R13

SET - 1

III B. Tech II Semester Supplementary Examinations, November/December – 2016
ENVIRONMENTAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1	a)	What is meant by safe and wholesome water?	[3M]
	b)	With a neat sketch, describe an artesian spring.	[4M]
	c)	Write the drinking water standards for Nitrates and Iron.	[3M]
	d)	What are pressure filters?	[4M]
	e)	How is temporary hardness removed?	[4M]
	f)	Write the purpose of air valve and scour valve.	[4M]

PART -B

2	a)	Write the role of an environmental engineer.	[6M]
	b)	What are the factors affecting water demand?	[6M]
	c)	The population of a certain town was 40,000 in the year 1950 and 50,000 in 1960. Determine its population in the year 1970 by Annual rate of Increase method.	[4M]
3	a)	What are wells? How are they classified?	[4M]
	b)	What are the operations involved in laying of pipes?	[8M]
	c)	Write the design considerations for intake structures.	[4M]
4	a)	Define the terms Alkalinity and Acidity. Write the importance of determining them in public water supply.	[8M]
	b)	Explain the method of estimation of solids in water – total solids, dissolved solids and settleable solids.	[8M]
5	a)	Explain the construction of Rapid Sand Filter (Gravity type).	[8M]
	b)	Give the Flow diagram of Water Treatment plant and write the principles involved at each stage.	[8M]
6	a)	Describe Aeration methods for the removal of objectionable dissolved gases.	[8M]
	b)	For disinfecting water supply, it is required to treat 500,000litres of daily supply with 0.5ppm of chlorine. If the disinfectant is available in the form of bleaching powder containing 30% of available chlorine, calculate the amount of bleaching powder required to treat the daily flow of water.	[8M]
7	a)	With neat sketch describe the Grid Iron system of distribution. Mention its advantages and disadvantages.	[8M]
	b)	Write about use of water meters, their classification and merits and demerits of using meters.	[8M]

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III B. Tech II Semester Regular/Supplementary Examinations, April- 2017
ENVIRONMENTAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1	a)	Write a short note on various methods of estimating fire demand.	[3M]
	b)	Compare ground water sources and surface water sources with reference to their quality and quantity.	[4M]
	c)	Give the desirable limits and permissible limits in the absence of other source for the following water quality parameters as per IS 10500 1991: i) Turbidity ii) Fluorides iii) Nitrates and iv) Sulphates	[4M]
	d)	Draw flow chart of water treatment plant for highly turbid river water.	[3M]
	e)	Explain with relevant equations, how chlorine acts as a disinfectant?	[4M]
	f)	What are the requirements of good water meters?	[4M]

PART –B

2	a)	What is meant by design period of a water supply scheme? Discuss various factors affecting design period.	[6M]
	b)	Predict the population for the year 2021 and 2031 using the following data by geometrical increase method and incremental increase method.	[10M]

Census Year	Population
1951	21,000
1961	22,800
1971	30,000
1981	42,000
1991	50,000
2001	55,500

3	a)	Explain the stepwise procedure to determine the reservoir capacity using mass curve technique.	[8M]
	b)	Explain canal intake with neat diagram. Mention important design features.	[8M]
4	a)	Explain EDTA method for the determination total, permanent and temporary hardness of water. Give the relevant chemical equations.	[6M]
	b)	Explain how do you conduct the following tests to detect the presence of coliform group: i) Presumptive test ii) Confirmed test iii) Completed test	[10M]
5	a)	Explain with relevant chemical equations, how alum acts as coagulant. What are the advantage and disadvantages of alum?	[8M]
	b)	Design slow sand filter beds for 50,000 population with an average per capita supply of 200 lpcd. Assume relevant data required. Keep one unit as stand by.	[8M]

6 a) Explain with relevant chemical equations, Lime-Soda process for softening of   [10M]
       hard water. What are the advantages and disadvantages of this process?
   b) Describe the following methods of disinfection and mention their advantages and   [6M]
       disadvantages:
       i)Ozonation   ii)UV-radiation

7 a) Explain stepwise procedure for the analysis of complex water distribution   [10M]
       networks using Hardy-cross method. Derive expression for correction term.
   b) Write short notes on: i) Sluice valve and ii) Check valve   [6M]

