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CE212 (R20)

B.TECH. DEGREE EXAMINATION, DECEMBER-2024

Semester III [Second Year] (Regular & Supplementary)

WATER SUPPLY ENGINEERING

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- | | |
|---|-----|
| (a) Classify various types of pipes. | CO1 |
| (b) Differentiate between surface and ground water sources. | CO1 |
| (c) What do you mean by pipe laying? | CO1 |
| (d) List out the types of impurities. | CO2 |
| (e) What are the water borne diseases? | CO2 |
| (f) Define Stoke's law. | CO2 |
| (g) What is a pressure filter? | CO3 |
| (h) List the types of chlorination. | CO3 |
| (i) What are the different methods of disinfection? | CO3 |
| (j) Define reverse osmosis. | CO4 |
| (k) What is a drain valve? | CO4 |
| (l) Classify various distribution systems. | CO4 |
| (m) Define Defluoridation. | CO4 |
| (n) What is Hardy Cross method? | CO4 |

UNIT – I

2. (a) What are the different types of water demand and explain them briefly. (7M) CO1
- (b) Discuss in detail about river, reservoir and canal intakes. (7M) CO1

(OR)

3. (a) Explain briefly about the different materials used for pipes. (7M) CO1
(b) What are the factors affecting per capita consumption and discuss them in detail. (7M) CO1

UNIT – II

4. (a) Discuss in detail about physical and chemical analysis of water. (7M) CO2
(b) Explain briefly water borne diseases. (7M) CO2

(OR)

5. (a) Explain briefly about sedimentation and coagulation. (7M) CO2
(b) Discuss the purposes of aeration. (7M) CO2

UNIT – III

6. (a) Explain in detail about the pressure filters. (7M) CO3
(b) Distinguish between slow sand and rapid sand filters. (7M) CO3

(OR)

7. (a) List out the types of chlorination and discuss them briefly. (7M) CO3
(b) Explain disinfection of water by using different methods. (7M) CO3

UNIT – IV

8. (a) Summarize the advanced methods of water treatment. (7M) CO4
(b) Explain in detail about the membrane filtration in water treatment. (7M) CO4

(OR)

9. (a) Summarize the general requirements of a distribution system. (7M) CO4
(b) List out the types of reservoirs and discuss their functions briefly. (7M) CO4

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CE212 (R20)

B.TECH. DEGREE EXAMINATION, APRIL-2024

Semester III [Second Year] (Supplementary)

WATER SUPPLY ENGINEERING

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- | | |
|---|-----|
| (a) Define a conduit. | CO1 |
| (b) What do you mean by per capita consumption? | CO1 |
| (c) What is an intake? | CO1 |
| (d) Define aeration. | CO2 |
| (e) List out the objectives of water treatment. | CO2 |
| (f) What are the BIS standards of drinking water? | CO2 |
| (g) Define filtration. | CO3 |
| (h) What is disinfection? | CO3 |
| (i) What are the forms of chlorine? | CO3 |
| (j) Define sluice valve. | CO4 |
| (k) What do you mean by ultra-filtration? | CO4 |
| (l) What is the purpose of water meters? | CO4 |
| (m) Classify distribution systems. | CO4 |
| (n) Define water softening. | CO4 |

UNIT – I

2. (a) Discuss the various population forecasting methods. (7M) CO1
- (b) Explain briefly different types of intakes with neat sketches. (7M) CO1

(OR)

3. (a) Classify various types of pumps and explain them briefly. (7M) CO1
- (b) Explain briefly about various types of pipe joints with neat sketches. (7M) CO1

UNIT – II

4. (a) Explain the types of impurities and also their effects on water. (7M) CO2
(b) Summarize BIS standards for drinking water. (7M) CO2

(OR)

5. (a) Discuss in detail about the design aspects of sedimentation tanks. (7M) CO2
(b) Explain the unit operations involved in water treatment. (7M) CO2

UNIT – III

6. (a) Explain briefly about the different methods of disinfection. (7M) CO3
(b) Differentiate between rapid sand and slow sand filters. (7M) CO3

(OR)

7. (a) Design the dimensions of a set of rapid sand gravity filter for treating water required for a population of 2 lakhs. Assured water supply is 200 lpcd. Rapid sand filter should be designed for twice the average flow. Assume any other required data. (7M) CO3
(b) Explain in detail about chlorination and its types. (7M) CO3

UNIT – IV

8. (a) Explain briefly methods of distribution system. (7M) CO4
(b) Illustrate the method of removing temporary and permanent hardness. (7M) CO4

(OR)

9. (a) Explain the various type of valves. (7M) CO4
(b) Discuss in detail about layouts of distribution networks. (7M) CO4

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CE212 (R20)

B.TECH. DEGREE EXAMINATION, DECEMBER-2023

Semester III [Second Year] (Regular & Supplementary)

