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18CV46

Fourth Semester B.E. Degree Examination, July/August 2021
Water Supply and Treatment Engineering

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. Explain the importance and need for protected Water supply. **(05 Marks)**
   b. Enumerate the five demand in Water supply. **(05 Marks)**
   c. The population of a city in three consecutive years i.e 1991, 2001 and 2011 is 80,000, 2,50,000 and 4,80,000 respectively. Estimate the probable population in the 2031 by geometrical and Incremental Increase methods. **(10 Marks)**

2 a. Discuss on the points to be considered in protected water supply system. **(05 Marks)**
   b. Explain the factors affecting per capita demand briefly. **(05 Marks)**
   c. The following population dates is available for a town. Estimate the probable population in the year 2051 by Arithmatic and Incremental Increase method. **(10 Marks)**

Year	1981	1991	2001	2011
Population	80,000	1,20,000	1,68,000	2,28,000

3 a. Discuss on the objectives of sampling and preservative techniques. **(06 Marks)**
   b. Explain briefly physical and chemical water quality characteristics. **(06 Marks)**
   c. Give the maximum possible limits as per BIS for Total hardness , Fluoride , Nitrate and Iron. **(08 Marks)**

4 a. What are the objectives of water treatment? Draw a flow chart of conventional water treatment plant and indicate various units. **(10 Marks)**
   b. Explain various sources of water and its suitability with respect to quantity and quality for a town. **(10 Marks)**

5 a. What is Coagulation of water? Estimate the quantity of alum required per month at a treatment plant to treat 10MLD of water with alum dosage of 20mg/litre. **(06 Marks)**
   b. Explain briefly the Mechanism of Filtration. **(06 Marks)**
   c. The maximum daily demand at a water purification plant has been estimated as 12MLD. Design the dimensions of a suitable sedimentation tank (Filled with mechanical sludge removal arrangements) for the water supplies. Assuming a detention period of 6 hours and the velocity of flow as 20cm/minute. **(08 Marks)**

6 a. Explain with a neat sketch, the working of a Rapid sand filter. **(05 Marks)**
   b. Discuss on various Constituents and Coagulation sedimentation tank. **(05 Marks)**
   c. Design a set of 10 slow sand filter units to treat water for a town of 2 lakh population with assured water supply of 135 ℓpcd and maximum daily water is 1.5 times the average demand. The rate of filtration is 200 litres per square meter per hour. **(10 Marks)**

7 a. Explain the objectives of Water softening. **(05 Marks)**
   b. Discuss on the reverse Osmosis process of Softening of water. **(05 Marks)**
   c. Estimate the quantity of Zeolite required to soften 2 MLD of water with hardness 360mg/h which should be reduced to 60mg/ℓ. The interval between successive regeneration is 4 hours and the capacity of exchanger is 24000 gram/Cu-m. **(10 Marks)**

8 a. Give a comparison of Lime soda and Zeolite process in softening of water. **(05 Marks)**
   b. Discuss on disinfection of water and requirement of a good disinfectant. **(05 Marks)**
   c. A college hostel having 800 students used well water for drinking. The rate of water supply is 120 Lpcd. The water to be disinfected using bleaching powder containing 30% chlorine available. Determine the monthly requirement of bleaching powder with the following data :
     i) Chlorine demand of well water = 1.2mg/litre.
     ii) Residual chlorine expected = 0.2mg/litre. **(10 Marks)**

9 a. Explain the basic requirements of Good distribution systems. **(05 Marks)**
   b. Discuss on types of Pumps. **(05 Marks)**
   c. For water supply of a town, water is pumped from a river 3km away into a reservoir. The maximum difference of levels in river and reservoir is 20m. The population of the town is 50,000 and per capita demand is 120 Lpcd. If pumps are to operate for a total of 8 hours and the efficiency of pumps is 80%, determine the horse power of the pumps. Assume the average daily demand is 1.5 times the average f' = 0.03 and V = 2m/sec. **(10 Marks)**

10 a. Explain the basic requirement of good hydrant. **(05 Marks)**
   b. Discuss on various methods of water distribution. **(05 Marks)**
   c. Explain with a neat sketch, Service Reservoir. **(10 Marks)**

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