SRM VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

V SEMESTER

EN8491-WATER SUPPLY ENGINEERING

Regulation – 2017

Academic Year 2019-2020

Prepared by

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(As per Anna University 2017 Regulation)

SUBJECT CODE/NAME: EN8491-WATER SUPPLY ENGINEERING
SEM/YEAR: V/III

UNIT I - SOURCES OF WATER

Public water supply system -Planning - Objectives -Design period - Population forecasting - Water demand -Sources of water and their characteristics -Surface and Groundwater- Impounding Reservoir- Development and selection of source - Source Water quality - Characterization -Significance-Drinking water quality standards

PART A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Define potable water.	BT-1	Remembering
2.	List out the various reasons for water demand encountered in recent times.	BT-1	Remembering
3.	Define design period.	BT-1	Remembering
4.	Name the drinking water quality standards for any four physic-chemical parameters.	BT-1	Remembering
5.	How to determine the storage need for an impounding reservoir?	BT-1	Remembering
6.	What are the components of water supply system?	BT-1	Remembering
7.	Distinguish between Surface water and Ground water.	BT-2	Understanding
8.	Outline the various sources of water.	BT-2	Understanding
9.	State the objectives of Public water supply scheme.	BT-2	Understanding
10.	Compare and contrast between carbonate and non-carbonate hardness.	BT-2	Understanding
11.	Illustrate the factors affecting per capita water demand.	BT-3	Applying

12.	Rainwater harvesting is the need of the hour-Examine.	BT-3	Applying
13.	Examine various methods by which ground water recharge is accomplished.	BT-3	Applying
14.	Analyze the purposes of carrying out water quality characterization.	BT-4	Analyzing
15.	What do you infer from the term per capita demand?	BT-4	Analyzing
16.	Explain the factors influencing the design period.	BT-4	Analyzing
17.	Write the maximum acceptable limit of the following for the public drinking water. i. Color ii. pH iii. Chlorides iv. Sulphates.	BT-5	Evaluating
18.	Determine the fire demand for a city with a population of 3500 using Freeman's formula.	BT-5	Evaluating
19.	Recommend acceptable quality standards as per BIS 10500: 1983 for fluoride and nitrates.	BT-6	Creating
20.	Summarize the assumptions made in an incremental increase method to forecast population.	BT-6	Creating
21.	Write in brief about the recharge of ground water.	BT2	Understanding
22.	What is water demand? State its types	BT3	Applying
23.	Define per capita demand. How is per capita demand for water calculated?	BT4	Analyzing
24.	Define BOD	BT5	Evaluating
25.	State the purposes of carrying out water quality characterization.	BT6	Creating
	PART B		
1.	i. Describe a few lines about water demand. (3) ii. In two periods each of 20 years a city has grown from 50000 to 110000 and 160000. Tell the population expected in the next 20 years and also the saturation population. (10)	BT-1	Remembering

