DHNALAKSHMI SRINIVASAN COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF CIVIL ENGINEERING

CE6503 - ENVIRONMENTAL ENGINEERING

(Regulation 2013)

TWO MARKS

UNIT I PLANNING FOR WATERSUPPLY SYSTEM

1. What are the methods of population forecasting?

Arithmetic increase method

Geometric increase method

Method of varying increment (or) Incremental increase method

Decreasing rate of growth method

Simple graphical method

Comparative graphical method

Master plan method (or) zoning method The

logistic curve method

2. Define design period?

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

3. What are the factors governing the design period?

The factors governing design period are,

a. Design period should not exceed the life period of the structure.

b. If the funds are not in a sufficient, the design period as to be decreased.

c. The rate of interest on borrowing and the additional money invested.

4. 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

5. 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

6. 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.

7. What are rivers? What are the types of river?

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.

8. What is jack well?

The various infiltration wells are connected by porous pipes to a sump well called jack well.

9. What are springs?

The natural out flow of ground water at the earth surface is called as springs.

10. What are the types of springs?

a. Gravity springs.

b. Surface springs.

c. Artesian springs.

11. What are artesian springs?

The pervious layer which contains water combined between two impervious

layers are called artesian springs.

12. What are the different types of wells?

a. Open wells

1. Shallow wells.

2. Deep wells.

b. Tube wells.

13. What is artesian spring?

The pervious layer which contains water combined between two impervious layers is called artesian

spring.

14. What are the factors governing the selection of a particular source of water?

The factors governing are as follows

a. the quantity of available water

b. The quality of available water

c. Distance of the source of supply

d. General topography of the intervening area e.

Elevation of the source of supply.

15. 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.

16. What are the factors governing design period?

The factors governing design period are,

a. Design period should not exceed the life period of structure.

b. If the funds are not in the sufficient the design period should has to be decreased.

c. The rate of interest is less for the borrowing funds.

d. The of population increases due to industries and commercial establishment.

PART B

1.Define the term „per capita demand‟. Write the factors affecting „per capita demand‟ and state the reasons for variations in demand.

2.What are the causes for pollution of surface and subsurface sources of water? State the measures to be adopted to prevent pollution of water.

Write in detail about “Water Pollution” in India. (4)

3.Explain in detail about the “Reasons for the analysis of water”. (4)

4.What are the requirements of potable water for domestic use?(4)

5.What are the various methods of population forecasts? (4)

6.The census records of a city show population as follows:

Present	50,000
Before one decade	47,100
Before two decades	43,500

Before three decades41,000 Workout the probable population after one, two and three decades by using Incremental increase method.

3. Mention the common impurities in water which should be taken into account in deciding the potability of water sample. Describe the essential tests to be performed on such a sample.

4. The population figures of a town during the four decades i.e. 1960, 1970, 1980 and 1990 are 25,000, 30,500, 35,500 and42, 000 respectively. Predict its population in the year 2000 and Compare the results through Arithmetical progression. Geometrical progression, Incremental increase method and Decreasing Rate method.

5. Discuss the various Physical, Chemical and Biological characteristics of water.

6. Name the various methods of population forecast and explain the circumstances under which it is applicable.

UNIT II CONVEYANCE SYSTEM

17. 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.

18. 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 can not be used for high pressures generally not used for pressures above 7kgkm

c. When large they are heavy and uneconomical.

d. They are likely to break during transportation or while making connection.

19. 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

20. How the corrosion of metal pipes is reduced?

The corrosion of metal pipes can be reduced by following method a.

Protective coating

b. Selecting proper pipe material

c. Quality of water

d. Cathodic protection.

21. What are the factors governing location of intake?

a. Intake structures are nearer to the treatment.

b. Intake structures must never be located near the disposal of water.

c. Intake structures should never be located near the navigation channel.

d. There should be sufficient scope for future expansion.

22. What are the types of intake?

1. Simple submerge intake. a.

Simple concrete blocks. b.

Rock fill timber blocks.

2. Intake structures.

a. Wet intake.

b. Dry intake.

23. What are vitrified clay pipes?

They are not generally used as pressure pipe for carrying because they are weak in tension. They are

extensively used for carrying sewage and drainage at partial depth.

24. 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.

25. What are tube wells?

Tube wells which a long pipe or a tube is bored or drilled deep in to the ground.