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III B. Tech II Semester Regular/Supplementary Examinations, April- 2017
ENVIRONMENTAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1	a)	Briefly discuss any four factors affecting design period of a water supply scheme.	[4M]
	b)	Define gravity conduits and pressure conduits. What are the advantages of pressure conduits over gravity conduits?	[3M]
	c)	The measured pH values of incoming and outgoing waters at a water treatment plant are 7.5 and 8.8 respectively. Determine the average pH of water, assuming linear variation of pH with time.	[4M]
	d)	Explain the principle of coagulation.	[3M]
	e)	What are the purposes served by aeration? List any four methods of aeration.	[4M]
	f)	Explain any one type of fire hydrant with a neat diagram.	[4M]

PART –B

2	a)	Explain various factors that affect per capita water consumption of a city.	[8M]
	b)	Estimate the probable population of a city for the years 2021 and 2031 by Arithmetic Increase method from the following censes data.	[8M]

Census Year	Population
1951	35,000
1961	42,700
1971	48,800
1981	60,000
1991	72,800
2001	88,500

3	a)	Draw a neat diagram of a river intake structure. Explain the salient features.	[8M]
	b)	The yield of water from a catchment area during each successive month is given below. Determine the minimum capacity of a reservoir required to allow the above volume of water to be drawn off at a uniform rate assuming that there is no loss of water over the spillway.	[8M]

Month	Inflow (M.cu.m)	Month	Inflow (M.cu.m)
January	1.5	July	8.4
February	2.2	August	5.6
March	3.0	September	2.3
April	8.9	October	2.0
May	12.0	November	1.8
June	11.8	December	1.2

4 a) Explain in detailed theprocedure for determination of MPN index of a water sample. [10M]
b) What are the sources and effects of the following water quality parameters? [6M]
i) Turbidity   ii) Fluorides and   iii) Hardness

5 a) 4 MLD of water per day passes through a sedimentation tank basin which is 6 m wide, 16 m long and 3.5 m deep. (i) Find the detention time for this basin (ii) Determine the average velocity of flow through the basin (iii) Compute the SOR of the basin. [8M]
b) Distinguish between slow sand filters and rapid gravity filters. [8M]

6 a) Explain Zeolite process for water softening. Enumerate its advantages and disadvantages. [10M]
b) Explain various methods of deflouridation. [6M]

7 a) Describe with neat diagrams various layouts of distribution. Mention the applicability of each method. [8M]
b) What are the requirements of a good water meter. Explain any one type of water meter with a neat sketch. [8M]

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Code No: RT32011

(**R13**)

(SET - 3)

III B. Tech II Semester Regular/Supplementary Examinations, April- 2017
ENVIRONMENTAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
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PART –A

1 a) Discuss the role of environmental engineer in protecting public health and improving quality of life of the society. [4M]

   b) What are tube wells and bore wells? Compare the quality and quantity of water obtained from these sources. [3M]

   c) Give the desirable limits for the physical parameters of drinking water as per IS 10500 -1991. [4M]

   d) What are the advantages and disadvantages of using alum as coagulant? [3M]

   e) With a neat diagram explain break point chlorination curve. [4M]

   f) What are gravity system and combined gravity and pumping system of water distribution? What are the advantages of combined system? [4M]

PART –B

2 a) Draw the flow chart of public water supply scheme. [4M]

   b) The population of the past three successive decades of a city is given below. Estimate the population of the city for the year 2021 by decreasing rate of growth method. [8M]

Census year	Population
1981	47050
1991	54500
2001	61000

   c) Write a short note on variations in rate of demand of water. [4M]

3 a) Explain various factors governing the selection of a suitable site for the location of an intake structure. [8M]

   b) A pipe line 0.8 m diameter is 1.5 km long. To augment the discharge, another pipe line of same diameter is introduced in parallel to the first in the second half of its length. Find the increase in discharge. The difference of head between inlet and outlet of the pipe line is 35 m. Use Darcy-Weisbach formula with f = 0.04. [8M]

4 a) Explain the following methods for ascertaining bacteriological quality of water. i) Total count test and ii) Membrane filter technique. What are the advantages of membrane filter technique? [8M]

   b) What are the disadvantages of excess hard water when supplied for industrial purpose? [4M]

   c) Find out the pH of a mixture formed by mixing the following two solutions: [4M]
   Solution A: Volume = 300 ml and pH = 7
   Solution B: Volume = 700 ml and pH = 6

5 a) Define optimum dosage of coagulant. Explain jar test for the determination of [8M] optimum dosage of coagulant.
   b) Draw a neat diagram of rapid sand filter and explain how the backwashing [8M] operation is carried out.