<table>
<tr><td>2.</td><td>Identify the daily water demand of the city in 2031, if the per capita water demand is 135 Lpcd and the city population records is as given below.
<table>
<tr><td>Census Year</td><td>1950</td><td>1965</td><td>1980</td><td>1995</td><td>2010</td></tr>
<tr><td>Population</td><td>25000</td><td>52000</td><td>94000</td><td>164000</td><td>247000</td></tr>
</table></td><td>BT-1</td><td>Remembering</td></tr>
<tr><td>3.</td><td>The population of a town as per census records is given below. Calculate the population in the year 2020 and 2035 using arithmetical increase method and incremental increase method. Estimate the water demand at 135 LPCD for the year 2035.
<table>
<tr><td>Census Year</td><td>1935</td><td>1955</td><td>1975</td><td>1995</td><td>2015</td></tr>
<tr><td>Population</td><td>39250</td><td>54390</td><td>68010</td><td>83630</td><td>99850</td></tr>
</table></td><td>BT-1</td><td>Remembering</td></tr>
<tr><td>4.</td><td>i. Discuss the factors to be considered in fixing the design period for water supply components. (8)
ii. Discuss about the drinking water quality standards as per BIS. (5)</td><td>BT-2</td><td>Understanding</td></tr>
<tr><td>5.</td><td>i. Briefly discuss about the various types of aquifer’s with neat sketch. (7)
ii. What are the factors influencing the population forecasting? (6)</td><td>BT-2</td><td>Understanding</td></tr>
<tr><td>6.</td><td>The population of a town Panchayat as per past census records are furnished below. Calculate the population in the year 2031 and 2041 using the following methods.
i. Arithmetical increase method (5)
ii. Geometrical increase method (4)
iii. Incremental increase method (4)
<table>
<tr><td>Census Year</td><td>1941</td><td>1951</td><td>1961</td><td>1971</td><td>1981</td></tr>
<tr><td>Population</td><td>35642</td><td>39487</td><td>46816</td><td>57859</td><td>70458</td></tr>
</table>
<table>
<tr><td>Census Year</td><td>1991</td><td>2001</td><td>2011</td></tr>
<tr><td>Population</td><td>78543</td><td>92131</td><td>116500</td></tr>
</table></td><td>BT-3</td><td>Applying</td></tr>
</table>

7.	i. Discuss the factors that affect the rate of water demand (7) ii. Explain about fire demand-its characteristics and the method of estimating it (6)	BT-3	Applying
8.	Describe the different sources of water and their characteristics with respect to Turbidity, Hardness, Chloride and Microbiology.	BT-1	Remembering
9.	i. Classify the different types of springs. (5) ii. With neat sketch, explain how water is drawn from infiltration galleries. (8)	BT-4	Analyzing
10.	Explain the laboratory procedure to determine the chlorides, turbidity, sulphates and odour.	BT-4	Analyzing
11.	Elaborate the public water supply system in accordance with the population forecasting.	BT-5	Evaluating
12.	Summarize various sources of water and give a brief account of the characteristics of water.	BT-2	Understanding
13.	Explain the different methods used for prediction of future population of a city, with reference to the design of a water supply system.	BT-4	Analyzing
14.	i.Present and past populations 20 years and 40 years back for a town are 292000, 172000 and 30000 respectively. Assess the population expected after 40 years using logistic curve method. (7) ii.Explain the factors that affect the rate of water demand. (6)	BT-6	Creating
	PART C		
1.	i. Discuss about the water quality standards available to characterize the drinking water quality. (5) ii. Explain the chemical characteristics of water (10)	BT-2	Understanding
2.	Briefly discuss about the various physic-chemical test on water and write their limitation for domestic and industrial purpose.	BT-1	Remembering
3.	Enumerate and explain the characteristics of surface water and ground water and state their environmental significance.	BT-4	Analyzing

<table>
<tr><td>4.</td><td>i. The population of 5 decades from 1930 to 1970 is given in table. Find out the population after one, two and three decades beyond the last known decade by any three methods? (10)
<table>
<tr><td>Year</td><td>1930</td><td>1940</td><td>1950</td><td>1960</td><td>1970</td></tr>
<tr><td>Population</td><td>25000</td><td>28000</td><td>34000</td><td>42000</td><td>47000</td></tr>
</table>
ii. Explain the various factors that influence the water demand of a community. (5)</td><td>BT-6</td><td>Creating</td></tr>
</table>

UNIT II - CONVEYANCE FROM THE SOURCE

Water supply -intake structures -Functions -Pipes and conduits for water- Pipe materials - Hydraulics of flow in pipes -Transmission main design -Laying, jointing and testing of pipes - appurtenances - Types and capacity of pumps -Selection of pumps and pipe materials.

