



## QUESTION BANK

Name of the Department : Civil Engineering  
Subject Code & Name : EN 8491 & Water Supply Engineering  
Year & Semester : III & V

### UNIT-I SOURCES OF WATER

#### PART A

#### 1. Write the per capita demand for an average Indian city

- i. Domestic use = 200 l/h/d
  - ii. Industrial use = 50 l/h/d
  - iii. Commercial use = 20 l/h/d
  - iv. Public use = 10 l/h/d
  - v. Wastes & thefts, etc = 55 l/h/d
- Total = 335 per capita demand

#### 2. What is meant by population growth curve?

When the birth, death and migration rate do not produce extraordinary changes, the population would probably follow the growth curve characteristics of living things within limited space or with limited economic opportunity. The curve is S-shaped and it is known as logistic curve.

#### 3. What are the objectives of water supply system?

The main objective of water supply system is to provide portable water to the various sections of community in accordance with their demand and requirement.

- i. It should ensure a constant and reliable water supply to the people.
- ii. It should help in supplying safe wholesome water to the people thereby promoting better health

#### 4. Why the water demand changes from season to season?

- i. Seasonal variation occurs due to larger use of water in summer season, lesser use in winter, and much less in rainy season.
- ii. These variation may also be caused by seasonal use of water in industries such as processing of cash crops at the time of harvesting, etc.

#### 5. What are the methods of population forecasting?

- a. Arithmetic increase method
- b. Geometric increase method
- c. Method of varying increment (or) Incremental increase method
- d. Decreasing rate of growth method
- e. Simple graphical method
- f. Comparative graphical method



- g. Master plan method (or) zoning method
- h. The logistic curve method

## 6. Define design period?

The future period for which a provision is made in the water supply scheme is known as design period.

## 7. What are various type of water demand?

- a. Domestic water demand
- b. Industrial
- c. Institution and commercial
- d. Demand for public use
- e. Fire demands

## 8. Define wholesome water

Wholesome water is defined as the water which containing minerals in small quantities and free from harmful chemical impurities. It should be free from bacteria and should be colourless, tasty and odour free.

## 9. Mention the factors which are influencing the per capita demand

- i. Size of the city
- ii. Climatic condition
- iii. Types of gentry and habits of people
- iv. Industrial and commercial activities
- v. Quality of water supplies
- vi. System of supply
- vii. Cost of water

## 10. What are the various type of water available on the earth?

- 1. Surface sources such as
  - a. ponds and lakes
  - b. Stream and rivers
  - c. Storage reservoirs
  - d. Ocean.
- 2. Sub surface sources
  - a. Spring
  - b. Infiltration galleries
  - c. Infiltration wells
  - d. Wells and tube wells

## 11. What is hydrologic cycle?

Water is lost to the atmosphere as vapor from the earth. Which is then precipitated back in the form of rain, snow, hail dew, sleet or frost etc. This process is known as hydrologic cycle.



## 12. What are rivers? What are the types of river?

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Rivers are the most important sources of water for public water supply schemes. Rivers are of two types, they are

- a. Perennial rivers.
- b. Non perennial rivers.

## 13. What are the types of springs?

- a. Gravity springs.
- b. Surface springs.
- c. Artesian springs.

## 14. What is meant by coincident draft?

The maximum daily demand when added to fire draft for working out total draft, is known as coincident draft.

## 15. What are the important requirements of water for domestic use.

- (i) it should be colorless, and sparkling clear. It must be free from solids in suspension and must not deposit sediment on standing
- (ii) it should be of good taste, free from odour
- (iii) it should be free from disease producing bacteria or organism
- (iv) it should be free from harmful salts
- (v) it should be free from objectionable dissolved gases, such as iron, manganese, lead, arsenic, etc
- (vi) it should be free from radioactive substances such as radium, strontium etc.