6 a) Calculate the quantity of bleaching powder required per year for disinfecting 6 [5M] million litres of water per day. The dose of chlorine has to be 0.35 ppm and the bleaching powder contains 35% of available chlorine.
   b) Explain the following: [8M]
       i) Removal of colour, odour and taste by Activated carbon
       ii) Removal of iron and manganese
   c) What do you understand by the term residual chlorine? Explain its significance in [3M] water supply scheme?

7 a) Describe with neat diagrams various layouts of distribution. Mention the [8M] applicability of each method.
   b) Write short notes on: [8M]
       i) Requirements of a good distribution system
       ii) Equivalent pipe method

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SET - 4

III B. Tech II Semester Regular/Supplementary Examinations, April- 2017
ENVIRONMENTAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours — Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A**is compulsory
3. Answer any **THREE** Questions from **Part-B**
*****

PART –A

1 a) Write a short note on waterborne diseases caused by bacteria and inorganic matter. [4M]

b) Draw a neat diagram of canal intake. [4M]

c) Write down the permissible limits for the following parameters as per IS 10500-1991 for drinking water:
i)Chlorides ii) Total Dissolved Solids iii) pH and iv) Phenolic compounds [4M]

d) Define Surface Over Flow rate and Detention period for a continuous flow sedimentation tank. Give the range of values normally adopted in the design for the above two parameters. [3M]

e) What do you understand by Chlorine Demand and Free Residual Chlorine? What is the importance of residual chlorine [4M]

f) Write a short note on pressure in distribution layouts. [3M]

PART –B

2 a) For a city of 1,00,000 population and an average water supply of 200 lpcd, calculate fire demand by using various equations and IS code provisions. Also determine the coincident draft. [7M]

b) What is meant by per capita demand and design period? Discuss various factors which affect per capita consumption of water. [9M]

3 a) Explain various surface and sub-surface water sources with reference to available quantity and quality of water. [8M]

b) Explain stepwise procedure to determine the capacity of storage reservoir by using mass curve method. [8M]

4 a) Explain the following tests used for the bacteriological analysis of the given water sample:
i) Presumptive test ii) Confirmed test and   iii) Completed test [10M]

b) The analysis of water from a well showed the following results in mg/L:
$Ca^{++} = 65$, $Mg^{++} = 51$, $Na^+ = 101.5$, $K^+ = 21.5$
$HCO_3^- = 248$, $SO_4^{--} = 221.8$, $Cl^- = 79.2$
Find the total hardness, carbonate hardness and non-carbonate hardness. [6M]

5   a)   Derive an expression for the determination of settling velocity of discrete particles.   [8M]

    b)   Design rapid sand filters beds for treating water required for a population of   [8M]
         1,50,000 people with an average rate of demand of 150 lpcd with the following
         data:
         i) Filter area of each unit should not be more than 50 m^2
         ii) Amount of water used for back-washing is 4% of treated water per day
         iii) The time required for back washing may be neglected
         iv) One unit must be kept as stand by.
         Assume any other data required.

6   a)   Explain zeolite method for water softening. Mention the advantages and   [8M]
         drawbacks of this method.

    b)   Write short notes on: [8M]
         i) Nalgonda Technique for defluoridation
         ii) Break point chlorination
         iii) Aeration

7   a)   Explain stepwise procedure for the analysis of complex water distribution   [10M]
         networks by using Hardy-cross method. Derive expression for correction term.

    b)   Write short notes on: i) Air relief valve ii) reflex valve and iii) scour valve   [6M]

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R13

III B.Tech II Semester Supplementary Examinations, November - 2019
ENVIRONMENTAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
*****

PART –A (22 Marks)

1	a)	Write about the water borne diseases.	[3M]
	b)	What are the advantages of pressure conduits over gravity conduits?	[4M]
	c)	Write short note on pH value and its determination.	[4M]
	d)	Discuss the factors effecting sedimentation.	[3M]
	e)	Discuss break point chlorination.	[4M]
	f)	Write notes on air valves and sluice valves.	[4M]

PART –B (48 Marks)

2	a)	Discuss the factors affecting water demand.	[4M]
	b)	Explain in brief various factors that affect population growth.	[8M]
	c)	Draw the flow chart of public water supply system and discuss it.	[4M]
3	a)	Write short note on infiltration galleries.	[3M]
	b)	Explain in detail about the various types of wells with the help of sketches.	[8M]
	c)	Discuss the design aspects of pipe lines.	[5M]
4	a)	Describe the multiple tube fermentation technique for the determination of coli forms.	[8M]
	b)	Write a note on significance of MPN in water quality.	[8M]
5	a)	Describe various methods of application of coagulants.	[8M]
	b)	Explain the working of a rapid sand gravity filter.	[8M]
6	a)	Describe in detail about the chlorination. Explain its action in killing bacteria.	[8M]
	b)	Describe Aeration methods for the removal of objectionable dissolved gases.	[8M]
7	a)	Distinguish between Hardy cross method and equivalent pipe method.	[8M]
	b)	Discuss about use of water meters, their classification and merits and demerits of using meters.	[8M]