PART A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Define intake.	BT-1	Remembering
2.	List functions of intake structures.	BT-1	Remembering
3.	List out the various joint's in cast iron pipes.	BT-1	Remembering
4.	Namethe types of intake according to their position.	BT-1	Remembering
5.	How the corrosion of metal pipes is reduced?	BT-2	Remembering
6.	Predict the factors controlling the choice of materials for water conduits.	BT-4	Analyzing
7.	Illustrate the properties of Ductile Iron pipes.	BT-3	Applying
8.	Compare gravity conduits with pressure conduits.	BT-4	Analyzing
9.	What are the advantages and limitations of RCC pipes?	BT-6	Evaluating
10.	Write down the formulae to find out head loss caused by pipe friction.	BT-5	Creating
11.	Define pipe appurtenances and identify their role.	BT-1	Remembering
12.	Highlight the criteria required for the pipe materials in the water supply system.	BT-1	Remembering

13.	Explain about economic diameter of a pumping main.	BT-2	Understanding
14.	How will you calculate total head in the design of pumps for water supply schemes?	BT-3	Applying
15.	Explain the various pipe appurtenances used in water conveyance system.	BT-4	Analyzing
16.	Explain the points to be observed in selecting a pump.	BT-2	Understanding
17.	What is the principle of centrifugal pump and reciprocating pumps?	BT-3	Applying
18.	Estimate the head loss in a C.I transmission main 300mm in diameter and 2 km in length with C=100, when it carries a flow of $10m^3$/min.	BT-2	Understanding
19.	What are the external forces acting on water transmission main if the pipe is laid under heavy traffic?	BT-5	Evaluating
20.	Summarize the situation in which pumps will be connected in i. Series ii. Parallel.	BT-6	Creating
21.	Mention the basis for the selection of types and capacity of pumps.	BT2	Understanding
22.	What is the difference between system curve and pump curve?	BT3	Applying
23.	What is meant by economic diameter of a pumping main?	BT4	Analyzing
24.	List out any two appurtenances in water conveyance system.	BT5	Evaluating
25.	Define Hydraulic ram.	BT6	Creating
	PART B		
1.	i. List out the important considerations which govern the selection of site of an intake structure? (6) ii. Describe the salient features of river intake with the aid of a neat sketch. (7)	BT-1	Remembering
2.	What are the basic requirements of a pipe joint? Describe the various pipe joints with neat sketches.	BT-1	Remembering
3.	Discuss about the wet and dry intake tower to draw water from the reservoir.	BT-2	Understanding
4.	Classify the types of intakes. Also explain the working of a reservoir intake with a neat sketch.	BT-2	Understanding
5.	In a water supply scheme to be designed for serving a population of 4 lakhs, the storage reservoir is situated at 8 km away from the city	BT-3	Applying

	and the loss of head from the source to city is 16 m. Calculate the size of supply main by using Weisbach formula as well as Hazen's formula assuming a maximum daily demand of 180 litres per day per person and half of the daily supply to be pumped in 8 hours. Assume coefficient of friction for the pipe material as 0.012 in Weisbach formula and C_H =130 in Hazen's formula.		
6.	Describe in detail about the Hydraulics of flow in pipes.	BT-4	Analyzing
7.	i. List the requirements of a good piping material. (6) ii.Quantity of water required by a town is 20,000m^3/day. The pumps are working against a total head of 40m, for 8 hours. Total length of the main is 20km, f=0.075. Design the size of the main using Darcy-Weisbach formula. Assume any other data required. (7)	BT-5	Evaluating
8.	i. List the factors to be considered in the selection of Pipe material for water transmission and describe it briefly. (6) ii. Explain the methods of transmission main system. (7)	BT-1	Remembering
9.	What are the different types of pipe materials used in the water transmission?	BT-1	Remembering
10.	Summarize few lines about the functioning of a jet pump with a neat sketch.	BT-2	Understanding
11.	Illustrate the different types of pipe appurtenances used in water supply project.	BT-3	Applying
12.	How to select pumps and pipe materials for water supply systems? Also Discuss the factors which are required to be considered in the selection of the type of a pump.	BT-4	Analyzing
13.	Explain the different types of pumps used in water supplies with a neat sketch.	BT-4	Analyzing
14.	i. Prepare the key features of testing and layingof pipeline. (8) ii. Explain the principle operation of a centrifugal pump with neat sketch. (5)	BT-6	Creating
	PART C		
1.	Mention the points which should be taken into consideration in deciding the location of an intake for the water supply of a large town, the source being a perennial river. Draw a neat sketch of a canal intake and explain the salient features.	BT-6	Creating
2.	Explain the types of Conduits in detail with neat sketches.	BT-1	Remembering