## 16. What are the factors affecting population growth?

- (i) economic factors
- (ii) development programmes
- (iii) social facilities
- (iv) communication links

## 17. Define the term design period in water supply project and write the factors affecting design period ?

The future period or the number of years for which a provision is made in designing the capacities of the various components of the water supply scheme is known as design period.

### Factors affecting design period:

- (i) useful life of component structures
- (ii) amount and availability of additional investments
- (iii) rate of interest
- (iv) anticipated rate of population growth



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## 18. Distinguish between continuous and intermittent supply?

In continuous supply the water may be supplied for continuously for all the 24 hours of the day whereas in intermittent supply the water will be supplied or available for only peak periods. 4

## 19. Define per capita demand and write the factors affecting the same.

It is the annual average amount of daily water required by one person, and includes the domestic use, industrial and commercial use, public use, wastes, thefts, etc. It may therefore be expressed as

$$\frac{\text{total yearly water requirement of the city in litres (v)}}{365 * \text{design population}}$$

## 20. What are the common impurities found in water?

- (i) Suspended impurities
- (ii) Dissolved impurities
- (iii) Colloidal impurities

### PART B

## 1. What is meant by design period and population forecasts? Discuss the different methods of forecasting future population of a city for which a water supply scheme is to be planned (May/June 2010, Nov/Dec 2009, Nov/Dec 2010, Nov/Dec 2011)

For notes refer (Page No: 30) (Author: S.K. Garg)

## 2. The population of 5 decades from 1930 to 1970 are given below. Find out the population after one, two and three decades beyond the last known decade, by using incremental increase method.

Year	1930	1940	1950	1960	1970
population	25,000	28,000	34,000	42,000	47,000

For notes refer (Page No: 39) (Author: S.K. Garg)

## 3. (i) Explain the factors affecting per capita demand for water in cities.

For notes refer (Page No: 16) (Author: S.K. Garg)

## (ii) Discuss the effects of variations in demand on the design capacities of different components of water supply scheme?

For notes refer (Page No: 23) (Author: S.K. Garg)

## 4. The population of a township for the past five decades as per the census records is given below:

Year	1961	1971	1981	1991	2001
population	25,000	28,000	34,000	42,000	47,000

Determine the daily water demand of the city in 2031, if the per capita water demand will be 135 Lpcd. Assume arithmetic increase in population

For notes refer (Page No: 42) (Author: S.K. Garg)



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5. Given the following data, calculate the population at the end of next three decades by decreasing rate methods.

year	1940	1950	1960	1970
population	80,000	1,20,000	1,68,000	2,28,580

6. Explain in details the financial aspects involved in water supply schemes. (Nov/Dec 2011)  
For notes refer (Page No: 2) (Author: S.K. Garg)

7. The population of 5 decades from 1930 to 1970 are given below. Find out the population after one, two and three decades beyond the last known decade, by using incremental increase method.

Year	1930	1940	1950	1960	1970
population	25,000	28,000	34,000	42,000	47,000

## UNIT-II CONVEYANCE FROM THE SOURCE

### PART A

1. State Darcy's law to determine yield?

According to darcy's law the discharge was propotional to the head loss ( $\Delta H$ ) and area of cross-section (A) of the soil and inversely propotional to the length of the soil sample (L)

$$Q = KiA$$

2. Define specific yield.

The volume of ground water extracted by gravity-drainage from a saturated water bearing material is known as the yield, and when it is expressed as the ration of the volume of the total material drained, then it is known as specific yield.

3. What is the principle of hydraulic ram?

A hydraulic ram is a kind of a pumping arrangement which does not utilize any outside power and uses the principle of water hammer pressures developed when a moving mass of water is suddenly stopped.

4. What are the types of precipitation?

- (i) Cyclonic precipitation
- (ii) Convective precipitation
- (iii) Orographhic precipitation

5. What do you mean by infiltration galleries?

Infiltration galleries are the horizontal or nearly horizontal tunnels constructed at shallow depth (3 to 5 metres) along the banks of rivers through the water bearing strata. They are sometimes called horizontal wells.



