



- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Diagrams and chemical equations should be given whenever necessary.
 11. Illustrate your answers whenever necessary with the help of neat sketches.
 12. Use of non programmable calculator is permitted.

1. a) Explain the various types of water demand. Explain the various factors affecting the water demand. **6**

- b) Determine the population of a city in 2031 by arithmetic increase method & Geometric increase method. **8**

The data from census record for the city is as follow.

Year	1961	1971	1981	1991	2001
Population in thousand	87	110	145	180	210

OR

2. a) What are the different sources of water? Explain any two sources with the help of neat sketches. **6**

- b) What are the intake structures? Explain with the help of neat sketch "RIVER INTAKE". **8**

3. a) Explain following pipes with their advantages & Disadvantages **any two**. **6**

- a) Cast iron pipe
- b) Steel pipe
- c) Plastic pipe

- b) In a supply scheme to be design service population of 4lakh storage reservoir is situated at 8 km away from the source to city is 16m. Calculate size of supply main using Weisbach and Hazen's Williams Formula, Assuming maximum dialy demand of 200 Lpcd and half of dialy supply is to be pumped is 8 hours. Assume coefficient of Friction is 0.012 & CH = 130. **7**

OR

4. a) Estimate the size of supply conduits Leading to an adequate service reservoir for small town having population of 25,000 and water supply rate of 135 lpcd. Also Find hydraulic gradient at which pipeline are proposed to be laid. Assume suitable data. **6**

- b) Explain with a neat sketch the working of centrifugal pump. 7
5. a) Draw a flow sheet of conventional water treatment plant & explain the function of each unit. 6
- b) Design a cascade aerator for a capacity of 15 MLd. Take velocity at inlet pipe as 1.2 m/sec. Area requirement for aerator is $0.03 \text{ m}^2/\text{m}^3/\text{hr}$. Numbers of steps as 4 and rise of each step as 0.2m 7

OR

6. a) What is screening? What are the different types of screens used in water treatment. 6
- b) Explain with a neat sketch the working of 'Clariflocculator' 7
7. a) What is sedimentation? State & Explain various factors affecting sedimentation. 6
- b) Design a plain sedimentation tank for a population of 2 lakh with water supply rate 200 Lpcd. Assuming detention period = 60 Minutes velocity = 50cm/min and depth = 3.5M. 8

OR

8. a) Draw a neat sketch of Rapid sand Filter & explain the working and cleaning. 6
- b) Determine the numbers of beds and size of bed for slow sand filter for a city with population of 1,50,000 and average demand of 200 Lpcd. 8
9. a) State various types of disinfectants used in water treatment. State advantages and disadvantages of chlorine as disinfectant. 6
- b) Calculate the quantity of bleaching powder required per day for disinfecting 4 million liters / day. The dose of chlorine has to be 0.5 p.p.m. and the bleaching powder contains 30% of available chlorine. 7

OR

10. a) Explain with the help of neat sketches the Lay-out of distribution system. 6
- b) With a Neat sketch explain surface Reservoir. 7
11. a) Explain the classification of solid waste on the basis of source of generation. 6
- b) Discuss the various methods of collection of solid waste. 7

OR

12. a) Explain in details 'sanitary landfill'. 6
- b) What are the points to be considered while selecting the site for sanitary land filling? 7