3.	i. Explain briefly the steps involved in water supply pipe line installation. (9) ii. Write brief notes on laying pipe lines and testing of pipelines. (6)	BT-2	Understanding
4.	Give a detailed account on the selection of pumps and pipe materials suitable for the conveyance system.	BT-3	Applying

UNIT - III WATER TREATMENT

Objectives - Unit operations and processes - Principles, functions design of water treatment plant units, Aerators of Flash mixers, Coagulation and flocculation -Clariflocculator-plate and tube settlers-Pulsator clarifier-Sand filters-Disinfection - Residue management-Construction, Operation & Maintenance aspects .

PART A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Define: Detention time and surface over flow rate.	BT 1	Remembering
2.	Give the design criteria for flash mixer and state its use in water supply Scheme.	BT 1	Remembering
3.	List out advantages of rapid sand filter.	BT 1	Remembering
4.	Mention the advantages of chlorine, as disinfectant.	BT 1	Remembering
5.	State the function of sedimentation tanks.	BT 1	Remembering
6.	Examine significance of velocity gradient in flash mixer.	BT 1	Remembering
7.	Differentiate between unit operation and unit process.	BT 2	Understanding
8.	Discuss the significances of velocity gradient in flocculator design.	BT 2	Understanding
9.	Differentiate between sterilization and disinfection.	BT 2	Understanding
10.	Describe the tests to be done to find the residual chlorine in water.	BT 2	Understanding
11.	Illustrate the mechanism of disinfection process.	BT 3	Applying
12.	Discover the factors which depends the dose of coagulants.	BT 3	Applying

13.	Show the layout plan of water treatment plant.	BT 3	Applying
14.	Compare the objectives of Screen chamber and Grit chamber.	BT 4	Analyzing
15.	Explain the factors influencing settling of discrete particles.	BT 4	Analyzing
16.	What are the steps required for the maintenance aspects of water treatment plant?	BT 4	Analyzing
17.	Explain the term coagulation.	BT 5	Evaluating
18.	Rewrite stokes equation for finding settling velocity of particles.	BT 5	Evaluating
19.	Write the nature of any four coagulants.	BT 6	Creating
20.	Summarize about break point chlorination.	BT 6	Creating
21.	What are Flocculators?	BT2	Understanding
22.	How to manage residue in water treatment plant?	BT3	Applying
23.	Define detention time and surface overflow rate for a sedimentation tank	BT4	Analyzing
24.	Classify filter into different categories.	BT5	Evaluating
25.	What are the residues generated from a water treatment plant?	BT6	Creating
	PART B		
1.	i. Develop the design for a rectangular sedimentation tank for 5 MLD flow. (7) ii. Draw and label the parts of the rectangular sedimentation tank(Longitudinal section) indicating the various zones. (6)	BT 1	Remembering
2.	Estimate the volume of a clariflocculator for a proposed water treatment plant with a capacity of 80 ML/d and draw a neat sketch of the unit.	BT 2	Understanding
3.	i. Estimate the settling velocity of a particle of 0.06 mm diameter having specific gravity of 2.65 in temperature of 20˚C. Take kinematic viscosity as 1.007×10^{-6} m^2/ sec. (7) ii. Write the design principles of flash mixer and flocculator.(6)	BT 2	Understanding
4.	Explain about slow sand filter and rapid sand filter with suitable diagram and also write their advantages over them.	BT 4	Analyzing
5.	Show the design of a slow sand filer for a town of population 60000 persons,provided water supply rate of 160 Lpcd. Take	BT 1	Remembering