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R13

SET - 1

III B.Tech II Semester Supplementary Examinations, April/May - 2019
ENVIRONMENTAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
*****

PART –A

1	a)	Discuss the average per capita demand for an Indian.	[3M]
	b)	What are factors governing the selection of the intake structure.	[4M]
	c)	What do you understand by coli form index? How do you determine it?	[4M]
	d)	Why alum is commonly used coagulant? Write down the reaction.	[3M]
	e)	Discuss about chlorination	[4M]
	f)	Discuss the components of distribution system.	[4M]

PART -B

2	a)	Discuss the role of environmental engineer.	[4M]
	b)	What are the factors affecting the design period? Explain.	[8M]
	c)	Explain the importance of protected water supply systems.	[4M]
3	a)	Write about Wells and Infiltration galleries.	[3M]
	b)	Discuss the merits and demerits of different kinds of pipes.	[8M]
	c)	Distinguish between gravity spring and artesian spring.	[5M]
4	a)	Describe in brief various tests conducted for physical examination of water.	[8M]
	b)	Discuss the bacteriological analysis of water.	[8M]
5	a)	What do you understand by plain sedimentation? Describe the design principles of a settling tank.	[8M]
	b)	Draw a neat flow chart of water treatment plant.	[8M]
6	a)	Explain chlorine-ammonia treatment for disinfecting drinking water. What are its advantages?	[8M]
	b)	Discuss the methods for softening of water. Mention the advantages and drawbacks of the methods.	[8M]
7		Explain in detail about the various methods of distributing water system and discuss the advantages and disadvantages of each.	[16M]

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III B. Tech II Semester Regular/Supplementary Examinations, April -2018
ENVIRONMENTAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
*****

PART –A

1	a)	What is meant by the term per capita demand?	[3M]
	b)	Differentiate between confined and unconfined aquifers.	[4M]
	c)	Define air valves. What is the purpose of providing air valves?	[4M]
	d)	Define specific conductivity of water.	[3M]
	e)	Define break point chlorination and double chlorination.	[4M]
	f)	What are the advantages of cast iron pipes?	[4M]

PART -B

2	a)	Mention and discuss the factors that influence per capita demand.	[4M]
	b)	What do you understand by continuous and intermittent system of water supply? What are their relative advantages and disadvantages?	[8M]
	c)	Explain the importance and necessity for planned water supplies.	[4M]
3	a)	Define an intake structure. What are the factors governing the location of an intake?	[8M]
	b)	Explain about pipe appurtenances which are provided at various suitable places along the pipe lines.	[8M]
4	a)	What are the common impurities found in natural sources of water, and explain their effects up on its quality.	[8M]
	b)	Explain about IS (Indian Standard) drinking water quality standards and WHO guidelines for drinking water.	[8M]
5	a)	Explain about operation and cleaning of slow sand filters.	[8M]
	b)	Design six slow sand filter beds from the following data: Population to be served = 50,000 persons. Per capita demand = 150 lt/head/day. Rate of filtration = 180 lt/hr/sq.m. Length of each bed = Twice the breadth. Assume maximum demand as 1.8 times the average daily demand. Also assume that one unit, out of six, will be kept as stand-by.	[8M]
6	a)	Explain about any three minor methods of disinfection.	[8M]
	b)	What are the various forms in which chlorine can be applied? Discuss.	[8M]
7	a)	Explain about grid iron system with neat sketch.	[8M]
	b)	Discuss about laying and testing of pipe lines.	[8M]

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Code No: RT32011 $\boxed{\text{R13}}$ $\boxed{\text{SET - 2}}$

III B. Tech II Semester Regular/Supplementary Examinations, April -2018
ENVIRONMENTAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours   Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
*****

PART –A

1 a) What is the difference between arithmetic increase method and geometric increase method? [3M]
   b) What do you mean by perched aquifer? [4M]
   c) Define pressure relief valves. What is the purpose of providing pressure relief valves? [4M]
   d) Define BOD. [4M]
   e) Define super chlorination. [3M]
   f) What do you mean by socket and spigot joint? [4M]