WATER SUPPLY ENGINEERING

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- | | |
|---|-----|
| (a) What is the role of Environmental Engineer in water supply? | CO1 |
| (b) What is meant by spring? | CO1 |
| (c) Write types of conduits. | CO1 |
| (d) What is the permissible limit of fluorides in water? | CO2 |
| (e) Write any two objectives of water treatment. | CO2 |
| (f) What is meant by sedimentation? | CO2 |
| (g) State the working principle of slow sand filter. | CO3 |
| (h) Mention the demerits of pressure filter. | CO3 |
| (i) Define disinfection. | CO3 |
| (j) What is meant by permanent harness? | CO4 |
| (k) What is meant by reverse osmosis? | CO4 |
| (l) Write any two requirements of ideal distribution systems. | CO4 |
| (m) What is meant by drain valve? | CO4 |
| (n) What is meant by intermittent system? | CO4 |

UNIT – I

2. (a) What are the various types of demand? Explain in detail. (7M) CO1
- (b) Write the various factors affecting selection of location for intake structure. (7M) CO1

(OR)

UNIT – IV

3. (a)

| Year | 1961 | 1971 | 1981 | 1991 | 2001 |
|------------|---------|---------|---------|---------|---------|
| Population | 4450000 | 4800000 | 5400000 | 6200000 | 6700000 |

- Find expected population in the year 2021 by using Arithmetical increase method and Geometrical increase method. (7M) CO1
- (b) Explain various factors affecting choice of pumps. (7M) CO1

UNIT – II

4. (a) List out various impurities and their effects on humans. (7M) CO2
- (b) Draw the neat sketch of treatment flow-sheet for raw water and write objectives of each unit. (7M) CO2

(OR)

5. (a) Write BIS standards for drinking water. (7M) CO2
- (b) Calculate size of a rectangular sedimentation tank to treat 1.8 million litres of raw water per day. Assume surface overflow rate 20000 l/day/m² and detention period 4 hr. (7M) CO2

UNIT – III

6. (a) Explain in detail working process of slow sand filters with neat sketches. (7M) CO3
- (b) What are the various methods of disinfection used in water treatment? Explain in detail. (7M) CO3

(OR)

7. (a) What are the various troubles in rapid sand filters? Explain in detail. (7M) CO3
- (b) Average water consumption rate is 150 lpcd in an urban area. Design a slow sand filter for a community having a population of 10000 at the base year 2068. (7M) CO3

8. (a) What are the various methods used in defluoridation? Explain any two methods in detail. (7M) CO4
- (b) Explain various layouts of distribution system with neat sketches. (7M) CO4

(OR)

9. (a) Explain in detail about membrane filtration technique used in water treatment. (7M) CO4
- (b) Derive equation for analysis of pipe networks by using Hardy cross method. (7M) CO4

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CE212 (R20)

B.TECH. DEGREE EXAMINATION, JUNE-2023

Semester III [Second Year] (Supplementary)

WATER SUPPLY ENGINEERING

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- | | |
|---|-----|
| (a) Define wholesome water. | CO1 |
| (b) What are the fluctuations in water demand? | CO1 |
| (c) What is the minimum quantity of water to be supplied for big cities with fully developed under drainage system? | CO1 |
| (d) What are the different types of joints in pipe? | CO2 |
| (e) Give drinking water standards for fluorides. | CO3 |
| (f) Name the buffer used in the determination of hardness of water. | CO3 |
| (g) What is plain sedimentation? | CO4 |
| (h) List the different chemical used for coagulation process. | CO4 |
| (i) What is the significance of 'Schmutzdeke' in slow sand filters? | CO4 |
| (j) What is the range of rate of filtration for pressure filters? | CO4 |
| (k) What is the percentage of chlorine in fresh bleaching powder? | CO4 |
| (l) In which softening treatment you will get zero hard water? | CO4 |
| (m) When do you prefer dead end system of distribution layout? | CO5 |
| (n) What is the purpose of scour value? | CO5 |

UNIT – I

2. (a) What are the objectives of water supply scheme? How do you achieve them? (7M) CO1
 (b) The population of a locality as obtained from census report is as follows: (7M) CO1

| Census Yr. | 1981 | 1991 | 2001 | 2011 | 2021 |
|------------|----------|----------|----------|-----------|-----------|
| Population | 3,50,000 | 4,66,000 | 9,94,000 | 15,60,000 | 16,23,000 |

Estimate the population of the locality in the years 2031 and 2041 by arithmetic increase method and geometrical increase method.