**6. Name the methods to determine the yield of a well.**

- (i) Theoretical method
- (ii) Field method
  - a) Pumping test
  - b) Recuperating test

**7. What is an intake structure?**

Intakes are the structures used for admitting water from the surface source and conveying it further to the treatment plant. It is a masonry or concrete structure with an aim of providing relatively clean water, free from pollution, sand and objectionable floating material.

**8. How to estimate storm runoff?**

- (i) Inglis formula
- (ii) Khosla's formula
- (iii) Justin's formula
- (iv) Vermule's formula
- (v) Run-off co-efficient formula.

**9. What are the sources of wastewater from a community?**

Surface water:

- (i) Rivers
- (ii) Lakes
- (iii) Impounding reservoirs

Ground waters:

- (i) Springs
- (ii) Infiltration galleries
- (iii) Wells

**10. Write about hydrological cycle with a neat diagram.**

Water is lost to the atmosphere as vapour from the earth, which is then precipitated back in the form of rain, snow, hail, dew, sleet or frost, etc. this precipitation and evaporation continues for ever, and thereby a balance is maintained between two. This process is known as hydrological cycle.

**11. State the factors affecting the selection of dam site.**

- (i) Suitability of foundation
- (ii) Economy
- (iii) General bed level
- (iv) Materials required

**12. Write the significance of flow mass curve in the fixation of reservoir capacity.**

After the inflow mass curve has been plotted, the mass curve of demand may be plotted by accumulating the required outflows.

**13. List the factors governing the selection of a particular source of water?**

- (i) The quantity of available water
- (ii) The quality of available water
- (iii) Distance of the source of supply
- (iv) General topography of the intervening area



## 14. Differentiate between rainfall and runoff.

Run off is the portion which flows over the surface of ground as storm water or flood flow to appear in the form of stream.

Rainfall results from precipitation which are measured as the vertical depth of water that would accumulate on a level surface.

## 15 What are various type pressure pipes?

- a. Cast iron pipes
- b. Steel pipes
- c. Rick pipes
- d. Home steel pipes
- e. Vitrified clay pipes
- f. Asbestos cement pipes
- g. Miscellaneous type of pipes.

## 16. What are the advantages and disadvantages of cast iron pipes?

Advantages:

- a. Moderate in cost
- b. Easy to join
- c. Strong and durable
- d. Corrosion resistant

Disadvantage:

- a. They cannot be used for high pressures generally not used for pressures above 7kg/cm<sup>2</sup>,
- b. When large they are heavy and uneconomical.
- c. They are likely to break during transportation or while making connection.

## 17. What are types of joint?

- a. Socket and spigot joint
- b.. Flanged joint
- c. Mechanical joint called dresser coupling
- d. Elexible joints
- e. Expansion joints



## 18. What are the types of intake?

Simple submerge intake.

- Simple concrete blocks.
- Rock fill timber blocks.

Intake structures.

- Wet intake.
- Dry intake.

## 19. What are the advantages and disadvantages of RCC pipes?

Advantages:

- a. They can resist excessive compressive load and do not collapse under normal vacuums.
- b. They are not corroded from inside by normal portable water.

Disadvantages:

- a. By means of acid they are corroded.
- b. They cannot with stand very high pressure.

## 20. What are the factors affecting per capita demand?

The factors affecting per capita demand are,

- a. Climatic condition.
- b. Habit of people.
- c. Size of city.
- d. Cost of water.
- e. Industry.
- f. Pressure in water tank.
- g. Quantity of water.
- h. System of sanitation.
- i. Supply of system.

## PART B

### 1. Write short notes on rainfall measurement, rain gauges and their types.

For notes refer (Page No: 61-65) (Author: S.K. Garg)

### 2. Differentiate between non recording type rain gauges and recording type rain gauges.

For notes refer (Page No: 62-64) (Author: S.K. Garg)

### 3. (i) Explain the utility a mass curve with the help of neat sketch.

For notes refer (Page No: 38) (Author: B.C. Punmia)

### (ii) Discuss the various factors that govern the selection of a particular source of water in formulation a water supply scheme.