	filtration rate as 2.5 litersperminute, m^2, L/B ratio as 2, maximum demand as 1.8 times average demand.		
6.	Discuss the design aspects of sedimentation tanks in detail.	BT 2	Understanding
7.	Describe Chlorination and its types. Explain the various process or methods.	BT 4	Analyzing
8.	Show the design of a sedimentation tank for water treatment plant to treat 8 MLD of water. Assume a surface loading rate of $30m^3/m^2/day$. Check the adequacy of detention time. Draw the plan of the water treatment plant.	BT 3	Applying
9.	i. Calculate the average chlorine required per day to treat 150MLD of water. Also calculate the storage required for 60 days. Assume an average chlorine dosage of 5mg/l. (7) ii. Illustrate the various unit operations and unit processes involved in water treatment. (6)	BT 3	Applying
10.	i. Explain the sedimentation by coagulation process using alum and state the merits and demerits of using alum. (7) ii. Examine the quality requirements of a disinfectant? (6)	BT 4	Analyzing
11.	i. Design a flash mixer for a proposed water treatment plant with a capacity of 25 ML/d and draw a neat sketch of the unit. (7) ii. Prepare a short note on "Break Point Chlorination". (6)	BT 5	Evaluating
12.	A new township is to have a population of 6,00,000 and 90 Lpcd of water supply. Find the rapid sand filter unit with details of under drainage and water washingincluding gutter arrangement. Limit the maximum spent backwash water as 3.5%.	BT 1	Remembering
13.	Explain about the process carried out in sedimentation tanks and sand filters during water treatment operation.	BT 1	Remembering
14.	What is disinfection? Identify the factors affecting disinfection? Examine the conventional and modern methods which are used to disinfect water.	BT 6	Creating
	PART C		
1.	i Calculate how many kg of bleaching powder with 25% available chlorine is required daily to treat 5MLD of water with 3mg/L of chlorine? (6) ii With a neat sketch explain briefly about pulsator clarifier.(9)	BT 3	Applying

2.	Show the mechanism of sand filtration. Draw a neat sketch of filter unitsand explain its working principle.	BT 1	Remembering
3.	Explain about the practices adopted in Residue management.	BT 4	Analyzing
4.	i. Explain briefly on Break point chlorination. (9) ii. Discuss the role of sedimentation tank in water treatment. (6)	BT 2	Understanding

UNIT IV - ADVANCED WATER TREATMENT

Water softening - Desalination -R.O plant- demineralization -adsorption-Ion exchange- Membrane Systems-R.O Reject management- Iron and manganese removal- Defluoridation- Construction, Operation & Maintenance aspects-Recent advances-MBR process

PART – A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Define reverse osmosis.	BT 1	Remembering
2.	List out the various types of aerators used in water treatment.	BT 1	Remembering
3.	Define Zeolite process.	BT 1	Remembering
4.	What is meant by adsorption isotherm?	BT 1	Remembering
5.	List any four effects of hardness in water	BT 1	Remembering
6.	How do you regenerate softener?	BT 1	Remembering
7.	Distinguish between physical adsorption and chemical adsorption	BT 2	Understanding
8.	Differentiate between demineralization and desalination.	BT 2	Understanding
9.	Describe about the term water softening.	BT 2	Understanding
10.	What are the recent advances in water treatment process?	BT 2	Understanding
11.	What is the principle of Demineralization by Ion-exchange?	BT 3	Applying
12.	Define Defluoridation.	BT 3	Applying
13.	Examine how to remove iron and manganese from water.	BT 3	Applying

