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Question Paper Code : 40572

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2021.

Fourth/Fifth Semester

Civil Engineering

EN 8491 – WATER SUPPLY ENGINEERING

(Common to Environmental Engineering)

(Regulations 2017)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is meant by design period?

2. Compare and contrast between infiltration gallery and infiltration well.

3. State any two factors to be considered while selecting a suitable site for an intake if the source is a perennial river.

4. What is meant by economic diameter of a pumping main?

5. Gentle mixing is preferable in flocculator – Justify.

6. State the objectives of aeration process in water treatment.

7. Distinguish between ultrafiltraion and nanofiltration.

8. What is meant by adsorption?

9. What role does service reservoir play in water distribution system?

10. Mention any two software pertaining to design and analysis of a water distribution network.

PART B — (5 × 13 = 65 marks)

11. (a) The population of a town as per past census records is furnished below. Forecast the population in the year 2031 and 2041 using the following methods : (13)

(i) Geometrical increase method

(ii) Incremental increase method

(iii) Graphical method.

Census Year :	1941	1951	1961	1971	1981	1991	2001	2011
Population :	34642	40487	46816	55859	61458	68543	76145	104520

Or

(b) Explain the various physico-chemical characteristics of water and write the biological quality standard for drinking water as per IS10500-2012. (13)

12. (a) What are the factors to be considered in the selection of pipe material for water transmission? Explain any four pipes used for conveyance of water. (13)

Or

(b) A centrifugal pump is installed in a water supply system with a population of 65000 at a per capita water supply rate of 90 Lpcd to raise water from one reservoir to another. The water surface elevation in the first reservoir is 150 m and that in the second reservoir is. 200 m. The pipeline connecting the reservoir is 3.9 km and the flow velocity in the pipe line as 1.2 m/s. Design the size of the pumping main. Also calculate the power requirement of motor by assuming overall efficiency as 80%. What will be the annual energy consumption charges? Assume CM value of pipe as 120 and energy charge per unit is Rs.5/-. (13)

13. (a) Explain the various unit operations and processes pertaining to surface water treatment with the help of a flow diagram. (13)

Or

(b) Design a flash mixer with various components for a proposed water treatment plant of 25 ML/d capacity. Also draw the schematic diagram for the design unit. (13)

14. (a) Explain the working principle of a water softening plant with the help of a flow diagram and briefly outline the design procedure. (13)

Or

(b) Explain the various methods of removing excess Iron and Manganese from Ground water. (13)

15. (a) A town requires a water supply of 6 ML/d. Estimate the storage capacity of service reservoir required for the demand shown in the table for 16 hours continuous pumping from 4.00 am. Also express the capacity as percentage of daily demand.

Time in hours :	0-4	4-5	5-7	7-9	9-12	12-14	14-16	16-20	20-24
Demand/hour :	0.25a	1.25a	2.25a	1.50a	1.25a	1.00a	1.75a	1.00a	0.25a

Here 'a' is the average demand of water per hour. (13)

Or

(b) Draw a sketch and label the parts of a water supply service connection from the street main to a residential building and state the functions of each fitting. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Design a clari-flocculator with various components for a proposed water treatment plant of 60 ML/d capacity. The viscosity of water and paddle tip velocity are 0.89×10^{-3} Ns/m^2 and 0.60 m/s respectively. (15)

Or

(b) Find the flows in each pipe in the Loop shown in Fig.1.Use Hardy Cross method for analyzing the Loop. Consider C_H as 100 for all pipes. (15)

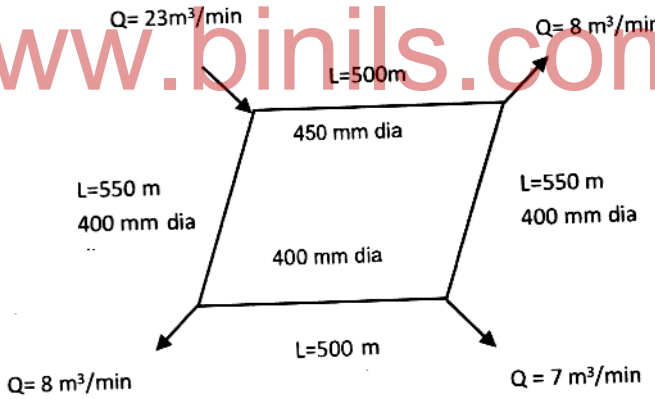

Fig. 1