For notes refer (Page No: 110) (Author: S.K. Garg)

### 4. How to determine the capacity of a service reservoir?

For notes refer (Page No: 80) (Author: S.K. Garg)



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5. During a recuperation test the water level in an open well was depressed by pumping by 2.5m and is recuperated by an amount of 1.6m in 70 minutes. 9

- a) Determine the yield from a well of 3m diameter under a depression head of 3.5m
- b) Also determine the diameter of well to yield 10 liters per second under a depression head of 2.5 m.

For notes refer (Page No: 145) (Author: S.K. Garg)

6. Explain in detail about the hydrological cycle, precipitation and types of precipitation.

For notes refer (Page No: 58) (Author: S.K. Garg)

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7. What are the sources of water and explain the surface source of water.

For notes refer (Page No: 57, 74) (Author: S.K. Garg)

## UNIT-III WATER TREATMENT

### PART A

1. Distinguish between BOD and COD.

The extent of organic matter present in water sample can also be easily estimated by supplying oxygen to the sample and finding the oxygen consumed by the organic matter present in water. This oxygen demand is known as biochemical oxygen demand.

2. What are the types of joints used in laying cast iron pipes?

- (i) Socket and spigot joint
- (ii) Flanged joint
- (iii) Mechanical joint called dresser coupling
- (iv) Flexible joint
- (v) Expansion joint

3. Compare reciprocating and centrifugal pump.

- (i) The initial cost as well as the maintenance cost are comparatively low in centrifugal pump whereas the initial cost is high in reciprocating pump
- (ii) The discharge obtained is steady and is non-pulsating in centrifugal pump whereas in reciprocating pump the discharge is constant under variable head
- (iii) They are quite durable and safe against high pressure in centrifugal pump whereas the reciprocating pumps are durable and flexible

4. Define the term: B.O.D.

If sufficient oxygen is present in water, the useful aerobic bacteria production will flourish and cause the biological decomposition of waste and organic matter, thereby reducing the carbonaceous material from the water. The amount of oxygen required in this process until oxidation gets completed is known as biochemical oxygen demand.



**5. Name any four physical characteristics of water.**

- (i) Colour
- (ii) Odour
- (iii) taste
- (iv) Turbidity

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**6. Write few advantages of flexible joint used in cast-iron pipes. (May/June 2010)**

Flexible joints are used where large scale flexibilities are required. Say for example, when pipes are laid in rivers with uneven beds, large scale settlements may break the ordinary type of joint. Similarly, while laying pipes on curves, the provided joints must be flexible, otherwise they break. In all such circumstances, flexible joints are used.

**7. Mention any four methods to control the corrosion of pipes. (May/June 2010)**

Corrosion of metal pipes may be reduced in various ways as described below:

- (i) Protective coatings
- ii) Selecting proper pipe materials
- iii) Quality of water
- iv) Cathodic protection

**8. What is the difference between contaminated water and polluted water. (April/May 2011)**

The water which contains suspended impurities and chemical compounds are known as contaminated water. The water which contains biological impurities and causes disease is known as polluted water.

**9. Define corrosion. (April/May 2011)**

When water flows through a metal pipe, it attacks and disintegrates the surface of the pipe. The material of the pipe thus gets dissolved and rusted, thereby reducing the life and carrying capacity of the pipe. This phenomenon which leads to the progressive disintegration of the pipe is known as corrosion.

**10. State a flanged joint. (April/May 2011)**

Flanged joints are used for pumping stations, filter plants, and at other locations where it may be necessary to occasionally disjoin the pipe. These joints are strong and rigid, and hence cannot be used where deflections or vibrations are expected.