26. What are the various methods of purification of water?

The various methods of purification of water are, a.

Screening.

PART-B

1.Draw a neat sketch of canal intake and explain the working principle. State its merit and demerits.

2.Describe the procedure adopted for laying and testing of water mains.

3.Write a brief note leak detection and state the various tests used to detect the leakage of water.

4.Explain in detail about „Canal intakes" with a neat diagram.

5.Compare the merits and demerits of the „Continuous" and „intermittent" systems of water supply.

6.(b) Give sketches of the

following: (i)Elevated Reservoir

(ii)Surface Reservoir

7.Explain the procedure for the complete testing of a newly laid C.I. pipe for carrying water supply.

8.What factors are required to be considered in the selection of the type of pump? Discuss the situations under which the following types of may be used.

a.Reciprocating pumps

b.centrifugal pumps

c.Air lift pumps.

9.What are the methods available for supplying water to the consumers? Which one do you think to be preferable and why?

10.What are intakes? Explain any two intake structure with neat sketches.

11.Write short notes on: a. Service storage b. Fire hydrant

12.Explain the treatment processes carried out for the removal of impurities in water?

13.What are the different types of reservoirs used for storage purposes? Explain any one system in a neat sketch.

b. Plain sedimentation.

c. Sedimentation aided with coagulation.

d. Filteration.

e. Disinfection.

f. Aeration.

g. softening.

h. Miscellaneous treatments such as fluoridation, recarbornation, liming, desalination.

27. 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.

28. Define coagulation?

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

29. 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.

30. What is schmutzdecke or dirty skin?

The harmless compound so formed, generally form a layer on the top which is called schmutzdecke or dirty skin. The layer helps in absorbing and straining out the impurities.

31. 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.

32. Define sterilization?

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

33. What is chloramine?

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

34. What is softening?

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

35. Define alkalinity?

It is defined as the quantity of ions in water that will react to neutralize the hydrogen ion. It will thus

represent the ability of water to neutralize acid.

36. What is permutit?

The most common artificial zeolite is a white colored substance called permutit manufactured from

feldspar, kaolin, clay, and soda.

37. Differentiate between slow and rapid sand filter with respect to (a). Rate of filtration.

(b). loss of head.

38. 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.

39. 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.

40. Define fluoridation?

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

41. 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.

42. 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.

43. What are various methods of distribution system?

The various methods of distribution system are, a.

Gravity system.

b. Pumping system.

c. Combined gravity and pumping system.

44. 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.

45. 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.

46. 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.

47. What are the two types of water meter?

The two types of water meter are,

a. Inferential meter.

b. Displacement meter.

48. Define time of concentration?

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

49. List the components of sewerage system?

The components of sewerage system are,

a. House sewers.

b. Lateral sewers.

c. Branch sewers.

d. Main sewers.

e. Outfall sewers.

f. Man holes.

50. What is peak drainage disturbance?

The method estimating the maximum rate of storm runoff is called as peak drainage disturbance.

51**.Mention some shapes of sewer pipes**

Circular shape

Egg shape

Horse shoe shape

Parabolic shape

Elliptical shape

Rectangular shape

52.What are the forces acting on sewer pipes?

Internal pressure ofsewage

Pressure due to external loads

Temperature stress

Flexural stress

53.What are the materials used for constructing sewer pipes?

Vitrified clay

Cement concrete

Asbestos cement

Cast iron

54.Give some qualities of the good sewer pipes

Resistance to corrosion

Resistance to abrasion

Strength and durability

Light weight

Economy and cost

55.What are the tests conducted in sewer pipes after laying?

Test for leakage(water test)

Test for straightness of alignment and obstruction

56.Define sewer appurtenances

Sewer appurtenances are those structures which are constructed at suitable interval along a sewerage

system and help in its efficient operation and maintenance

57.Mention the classification of manholes

Shallow manholes

Normal manholes

Deep manholes

58.What is meant by catch basins?

Catch basins are nothing but street inlets provided with additional small setting basins for avoiding the

entry of the particles like grit, sand ,debris in to the sewer pipes

59.Define inverted siphons

Inverted siphon is defined as the sewer section constructed lower than the adjacent sewer section and

it runs full under gravity with pressure greater than the atmosphere

60.What are the various methods of ventilation for sewers?