(OR)

3. (a) Explain the functioning of river intake structure and reservoir intake structure with neat sketch. (7M) CO1
 (b) Design the size of supply main for a town having population of 1.2 lakhs from a reservoir 5 km away, if the head available is 16 m. Use Hazen-William's formula. Take $C_H = 100$. (7M) CO2

UNIT – II

4. (a) Discuss the physical and chemical analysis of water. (7M) CO3
 (b) Discuss the function of each unit of a water supply scheme for river water with a flow diagram. (7M) CO4

(OR)

5. (a) Design rectangular sedimentation tank for 1 lakh population. Assume any other data needed. (7M) CO4
 (b) Explain the jar test for the determination of optimum dosage of coagulant. (7M) CO4

UNIT – III

6. (a) Explain the construction and working of slow sand filter with a sketch. (7M) CO4

- (b) Design a set of rapid sand filters for a town of population 2.5 lakhs with an assured water supply at the rate of 200 lpcd. (7M) CO4

(OR)

7. (a) What are the different methods of disinfection? Explain any three methods. (7M) CO4
 (b) Discuss the types of chlorination. (7M) CO4

UNIT – IV

8. (a) Explain lime soda process and zeolite process for the removal of hardness from water. (7M) CO4
 (b) Discuss the requirement and functions of service reservoir. (7M) CO4

(OR)

9. (a) Explain the methods of distribution system. (7M) CO4
 (b) Explain the function and working of the following with suitable diagrams: (7M) CO4
 (i) Sluice valve
 (ii) Reflux valve
 (iii) Hydrants

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CE212 (R20)

B.TECH. DEGREE EXAMINATION, MARCH-2023

Semester III [Second Year] (Regular & Supplementary)

WATER SUPPLY ENGINEERING

Time: Three hours

Maximum Marks: 70

Answer Question No.1 compulsorily. (14 x 1 = 14)

Answer One Question from each unit. (4 x 14 = 56)

1. Answer the following:

- (a) What is design period? CO1
- (b) What is the Freeman's formula for estimating fire demand? CO1
- (c) Which is the most common pump used in municipal water supply scheme. CO2
- (d) Give drinking water standards for nitrates and nitrites. CO3
- (e) The pH value of sample A is 4.65 and that of sample B is 6.45. Which sample is more acidic and by how many times? CO3
- (f) Define Surface Overflow Rate. CO4
- (g) Name the treatment unit in which discrete particles are removed. CO4
- (h) What is the pH range in which alum is most effective as coagulant? CO4
- (i) What is the purpose of aeration? CO4
- (j) What are the functions served by under drainage system in Rapid Gravity Filters? CO4
- (k) Define 'free available chlorine' and 'combined available chlorine'. CO4
- (l) In which softening treatment you will get zero hard water? CO4
- (m) Name the method used for determining the capacity of a balancing reservoir? CO5
- (n) What is the purpose of reflux valve? CO5

UNIT – I

2. (a) What do you mean by per capita demand? Explain various factors that affect per capita demand? (7M) CO1
- (b) Estimate the population for the year 2011, 2021 and 2031 from the following past census data by Geometrical increase method and Incremental increase method. (7M) CO1

| Census Yr. | 1951 | 1961 | 1971 | 1981 | 1991 | 2001 |
|------------|-------|-------|-------|-------|-------|-------|
| Population | 25000 | 27800 | 35000 | 43000 | 52000 | 60000 |

(OR)

3. (a) Compare & contrast the sources of water with reference to its quantity and quality. (7M) CO1
- (b) Explain various steps in laying of water supply pipe line. How do you test it for leakages? (7M) CO2

UNIT – II

4. (a) What are various water borne diseases and list out BIS standards for drinking water quality? (7M) CO3
- (b) Explain most probable number test for determining the biological quality of water. (7M) CO3

(OR)

5. (a) Design a rectangular sedimentation tank for a population of 1,00,000 people with assured water supply of 150 lpcd. Detention time of the tank as 4 hours. (7M) CO4
- (b) What is the principle of coagulation? Explain how alum acts as a coagulant? (7M) CO4

UNIT – III

6. (a) Explain the working and backwashing of rapid sand gravity filters with neat sketch? (7M) CO4
- (b) Design a set of slow sand filters to supply water to a population of 50,000. Water is supplied at the rate of 200 lpcd. The rate of filtration is 150 l/hr/sq.m of filter area. (7M) CO4

(OR)

7. (a) Discuss the action of chlorine as a disinfectant. (7M) CO4
- (b) Explain the forms of application of chlorine for disinfection. (7M) CO4

UNIT – IV

8. (a) Discuss the following: (7M) CO4
- (i) Microfiltration
 - (ii) Ultrafiltration
 - (iii) Nanofiltration
- (b) Explain the Nalgonda technique for the removal of excess fluoride from ground water? (7M) CO4

(OR)

9. (a) Discuss different types of distribution layouts. Mention the merits and de-merits of each layout. (7M) CO5
- (b) Derive relevant equation and discuss step by step procedure for the analysis of a complex distribution network by Hardy-cross method. (7M) CO5

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