**11. Write about the pumping station. (April/May 2011)**

The location of a pumping station is primarily governed by the location of the place from where it is to receive water, and also by the location of the place where it is to supply that water. The pumping station should be made attractive in their exterior and interior, which may arouse public faith in the neatness and cleanliness of the water supplied to them.

**12. What are vitrified clay pipes? (Nov/Dec 2011)**

These pipes are extensively used for carrying sewage and drainage at partial depths. These pipes are free from corrosion and provide a smooth hydraulically efficient surface. Clay pipes are commonly made in lengths of about 0.6 to 1.2m or so.



**13. Mention the appurtenance used for fire fighting in distribution system. (Nov/Dec 2011)**

- a. Fire hydrants
- b. Water meters
- c. Water taps
- d. Stop cocks
- e. Pipe bends

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**14. Mention the forces acting on a pressure conduit. (May/June 2010)**

- (i) Internal force
- (ii) Pressure due to external loads
- (iii) Longitudinal stresses created when the pipes are laid above the ground
- (iv) Longitudinal stresses created due to unbalanced pressures at bends
- (v) Flexural stresses

**15. What are the various methods of purification of water?**

The various methods of purification of water are,

- a. Screening.
- b. Plain sedimentation.
- c. Sedimentation aided with coagulation.
- d. Filtration.
- e. Disinfection.
- f. Aeration.
- g. softening.
- h. Miscellaneous treatments such as fluoridation, recarbonation, liming, desalination.

**16. Define detention period?**

Detention period of settling tank may be defined as the average theoretical time required for the water to flow through tank length.

**17. Define coagulation?**

The process of addition and mixing the chemical is called coagulation.

**18. Define filtration? What are the 2 types of filter?**

The process of passing the water through the beds of such granular materials is known as filtration.

The two types of filters are,

- a. Slow sand gravity filter.
- b. Rapid sand gravity filter.

**19. Define uniform coefficient?**

It is defined as the ratio of the sieve size in mm through which 60% of the samples of sand will pass, to the effective size of the sand.



## 20. Differentiate between slow and rapid sand filter.

S.NO	ITEMS	SLOW SAND FILTER	RAPID SAND FILTER
1.	Rate of filtration	Small, such as 100 to 20 l/hr/sq .m of filter area.	Large, such as 3000 to 6000 l/hr/sq. m of filter area
2.	Loss of head	Approx 10cm is the initial loss & 0.8 to 1.2m is final limit when cleaning is required	Approx 0.3m is the initial loss & 2.5 to 3.5m is final limit when cleaning is required.

### PART B

- 1. With the help of neat sketch, explain the “socket and spigot” and “flanged” methods of jointing water supply pipes. (Nov/Dec 2006)**  
For notes refer (Page No: 312) (Author: S.K. Garg)
- 2. Briefly discuss the use of cast iron, steel and R.C.C as materials for water supply pipes. Explain how are the first two types of pipes get corroded? (Nov/Dec 2011)**  
For notes refer (Page No: 310) (Author: S.K. Garg)
- 3. Explain the working of a centrifugal pumps with its advantages and disadvantages. (Nov/Dec 2011)**  
For notes refer (Page No: 340) (Author: S.K. Garg)
- 4. Write in greater depth the operation and characteristics of centrifugal pump. (April/May 2011)**  
For notes refer (Page No: 345) (Author: S.K. Garg)
- 5. Briefly explain about the various types of joints provided in cast iron pipes with neat sketches. (May/June 2010)**  
For notes refer (Page No: 312) (Author: S.K. Garg)
- 6. a) What are the factors affecting the selection of pump? (Nov/Dec 2010)**  
For notes refer (Page No: 358) (Author: S.K. Garg)  
**b) What do you understand by the economical diameter of pumping main? (Nov/Dec 2010)**  
For notes refer (Page No: 360) (Author: S.K. Garg)



## UNIT-IV

### ADVANCED WATER TREATMENT

#### PART A

**1. Distinguish between coagulation and flocculation. (Nov/Dec 2006)**

Coagulation is a chemical technique which is directed towards the destabilization of the charged colloidal particles. Flocculation of the other hand, is a slow mixing technique which promotes the agglomeration of the stabilized particles.