Useof ventilating columns

Use of ventilating manhole covers

Proper design of sewers

Use of mechanical devices

61.What are the different types of pumps used commonly for pumping the sewage?

Centrifugal pump

Reciprocating pump

Pneumatic ejectors (or) Air pressure pumps

PART-B

1(a) Discuss the relative merits of rapid sand filters and slow sand filters indicating the condition favorable for the choice each.

(b)Discuss the use of chlorine as disinfecting agent with reference to a.

a)Its disinfecting action.

b)Dosage

c)Its form

d)Testing its residuals

2.Distinguish between the slow sand filter and rapid sand gravity sand filters in a tabular form.

3.Water has to be purified for a town whose daily demand is 9 x 106 litres/day. Design a suitable sedimentation tank of the water works fitted with sludge remover. Assume the velocity of flow, in the sedimentation tank as 22cm/min and the detention period as 8 hrs.

4.(a) State the principles of working of a horizontal flow sedimentation tanks.

(b)What should be the size of a rectangular sedimentation tank to treat 1.0 MLD with 2 hours detention and overflow rate less than 40,000 litres per day per sq.m. of the surface areas?

5.(a) What are the merits and demerits of the rapid sand filters as compared with slow sand filters?

(b) What is air binding? What are its effects?

6.(a) Explain with a neat sketch, the working of a continuous flow type sedimentation

tank. (8)
(b) Explain the principle of coagulation (4)
7. (a) List out the differences between slowsand and Rapid sand filters. (8)
(b) What is the necessity for disinfection of water?(4)

8. Draw a typical line sketch of water treatment plant and explain the various components in it.

9. What do you understand by the term water softening? Explain with neat sketch the zeolite process for softening of water.
10.Design a sedimentation tank for water treatment plant to treat 8 MLD of water. Assume a surface loading rate of 30 m3/m2/day. Check the adequacy of detention time. Draw the plan of the water treatment plant.

Unit -4 ADVANCED WATER TREATMENT

62. What is the purpose of using velocity control device in a grid chamber?

The velocity control device in a grid chamber is providing for settling the grid particles in the sewer

pipes and then it is removed by an endless chain to which perforated buckets are fixed

63. Mention the classification of treatment process of sewage

Preliminary treatment

Primary treatment

Secondary treatment

Complete final treatment

64. State the purpose of using the skimming tanks

The skimming tanks are employed for removing oils & grease from the sewage

and placed before the sedimentation tanks

65. Why baffles are provided in the sedimentation tank in sewage treatment?

Baffles are required to prevent the movement of organic matters and it escapes along with the effluent and to distribute the sewage uniformly through the cross section of the tank and thus to avoid

short circuiting

66. What are the types of trickling filters?

Conventional trickling filter

High rate trickling filter

67. What are the operational troubles in trickling filter? Fly

nuisance

Odour nuisance

Ponding troubles

68. Define sludge

The sludge age is defined as the average time for whichparticles of suspended soil remain under

aeration

69. Define sludge volume index

sludge volume index is defined as the volume occupied in ml by 1 gm of solids in the mixed liquor after

settling for 30 minutes and is determined experimentally

70. What is meant by biodegradable organic matter?

The organic matters is decomposed by bacteria under biological action is called biodegradable organic

matter

71. What are the various tests for finding the quality of sewage?

Turbidity test

Colour test

Odour test

Temperature test

72.What is meant by relative stability of a sewage effluent?

The relative stability of a sewage effluent is nothing but the ratio of oxygen available in the effluent to

the total oxygen required to satisfy its first stage BOD demand

73. What are the methods of disposing the sewage effluent

Disposal in water(dilution) By

disposal on land

74.What are the different types of sewage treatment?

Contact beds

Intermittent sand filters

Trickling filters

Miscellaneous type offilters

75.Define sludge digestion

The process of stabilization of the sewage particles are called sludge digestion

76.What are the stages in the sludge digestion process?

Acid fermentation

Acid regression

Alkaline fermentation

77.What is meant by ripened sludge?

The ripened sludge is nothing but the digested sludge is collected at the bottom of the digestion tank

and it is alkaline in nature

78.What are the factors affecting sludge digestion and their control?

