain each unit with its specific role in the water treatment process. (10 Marks)

Module-3

- 5 a. Explain the jar test step by step procedure to determine optimum dosage of coagulants. (05 Marks)
- b. At a water treatment plant serving 50000 people at the water supply rate of 180 litres per capita per day, 50 tones per annum of Alum is used. Find
 (i) Daily requirement of Alum
 (ii) Alum dosage applied in mg/lit. (05 Marks)
- c. Design a rectangular sedimentation basin to treat 2.5 million litres of raw water per day. The detention period may be assumed to be 3 hrs. (10 Marks)

OR

- 6 a. Differentiate between rapid sand filters and slow sand filters. Also explain the operational troubles in rapid sand filters. (10 Marks)
- b. Design a set of 6 rapid sand filters for treating water at water works, which has to supply water to a town of population of 1,50,000 with the water supply rate of 200 lpcd. Also consider one unit out of 6 units will be kept as stand by unit. (10 Marks)

Module-4

- 7 a. Explain break point chlorination with the aid of neat graph. (10 Marks)
- b. Calculate the amount of Pure Lime and Soda (85% pure) required for the treatment of 40 m³ of water, whose analysis is as follows :
 $\text{Ca}(\text{HCO}_3)_2 = 48.0 \text{ PPM}$, $\text{Mg}(\text{HCO}_3)_2 = 40.0 \text{ PPM}$
 $\text{MgSO}_4 = 35.0 \text{ PPM}$, $\text{CaSO}_4 = 37.5 \text{ PPM}$
 $\text{MgCl}_2 = 25.0 \text{ PPM}$, $\text{NaCl} = 10.0 \text{ PPM}$
 $\text{Fe}_2\text{O}_3 = 40.0 \text{ PPM}$, $\text{SiO}_2 = 30.0 \text{ PPM}$
 (10 Marks)

OR

- 8 a. Explain Zeolite process. Give its advantages and disadvantages. (10 Marks)
- b. Chlorine usage in the treatment of 25000 m³/day is 9 kg/day. The residual chlorine after 10 min contact is 0.2 mg/lit. Calculate the dosage in milligrams per litre and the chlorine demand of water. (06 Marks)
- c. Explain the Nalagonda Technique of defluoridation process. (04 Marks)

Module-5

- 9 a. Give the comparison of Reciprocating Pumps with the centrifugal pumps. (06 Marks)
- b. Write a note on the Economical Diameter of the pumping mains. (04 Marks)
- c. List and explain the different methods of distribution of water. (10 Marks)

OR

- 10 a. With the aid of neat diagrams, explain the following :
 (i) Air relief valve
 (ii) Fire hydrant. (10 Marks)
- b. Write down the factors affecting the selection of pipe materials. (04 Marks)
- c. Explain any two water distribution layouts with their advantages and disadvantages. (06 Marks)