14.	Explain the methods of demineralization.	BT 4	Analyzing
15.	Briefly explain 'Nalgonda Technique'.	BT 4	Analyzing
16.	Summarize the methods of deflouridation.	BT 4	Analyzing
17.	What are Membrane Bioreactors?	BT 5	Evaluating
18.	Rewrite the maximum permissible limit of fluoride in drinking water.	BT 5	Evaluating
19.	Recommend any four methods of desalination process.	BT 6	Creating
20.	Discuss the unit processes applied to remove iron and manganese from water.	BT 6	Creating
21.	How do you protect water treatment plants from corrosion?	BT2	Understanding
22.	Name the effects of excess fluoride content in drinking water.	BT3	Applying
23.	Define RO reject management.	BT4	Analyzing
24.	Show the methods of removing temporary and permanent hardness.	BT5	Evaluating
25.	Write a short note on water-softening by lime-soda process.	BT6	Creating
	PART – B		
1.	Explain the various methods of removing excess Iron and Manganese from Ground water.	BT 4	Analyzing
2.	Describe in detail about the principle and mechanism of desalination process.	BT 1	Remembering
3.	Elaborate, how are defluoridation and demineralisation carried out in the advanced water treatment process.	BT 1	Remembering
4.	What are the effects of excess concentration of Fluoride in water and list the methods available for defluoridation and explain any one of them.	BT 1	Remembering

<table>
<tr><td>5.</td><td>Estimate the volumes of cation and anion exchanger beds to demineralize 0.35 ML/d water that has the following chemical quality.

<table><tr><th>Cations</th><th>Anions</th></tr><tr><td>Ca^{2+} = 30 mg/L</td><td>HCO_3^-= 50 mg/L</td></tr><tr><td>Mg^{2+} = 5 mg/L</td><td>SO_4^{2-} =45 mg/L</td></tr><tr><td>Na^+ = 25 mg/L</td><td>Cl^-=45 mg/L</td></tr><tr><td>K^+ = 10 mg/L</td><td>NO_3^- =10 mg/L</td></tr></table>
The ion exchange capacities of cation and anion exchange resins are 70,000 and 40,000g $CaCO_3/m^3$ cycle, respectively. Also, estimate the required quantities of regeneration chemicals. The regeneration cycle is once per day.</td><td>BT 2</td><td>Understanding</td></tr>
<tr><td>6.</td><td>i. Describe the types of hardness present in water. (5)
ii. Discuss about the Ion exchange method of water softening with a sketch. (8)</td><td>BT 2</td><td>Understanding</td></tr>
<tr><td>7.</td><td>Explain the methods of removing temporary and permanent hardness from water.</td><td>BT 2</td><td>Understanding</td></tr>
<tr><td>8.</td><td>Illustrate a schematic diagram of a DM plant and explain the mechanism of cations as well as anions removal. Also, briefly outline the design procedure.</td><td>BT 3</td><td>Applying</td></tr>
<tr><td>9.</td><td>Explain the Zeolite process for the removal of permanent hardness from water.</td><td>BT 4</td><td>Analyzing</td></tr>
<tr><td>10.</td><td>i. Why and what pretreatment is required in the feed water to RO plant? (8)

ii. Explain the techniques adopted in RO reject management. (5)</td><td>BT 1</td><td>Remembering</td></tr>
<tr><td>11.</td><td>Design a zeolite softener for an industrial establishment working for 2 shifts of 8 hours each for the following data and draw a neat sketch of the unit.
i. Soft water requirement = 2.5 ML/d in 16 hours
ii. Raw water hardness = 800 mg/L as $CaCo_3$
iii. Product water hardness =50 mg/L as $CaCo_3$
iv. Exchange capacity of the resin = 35 kg $(CaCO_3)/m^3$
v. Salt required for regeneration = 50 kg $(NaCl)/m^3$ of resin.</td><td>BT 6</td><td>Creating</td></tr>
<tr><td>12.</td><td>Explain in detail with neat sketches about the Membrane Bioreactor(MBR) process.</td><td>BT 3</td><td>Applying</td></tr>
</table>