PART -B

2 a) What are the factors governing the design period? [4M]
   b) Compute the population of the year 2000 and 2018 for a city whose population in the year 1930 was 25,000 and in the year 1970 was 47,000. Make use of geometric increase method. [8M]
   c) Explain about master plan method. [4M]

3 a) What are intake towers? Differentiate between dry and wet intake towers. [8M]
   b) Explain about the classification of river intake structures. [8M]

4 a) Explain about water borne diseases and their control. [8M]
   b) Explain about physical characteristics of water. [8M]

5 a) Explain about roughening and diatomaceous earth filters. [8M]
   b) Discuss about theory of filtration. [8M]

6 a) Explain about orthotolidine and D.P.D test. [8M]
   b) What are the methods of removing temporary hardness? Discuss in detail. [8M]

7 a) Explain about dead end system with neat sketch. [8M]
   b) What are the advantages and disadvantages of dead end system? [8M]

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III B. Tech II Semester Regular/Supplementary Examinations, April -2018
ENVIRONMENTAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours
Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
*****

PART –A

1	a)	Write a short note on provision for fire demand in water supply.	[3M]
	b)	What is the difference between aquifuge and aquitard?	[4M]
	c)	Define check valves.	[3M]
	d)	What do you mean by water borne diseases? Mention the names of diseases that are caused by bacterial and protozoal infections.	[4M]
	e)	Define zeolite.	[4M]
	f)	What is the purpose of providing expansion joints?	[4M]

PART –B

2	a)	Discuss the logistic curve method for determining the future populations of a locality. Derive a standard equation for such a curve and explain its use for determining the future population.	[8M]
	b)	In two periods each of 20 years, a city has grown from 40,000 to 1, 60,000 and then 2, 80,000. Determine (i) saturation population (ii) equation of logistic curve and (iii) expected population after the next 15 years.	[8M]
3	a)	Give an equation defining Darcy's law. What is its limitation?	[8M]
	b)	What are infiltration galleries and infiltration wells? Explain both with neat sketches. Also define a ranney well.	[8M]
4	a)	How does water quality criteria differs for industrial supplies from those for domestic municipal supplies?	[8M]
	b)	Explain why bacteriological test should be necessary in handling problems of water supply.	[8M]
5	a)	Differentiate between slow sand and rapid gravity filters.	[8M]
	b)	What are the advantages and disadvantages of pressure filters?	[8M]
6	a)	Explain about lime – soda process for removing hardness.	[8M]
	b)	Explain about desalination by electrodialysis method.	[8M]
7	a)	Explain the Hardy cross method used for pipe network analysis in water distribution system.	[8M]
	b)	What are the requirements of a good distribution system?	[8M]

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III B. Tech II Semester Regular/Supplementary Examinations, April -2018
ENVIRONMENTAL ENGINEERING – I
(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B)**
2. Answering the question in **Part-A** is compulsory
3. Answer any **THREE** Questions from **Part-B**
*****

PART –A

1	a)	What is meant by coincident draft?	[3M]
	b)	Define cyclonic precipitation.	[4M]
	c)	Define turbidity.	[3M]
	d)	What are the maximum acceptable limits of i)Turbidity ii)Fluorides iii)Nitrates and iv)Phenolic substances, in drinking water.	[4M]
	e)	Distinguish between slow sand and rapid sand filters with reference to method of cleaning.	[4M]
	f)	Define flexible joint and flanged joint.	[4M]

PART –B

2	a)	Explain the different methods of forecasting future population of a city for which a water supply scheme is to be planned.	[8M]
	b)	Given the following data, calculate the population at the end of next three decades by decreasing rate method.	[8M]

Year	Population
1940	80,000
1950	1,20,000
1960	1,68,000
1970	2,28,580

3	a)	Enumerate the various surface sources of water, and discuss and compare the quality and quantity of water supplies that may be available from these sources.	[8M]
	b)	What are the factors governing the selection of dam site.	[8M]
4		Explain about chemical characteristics of water.	[16M]
5	a)	Explain about working and cleaning of rapid gravity filters.	[8M]
	b)	Discuss about operational troubles in rapid gravity filters.	[8M]
6	a)	Explain about zeolite process for removing hardness.	[8M]
	b)	What do you mean by desalination? Explain about desalination by reverse osmosis process.	[8M]
7		Explain about methods of distribution. Mention their advantages and disadvantages.	[16M]

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