**2. What is the principle of water softening by ion exchange method. (Nov/Dec 2006)**

This process uses a strong base anion exchange resin in the chloride form. As the water passes through the bed of the resin contained in a pressure vessel, fluorides and other anions like arsenic, nitrates, etc., present in the water are exchanged with the chloride ions of the resin, thus releasing chlorides into water and absorbing fluoride ions into the resin. The arsenic and nitrate ions also get removed in this process.

**3. Define sedimentation. (April/May 2011)**

When the impurities are separate from suspending fluid by action of natural forces alone by gravity and natural aggregation of the settling particles, the operation is called plain sedimentation.

**4. Write any two operational troubles in pressure filter. (April/May 2011)**

- (i) Little time is available for the coagulant to get mixed properly or to form floc outside the filter vessel.
- (ii) The filtered supplies should not be collected for a little time
- (iii) Pressure filters may require slightly more frequent cleaning

**5. Distinguish between double chlorination and breaking point chlorination. (April/May 2011, Nov/Dec 2010)**

Double chlorination is used to indicate that the water has been chlorinated twice. The pre-chlorination and post chlorination are generally used in double chlorination. Whereas break point chlorination is a term which gives us an idea of the extent of chlorine added to water. In fact, it represents, that much dose of chlorination, beyond which any further addition of chlorine will appear as free residual chlorine.

**6. What is the fluoride limit in potable water and what is defluoridation. (April/May 2011)**

The permissible value of fluoride in potable water is about 1 mg/l. Fluoride mainly enters the human body through drinking water. 96-99% of it combines with bones, since



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fluoride has affinity for calcium phosphate in the bones. Excess intake of fluoride can lead to dental fluorosis, skeletal fluorosis, or non-skeletal fluorosis.

**7. What do you mean by coagulation? (May/June 2010)**

Coagulation is a chemical technique which is directed towards the destabilization of the charged colloidal particles.

**8. What do you understand by the term “hardness” in water? (May/June 2010)**

Water is said to be ‘hard’ when it contains relatively large amounts of bicarbonates, carbonates, sulphates and chlorides of calcium and magnesium dissolved in it. The permissible hardness for public supplies normally ranges between 75 to 115 mg/l.

**9. What is meant by water softening? (May/June 2010)**

The reduction or removal of hardness from water is known as water softening. The advantage of softening lies chiefly in the reduction of soap consumption, lowered cost in maintaining plumbing fixtures, and improved taste of food preparations.

**10. What type of pollutants are removed by secondary treatment? (Nov/Dec 2007)**

Surface pollution, Dissolved pollution, Suspended pollution, Deposited insoluble

**11. What do you understand by screening? (Nov/Dec 2010)**

Most of the big and visible objects, such as trees, branches, sticks, vegetations, fish, animal life, etc., present in raw waters of surface sources can be removed by the process known as screening.

**12. What are the methods adopted for the removal of permanent hardness in water? (Nov/Dec 2010)**

- (i) Lime-soda process
- (ii) Base-exchange process, generally called zeolite process
- (iii) Demineralization process

**13. What do you understand by fluoridation and defluoridation? (Nov/Dec 2010)**

Fluorides in drinking water must neither be totally absent nor should exceed an optimum value of about 1 mg/l. To ensure this, fluorides are added to waters found deficient in fluoride concentrations, under a process known as fluoridation.

Fluoride mainly enters the human body through drinking water. 96-99% of it combines with bones, since fluoride has affinity for calcium phosphate in the bones. Excess intake of fluoride can lead to dental fluorosis, skeletal fluorosis, or non-skeletal fluorosis.

