Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 70640

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

Fourth/Fifth Semester

Environmental Engineering

EN 8491 — WATER SUPPLY ENGINEERING

(Common to Civil Engineering)

(Regulations 2017)

Time : Three hours   Maximum : 100 marks

(Assume Suitable data, if missing)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. State the permitted values as per IS 10500 : 2012 for Total dissolved solids and pH.

2. What is design period?

3. What is meant by intake?

4. Enlist different types of joints in pipe.

5. Why aerators are provided in the water treatment plant?

6. What is Chlorination?

7. State the methods of defluoridation.

8. List down RO reject Management techniques.

9. What are the continuous and intermittent system of distribution?

10. Mention the importance of air relief valve.

PART B — (5 × 13 = 65 marks)

11. (a) Population data for a Town is given in following table. Estimate population in 2041 and 2051 and by using arithmetical increase and increment increase method. (13)

Year	Population in 1000
1981	90
1991	110
2001	125
2011	140
2021	160

Or

(b) Enumerate and explain the characteristics of water and state their environmental significance.

12. (a) Design a bell mouth canal intake for a city of 125000 persons. From a canal which is running 10 hours a day depth 1.5 m. Also calculate head loss in intake conduit if the treatment works are 1 km away from intake. Average consumption is 135 liters/day/capita. Velocity through screen is 15 cm/s and bell mouth 30 cm/s respectively. (13)

Or

(b) (i) Explain how head loss is calculated in pipe? (7)

(ii) Compare 'Reciprocating' and 'Centrifugal pumps'. (6)

13. (a) Explain the working principle of rapid sand filter with a neat sketch.

Or

(b) Design a Clariflocculator for a WTP of 50 MLD capacity with suitable design criteria.

14. (a) Draw a neat sketch of DM plant and explain its working principle.

Or

(b) Explain the various methods of Iron and Manganese removal.

15. (a) Explain the various types of water distribution networks.

Or

(b) Explain the various components of a house service connection with suitable diagram.

PART C — (1 × 15 = 15 marks)

16. (a) Design a flash mixer for a proposed WTP for 20 MLD capacity with suitable design criteria. Draw a neat sketch of the unit.

Or

(b) Design a softening plant for the following data :

Raw water hardness : 800 mg/L as $CaCO_3$

Treated water hardness : 50 mg/L as $CaCO_3$

Exchange capacity : 50 kg $CaCO_3/m^3$

Salt requirement : 150 kg/m^3 of resin

Plant capacity : 250 kL/d

Draw a neat sketch of the design unit.

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