13.	Explain the activated carbon treatments and pollutants removed and advantages of the process.	BT 4	Analyzing
14.	Recommend the various techniques involved in defluoridation.	BT 5	Evaluating
	PART C		
1.	Write a note on Iron removal from water for small communities.	BT 6	Creating
2.	Explain the different methods of Water Softening.	BT 4	Analyzing
3.	Write a notes on i. Prasanthi technique (5) ii. Reverse osmosis (5) iii. Nalgonda technique (5)	BT 3	Applying
4.	With neat sketches explain desalination by Electrodialysis method and RO process.	BT 1	Remembering

UNIT V - WATER DISTRIBUTION AND SUPPLY

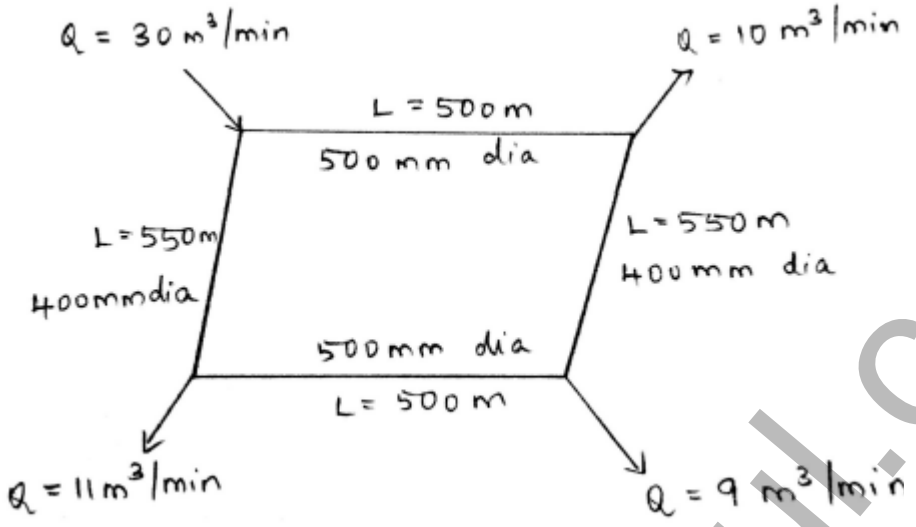
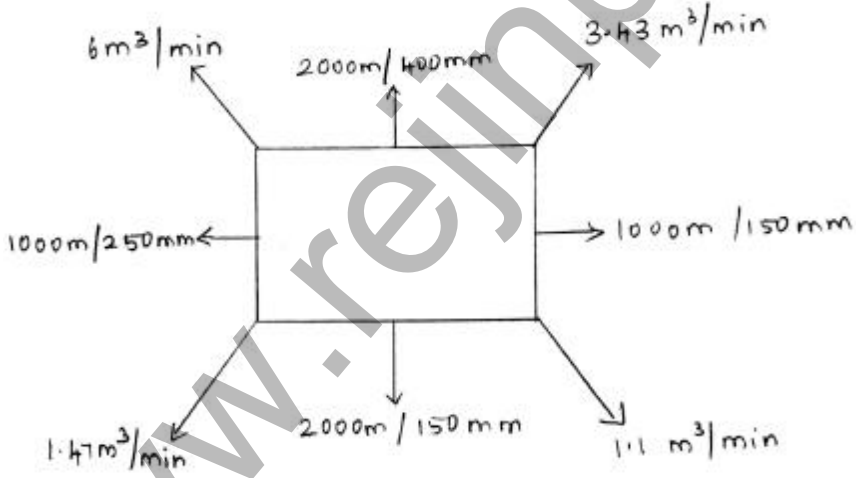
Requirements of water distribution -Components -Selection of pipe material-Service reservoirs - Functions - Network design -Economics - -Analysis of distribution networks -Computer applications- Appurtenances - Leak detection. Principles of design of water supply in buildings -House service connection - Fixtures and fittings -Systems of plumbing and types of plumbing.

