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## Sixth Semester B.E. Degree Examination, July/August 2022 Water Supply and Treatment Engineering

Time: 3 hrs.

Max. Marks: 100

**Note: Answer any FIVE full questions, choosing ONE full question from each module.**

### Module-1

- 1 a. Explain the need and importance of protected water supply to a community. (05 Marks)  
b. List different methods of population forecasting. Explain briefly any two methods. (15 Marks)

**OR**

- 2 a. List the various types of water demand. Explain them in brief. (10 Marks)  
b. The population of 5 decades from 1980 to 2020 are given below in the table. Find out the population after one, two and three decades beyond the last known decade, by using arithmetic increase method and geometric increase method.

Year	1980	1990	2000	2010	2020
Population	250000	280000	340000	420000	470000

(10 Marks)

### Module-2

- 3 a. What are the objectives of water treatment? Draw a flow chart of conventional water treatment plant. (10 Marks)  
b. Classify various sources of water and explain briefly their suitability with respect to quality and quality for a town. (10 Marks)

**OR**

- 4 a. Define sampling of water. Briefly explain the different sampling methods. (10 Marks)  
b. Explain the significance and give the maximum permissible limits as per the BIS for the following water quality parameters :  
i) Hardness ii) Fluoride iii) Nitrate iv) Iron v) pH. (10 Marks)

### Module-3

- 5 a. Explain theory of sedimentation with help of neat sketch. List the various coagulants used for sedimentation aided with coagulation. (10 Marks)  
b. The maximum daily demand at a water purification plant has been estimated as 12 million liters per day. Design the dimensions of a suitable sedimentation tank (fitted with mechanical sludge removal arrangements) for the raw supplies, assuming a detention period of 6 hours and the velocity of flow as 20cm per minute. (10 Marks)

**OR**

- 6 a. Explain the working and back washing of rapid sand gravity filter with the help of neat sketch. (10 Marks)  
b. Design six slow sand filter beds from the following data :  
Population to be served = 50,000 persons  
Per capita demand = 150 liters/head/day  
Rate of filtration = 180 liters/hr/sq m  
Length of each bed = Twice the breadth  
Assume maximum demand as 1.8 times the average daily demand. Also assume that one unit, out the six will be kept as stand by. (10 Marks)



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**Module-4**

- 7 a. Explain the zeolite process of softening of water. (10 Marks)  
b. List the different methods of disinfection. Explain any two methods. (10 Marks)

**OR**

- 8 a. Explain Reverse Osmosis and nanofiltration process. (10 Marks)  
b. List the different defluoridation techniques. Explain any one method. (10 Marks)

**Module-5**

- 9 a. Enumerate the types of intake structures. Explain the factors to be considered in selection of intake structures. (10 Marks)  
b. Explain methods of distribution system. (10 Marks)

**OR**

- 10 a. Write short notes on :  
i) Pipe appurtenances  
ii) Pipe materials. (10 Marks)  
b. A centrifugal pump driven by an electric motor lifts water through a total height of 50 meter from the reservoir to the discharge end. The pump efficiency is 77 percent and the motor efficiency is 85 percent. The lift is through 300 meters length of 10cm diameter pipe and the pumping rate is 1500 liters per minute. IF  $4f = 0.025$  and power costs 25 paisa per kilowatt hour. What is the cost of power of pumping four million liters of water? (10 Marks)

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