Temperature

pH value

mixing and stirring of raw sludge with digested sludge

79.What are the types of incinerators has primary designed?

multiple hearth furnace

fluid bed furnace and infra red furnace

80.What are the methods of aeration ?

diffused air

mechanical aeration

combined aeration

81.What is meant by sludge concentrator unit ?

the sludge obtained in a sludge digestion plant contains too much of moisture and is therefore very

bulky may be reduced in its moisture content by sending into sludge thicker unit (or) sludge

concentrator unit

82.Give different types of thicker unit

Gravity thickener

Floating thickener

Centrifugal thickener

83.What are the methods of disposal of septic tank effluent?

Soil absorption system

Biological filters

up flow anaerobicfilters

84.Define percolation rate

percolation rate is defined as the time in minuets required for sewage of water through that ground by

one cm

85.what are the soil absorption system

dispersion trench

seepage pit (or) soak pit

86.What are the methods of applying sewage effluents to forms ?

surface irrigation

free flooding

border flooding

check flooding

87.What is meant by oxygen sag curve?

The amount of resultant oxygen deflect can be obtained by algebraically adding the de - oxygenation

and re -oxygenation curves. The resultant curve so obtained is called oxygen sag curve

88.What is meant by sewage sickness?

The phenomena of soil getting clogged when the sewage is applied continuously on a piece of land is

called sewage sickness

89.What are the preventive methods for sewage sickness?

Primary treatment of sewage

Choice of land

Under drainage of soil

Giving rest to land and Rotation of crops

90.Define dilution factor

The dilution factor is defined as the ratio of the amount of river water to the amount of the sewage

PART-B

1. Explain the Nalgonda technique of deflouridation by exhibiting its use for an individual rural household.
2. Describe the methods of effective usage of waste water.
3. What is aerator? Explain different type of aerators with sketches.
4. Write notes on : i) Membrane process ii) Desalination process
5. What are the effects of excess concentration of fluoride in water and list the methods available for defluoridation and explain any one of them. (10)
6. Write a note on iron removal from water for small communities. (6)

7. What are the types of hardness present in water? (4)
8. Explain the ion exchange method of water softening with a sketch. (12)
9. Describe the procedure for removal of iron from raw supplies in rural areas.

Unit -5 WATER DISTRIBUTION AND SUPPLY TO BUILDINGS

91.What is meant by self purification?

The automatic purification of natural water is known as self

92.List various natural forces of self purification

Physical orcesf

Chemical forces

93.What are the factors affecting the reduction ?

Temperature

Turbulence effect of wind

Hydrographic

Available dissolved oxygen

Rate of re-aeration

94.What is meant by prim lake pollutant ?

The phosphorus which containsin domestic sewage as well as in the industrial waste which affect the

water quality of the lake and its called prim lake pollutant

95.What is meant by de oxygenation curve?

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

96.How the river maintaining its clearness?

The turbulence in the water body helps in breaking the surface of the stream and helps in rapid re

aeration from the atmosphere. Thus it helps in maintaining aerobic conditions in the stream and keeping

it clear

97.Name the biological zone in lakes

Euphonic zone

Littoral zone

Benthic zone

98.What is meant by re -oxygenation?

In order to counter balancethe consumption of D.O due to the de – oxygenation ,atmosphere supplies

oxygen to the water and the process is called the re -oxygenation

99.What is meant by zone of recovery?

The zone in which the river water tries to recover from its degraded conditions to its former appearance is called zone of recovery

100.What is meant by sludge banks?

When the solid waste are thrown into the sea water, chemical react with the dissolved matter of sea water and resulting in some precipitation of solid waste giving a milky appearance to sea water forming the sludge banks

PART-B

1. Draw a neat sketch of a rain water harvesting structure and write the problems associated with operation and maintenance of rain water harvesting structures.
2. Discuss in detail the concept of linking of Indian rivers. Write the various constraints in executing this project.
3. Discuss with neat sketches the various types of layout of distribution system.
4. Discuss the various possible water distribution arrangements in multistoried buildings.
5. What are the general design guidelines for a water distribution system?

6 Briefly explain the house service connection with a sketch.

7.Explain the hardy cross method used for pipe network analysis in water distribution system.

8.What are the main functions of the storage and distribution reservoirs?

9.What are the four different systems of distribution? Explain any one system in a neat sketch.

10.What are the different types of pipes in use for carrying water Indicate approximately diameters and pressure ranges in which they are used.