PART – A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	What is an equivalent pipe?	BT 1	Remembering
2.	What is meant by appurtenances?	BT 1	Remembering
3.	Mention the important components needed for the water distribution to buildings.	BT 1	Remembering
4.	Where the ring system of water distribution system is adopted?	BT 1	Remembering
5.	What are the requirements of water distribution system.	BT 1	Remembering
6.	Name the appurtenances used in water distribution system.	BT 1	Remembering
7.	Describe about air valves. Mention the different types of air valves.	BT 2	Understanding
8.	Extend a few lines on ferrule in water service connection.	BT 2	Understanding

9.	Predict the factors which control water supply to buildings.	BT 2	Understanding
10.	Discuss the methods available to find the leakages in pipelines.	BT 2	Understanding
11.	Illustrate few lines on hydraulically balanced network.	BT 3	Applying
12.	Examine the prime functions of service reservoirs.	BT 3	Applying
13.	Illustrate the methods of distribution of water.	BT 3	Applying
14.	Analyze how to identify leakage in pipe lines.	BT 4	Analyzing
15.	Compare gravity system of distribution and pumping system of distribution.	BT 4	Analyzing
16.	Explain Hardy Cross method of pipe network analysis.	BT 4	Analyzing
17.	Rewrite anyone of the empirical formula to relate pressure to height in distribution system.	BT 5	Evaluating
18.	Invent the methods of leak detection in water distribution system.	BT 5	Evaluating
19.	Discuss the general methods of distribution of water employed in Municipal water supply scheme.	BT 6	Creating
20.	Summarize the role of computer application in water supply system.	BT 6	Creating
21.	Highlight the important aspects related to leak detection.	BT2	Understanding
22.	What is a surface reservoir?	BT3	Applying
23.	What is a stand pipe?	BT4	Analyzing
24.	List out the components of service connection pipe.	BT5	Evaluating
25.	How will you calculate the service capacity of the reservoir?	BT6	Creating
	PART – B		
1.	What are the functions of service reservoir? Briefly outline the design aspects of service reservoir.	BT 1	Remembering
2.	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.	BT 1	Remembering
3.	What is the role of computer applications in the water distribution system?	BT 1	Remembering

4.	Explain the principles of design of water supply in buildings.	BT 1	Remembering
5.	Discuss with neat sketches the various types of layout of distribution system and state their advantages and disadvantages.	BT 2	Understanding
6.	Classify the different plumbing systems with neat sketches. Also compare them for their cost, efficiency, easiness, etc.	BT 4	Analyzing
7.	Explain the "one" and "two" pipe system of plumbing and state the conditions under which they are adopted?	BT 4	Analyzing
8.	Discuss in detail about i. Waste water detection method.(7) ii. Various pipe fitting with neat sketches.(6)	BT 2	Understanding
9.	Give a detailed account on the key requirements of water distribution.	BT 5	Evaluating
10.	Explain with neat sketches about the appurtenances, fixtures and fittings in water distribution system.	BT 4	Analyzing
11.	Summarize few lines about leak detection and explain its methods. How to maintain the drinking water pipe line system.	BT 6	Creating
12.	Explain the important aspects associated with house service connection.	BT 3	Applying
13.	Discuss Hardy-cross method and Equivalent pipe method to analyse complex pipe network.	BT 2	Understanding
14.	Write some of the appurtenances required for the pipes of water distribution networks.	BT 3	Applying
	PART – C		
1.	Explain about the analysis of distribution networks in water distribution and supply to buildings.	BT 4	Analyzing
2.	Write short notes on the detection and prevention of wastage of water.	BT 3	Applying

3.	Design the pipe network shown below and tabulate the flow values in each of the pipe. 	BT 6	Creating
4.	Identify the flow in each pipe in the loop shown in fig. use Hardy cross method for analyzing the loop. Consider C_H as 110 for all pipes. 	BT 1	Remembering