B. M. S. College of Engineering, Bengaluru - 560019

Autonomous Institute Affiliated to VTU

October 2023 Semester End Main Examinations

Programme: B.E.   Semester : IV
Branch : CIVIL ENGINEERING   Duration: 3 hrs.
Course Code: 19CV4PCWSE   Max Marks: 100
Course: WATER SUPPLY ENGINEERING

Instructions:

1. **Answer any _FIVE_ full questions from the following**
2. Missing data may be assumed suitably.

UNIT - I

1. a) Define per capita water demand? Enumerate the factors affecting the same. **06**

    b) For the following data given below, estimate the future population of a city in the year 2042 by (i) AIM, (ii) GIM, and (iii) IIM. Comment on their relative merits and demerits of each method. **08**

Year	1972	1982	1992	2002	2012
Population	81,420	12,5000	1,70,000	2,20,000	2,30,000

    c) Explain the need and importance for planned water supply scheme to town. **06**

UNIT – II

2. a) Describe an Intake structure. Illustrate with a neat sketch, a river intake structure along with various components. **06**

    b) Compare surface and underground sources of water with regard to quantity and quality. **06**

    c) Water is to be supplied to a town with one lakh population at the rate of 150lpcd from a river 2.0km away. The difference in elevation between the lowest level in the sump & reservoir is 36m. If the demand has to be supplied in 8 hours, determine the size of the main and BHP of the pumps required. Assume maximum demand as1.5times the average demand and f=0.0075 Take velocity in the pipe as 2.4m/sec and efficiency of pump as 80%. **08**

UNIT – III

3. a) Mention maximum acceptable limits for the following and also explain their undesirable ill effects, if the limit is exceeded in drinking water supply as per BIS
        (i) Chlorides (ii) Turbidity (iii) Fluorides (iv) Nitrates (v) Arsenic **10**

b) Discuss the objectives of physical, chemical and microbiological examination of water. **10**

<div align="center">**OR**</div>

4. a) Explain the various waterborne diseases and their control **06**

   b) Explain the different physical, chemical and bacterilogical tests conducted on water. **10**

   c) Discuss the concept of safe, Wholesome and palatability of water. **04**

<div align="center">**UNIT - IV**</div>

5. a) Discuss major design parameters involved in design of sedimentation tank. **10**

   b) Elucidate the Laboratory procedure recommended to determine the "optimum dosage" of coagulant with neat diagram. **06**

   c) Summarise the objectives of Aeration of water and explain cascade type of Aeration **04**

<div align="center">**UNIT - V**</div>

6. a) Design 6 Slow Sand Filters (SSF) beds from the following data:
   Population to be served: 50000, Per capita demand: 150 L/h/d, rate of filter: 180 L/h/sq.m, Length of each bed = two times the breadth. Assume maximum demand as 1.8 times average daily demand. Also assume one unit out of six units will be kept as stand by **10**

   b) Discuss the operational troubles associated with rapid sand filters and suggest possible remedial measures. **10**

<div align="center">**OR**</div>

7. a) Enumerate various forms of application of chlorine? Describe Breakpoint Chlorination. **10**

   b) A municipal water treatment plant of design capacity 250million liters/day is using bleaching powder as a disinfectant which contains 22% available chlorine. The chlorine dosage determined from chlorine demand test to ensure 0.20mg/lit residual, is 1.40mg/lit. Determine daily requirement of bleaching powder in tonnes **10**

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