

CBCS SCHEME

USN

--	--	--	--	--	--	--	--	--	--

18CV46

Fourth Semester B.E. Degree Examination, Jan./Feb. 2021
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. Enumerate points to be considered for water supply scheme. (04 Marks)
 b. What is meant by Per Capita Demand? List and discuss the factors that affect the per capita demand. (08 Marks)
 c. Compute the fire demand for population of 2,30,000 by various formula. (08 Marks)

OR

- 2 a. With the help of a neat sketch, explain in detail the variations in demand of water. (10 Marks)
 b. The following population data are available for a town. Estimate the probable population in the years 2021 and 2031 by geometrical and incremental increase methods.

Year	1971	1981	1991	2001
Population	80,000	1,20,000	1,68,000	2,28,000

(10 Marks)

Module-2

- 3 a. Explain the objectives of water treatment. (06 Marks)
 b. Discuss the complete sequence of water treatment plant with a flow diagram. (07 Marks)
 c. Discuss on surface and subsurface water sources with regard to their quality and quantity. (07 Marks)

OR

- 4 a. What are the objectives of Water Quality Management? (04 Marks)
 b. Mention the maximum permissible limits as per BIS of the following water quality parameters and write the problem caused if the limit is exceeded i) Hardness ii) pH iii) Nitrate iv) Fluoride v) Turbidity. (10 Marks)
 c. Explain the method of Sampling of water. (06 Marks)

Module-3

- 5 a. What are the characteristics of a Good Coagulant? (04 Marks)
 b. Briefly explain mechanism of filtration. (08 Marks)
 c. 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 velocity of flow as 20cm/min. (08 Marks)

OR

- 6 a. Briefly explain design elements of a rectangular sedimentation tank. (06 Marks)
 b. With a neat sketch, explain the working process of a slow sand filter. (07 Marks)

1 of 2

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

18CV46

- c. Design 6 slow sand filter beds from the following data ;
i) Population to be served = 60,000 ii) Per capita demand = 125L/Capita/day
iii) Rate of filtration = 180L/hr/m² iv) Length of each bed = 2(Breath).
Assume maximum demand on 1.8 average daily demand , also assume that 1 unit out of 6 will be kept as stand by. (07 Marks)

Module-4

- 7 a. What is Permanent Hardness? With the help of chemical formula, explain Zeolite process of removing hardness. (08 Marks)
b. Explain Reverse Osmosis principle, with the help of a neat sketch. (04 Marks)
c. Compute the quantities of lime and soda ash required to soften raw water containing alkalinity of 220mg/lt. Hardness as CaCO₃ = 40mg/lt and Magnesium sulphate = 60 mg/lt. Water required to be treated is 1 million litres. Given Molecular weight of CaCO₃ = 100 , Ca(OH)₂ = 74 , MgSO₄ = 120 , CaCl₂ = 111 , Na₂CO₃ = 106. (08 Marks)

OR

- 8 a. Discuss the importance of Nano filtration and explain different forms of chlorination. (08 Marks)
b. Enumerate importance of defluoridation. Mention the methods of defluoridation. (06 Marks)
c. Calculate the quantity of bleaching powder required per day for disinfecting 4 million litres per day. The dose of chlorine has to be 0.5 PPM and the bleaching powder contains 30% of available chlorine. (06 Marks)

Module-5

- 9 a. Briefly explain Economical diameter of raising main. (04 Marks)
b. List the advantages and disadvantages of dead end system. (06 Marks)
c. For a water supply of a town, water is pumped from a river 2km away into a reservoir. The maximum difference of levels of water in river and reservoir is 25m, the population of the town is 80,000 and per capita water demand is 125 lit/day. If pumps are to operate for a total of 8 hours and the efficiency of the pump is 80%. Determine the horse power of the pumps. Assume friction factor as 0.03 and velocity of flow as 2m/sec and maximum daily demand is 1.5 times the average daily demand. (10 Marks)

OR

- 10 a. Differentiate between continuous and intermittent system of water supply. (04 Marks)
b. Write short notes on :
i) Reflux valve ii) Fire hydrant
iii) Corrosion of pipes iv) Air valve. (16 Marks)