**14. Define sterilization?**

The chemical used in killing these bacteria are known as disinfectants and the process is known as disinfection or sterilization.



**15. What is chloramine?**

Chloramine is the disinfectant compounds which are formed by the reaction between ammonia and chlorine.

**16. What is softening?**

The reduction or removal of hardness from water is known as water softening.

**17. What are the methods of removing permanent hardness?**

The methods removing permanent hardness are,

- a. Lime soda process.
- b. Base exchange process called zeolite process.
- c. Demineralization.

**18. How are aeration water carried out?**

Aeration water are carried out as follows,

- a. By using spray nozzles.
- b. By permitting water to trickle over the cascades.
- c. By air diffusion.
- d. By using trickling beds.

**19. Define fluoridation?**

The process of adding fluoride compounds in excess is called as the fluoridation.

**20. What are the methods of desalination?**

The methods of desalination are,

- a. Desalination by evaporation & distillation.
- b. Electro dialysis method.
- c. Reverse osmosis method.
- d. Freezing process.
- e. Solar distribution method.
- f. Other method.

**PART B**

**1. What are the water softening methods available and uses of water softening? Explain the iron and manganese removal with suitable examples. (Nov/Dec 2011)**

For notes refer (Page No: 583) (Author: S.K. Garg)

**2. a) Write the comparison between slow sand filters and rapid sand filters. (May/June 2010)**

For notes refer (Page No: 512 & 517) (Author: S.K. Garg)

**b) What is meant by disinfection? Explain any two methods of disinfecting water. (May/June 2010)**

For notes refer (Page No: 558) (Author: S.K. Garg)



3. a) Explain the working operation of slow sand filter with the help of neat sketch. (Nov/Dec 2010)

For notes refer (Page No: 512) (Author: S.K. Garg)

- b) Explain briefly about fluoridation and defluoridation. (Nov/Dec 2010)

For notes refer (Page No: 634 & 636) (Author: S.K. Garg)

4. Explain briefly the following processes:

- i. Break point chlorination
- ii. Super chlorination.

5. (i) Differentiate between temporary and permanent hardness.  
(ii) Describe zeolite process of softening water in detail.

6. Write short notes on any four following:

- i. Chlorination,
- ii. Water aeration
- iii. Desalination,
- iv. Removal of radioactivity from water.

7. What is aerator? Explain different types of aerators with sketches?

## UNIT-V

### WATER DISTRIBUTION AND SUPPLY

#### PART A

1. State the principle of analysis of distribution networks. (May/June 2010)

Depending upon the various factors, such as relative levels of the different zones of the city, the layout of the roads, etc., the type of the distribution network (the arrangement of the distribution pipes) to be adopted is first of all, decided. The four important types of network, namely, the dead-end system, the grid-iron system, the circle or ring system and the radial system have been used.

2. What are the requirements of a good distribution system? (May/June 2010, April/May 2011)

- (i) It should be capable of supplying water at all the intended places within the city with a reasonably sufficient pressure head
- (ii) It should be capable of supplying the required amount of water for fire fighting
- (iii) It should be cheap with the least capital construction cost
- (iv) It should be safe against any future pollution of water
- (v) It should be water tight, as to keep the losses due to leakage to the minimum



**3. What are the four actions in which the filtration process is taking place? (May/June 2010)**

- Mechanical straining
- Flocculation and sedimentation
- Biological metabolism
- Electrolytic changes

**4. With a neat diagram show the difference between dead end system and grid iron system. (April/May 2011)**

For notes refer (Page No: 684 & 686) (Author: S.K. Garg)

**5. Write down the methods of distribution. (April/May 2011)**

- By gravitational system
- By pumping system
- By combined gravity and pumping system

**6. What are the advantages of dead end distribution system? (Nov/Dec 2010)**

- The distribution network can be solved easily, and it is possible to easily and accurately calculate the discharges and pressures at different points in the system
- Lesser number of cut-off valves are required in this system
- Shorter pipe lengths are needed, and the laying of pipes is easier
- It is cheap and simple and can be extended or expanded easily

**7. What are fire hydrants? (Nov/Dec 2010)**

A hydrant is an outlet provided in a water distribution main or a sub-main (at least 15cm dia pipe) for tapping water, mainly during fire.

**8. Write a note on equivalent pipe method. (Nov/Dec 2010, Nov/Dec 2011)**

This method is sometimes used as an aid in solving large networks of pipes, in which it becomes convenient to, first of all, replace the different small loops by single equivalent pipes having the same discharging capacities and causing the same head loss.

**9. Draw the layout of grid-iron system. (Nov/Dec 2011)**

For notes refer (Page No: 686) (Author: S.K. Garg)

**10. What are the assumptions made in hardy cross method? (Nov/Dec 2011)**

- Assume any internally consistent distribution of flow. The sum of the flows entering any junction must equal to the sum of the flows leaving that junction



- b. Compute the head loss in each pipe by means of an equation or diagram. Conventionally, clockwise flows are positive and produce positive head loss, and vice versa
- c. With due attention to sign, compute the total head loss around each circuit
- d. Compute without regard to sign, for the same circuit, the sum of  $\sum x KQ_a^{x-1}$
- e. Apply the corrections to the flow in each pipe

**11. What is different system of distribution networks?**

The different system of distribution networks is,

- a. Dead end system.
- b. Grid iron system.
- c. Ring system.
- d. Radial system.

**12. Define fire storage?**

It is sufficient amount of water available in the reservoir for throwing it over the fire in case of fire accidents is called fire storage.

**13. Enumerate various chemical parameter of water?**

Various chemical parameter of water are,

- a. Chlorine content.
- b. Nitrogen content.
- c. Iron content.
- d. Manganese and other metal content.

**14. What are the two types of sewage system?**

The two types of sewage system are,

a. Combined system:

When the drainage is taken along with the sewage then it is called as combined system.

b. Separate system:

When the drainage and sewage are taken independently of each through two different sets of sewage is called as separate system.

**15. What are the two types of water meter?**

The two types of water meter are,

- a. Inferential meter.
- b. Displacement meter.

**16. Define time of concentration?**

The period after which the entire area will start contributing to the runoff is called time of concentration.



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**17. List the components of sewerage system?**

The components of sewerage system are,

- a. House sewers.
- b. Lateral sewers.

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**18. What are the factors affecting the reduction?**

Temperature, turbulence effect of wind, hydrographic, available dissolved oxygen, rate of re-aeration

**19. What is meant by prim lake pollutant?**

The phosphorus which contains in domestic sewage as well as the industrial waste which affect the water quality of the lake.

**20. What is meant by de-oxygenation curve?**

The curve which represents (or) showing the depletion of DO with time at the given temperature.

**PART B**

**1. Explain the hardy cross method used for pipe network analysis. (May/June 2010, April/May 2011)**

For notes refer (Page No: 733) (Author: S.K. Garg)

**2. What is fire hydrant? Discuss the use and functioning of a fire hydrant. (May/June 2010)**

For notes refer (Page No: 749) (Author: S.K. Garg)

**3. What are the different types of pipe network? Explain in detail with sketches. (Nov/Dec 2010)**

For notes refer (Page No: 683) (Author: S.K. Garg)

**4. (i) What are distribution reservoirs?**

For notes refer (Page No: 694) (Author: S.K. Garg)

**(ii) Explain the purpose of distribution reservoirs types and their design aspects. (Nov/Dec 2011)**

For notes refer (Page No: 695) (Author: S.K. Garg)

**5. Write short notes on:**

a) What are the requirements of a distribution system?

b) What are the requirements of pipe material?

**6. Mention any four appurtenances used in water distribution system and explain their functions.**

**7. a). Draw the neat sketch of overhead tank and state the function of each component.**

**b). Draw the neat sketch of centrifugal pump and explain operation**