

VALLIAMMAI ENGINEERING COLLEGE
CE2304 ENVIRONMENTAL ENGINEERING I
III YEAR V SEM
QUESTION BANK

UNIT I

PART A

1. List four factors affecting per capita water demand.
2. What are the components of a water supply system?
3. What is the objective of water supply system?
4. What is the significance of Nitrite and fluoride in water?
5. Define Design period.
6. Define the term potable water.
7. State the causes for water pollution.
8. Write the advantage of sub-surface sources
9. What are the uses of nomograms?
10. State the effects when each of the following substances exceeds the prescribed limits in a water sample. (a) Nitrates (b) fluorides.
11. Define 'percapita demand'.
12. Differentiate between Temporary and Permanent hardness?
13. What is meant by equalizing reservoirs?
14. Rainwater harvesting is the need of the hour – justify.
15. What are the different tests done during water analysis?
16. What do you understand by the term per capita demand? In a town or city for what purpose generally water required.
17. What are the factors to be considered for rain water harvesting?
18. What are the various methods by which ground water recharge is accomplished?
19. List out any four factors affecting rate of demand?

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 decades	41,000

Workout the probable population after one, two and three decades by using Incremental increase method.
7. 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.

8. The population figures of a town during the four decades i.e. 1960, 1970, 1980 and 1990 are 25,000, 30,500, 35,500 and 42,000 respectively. Predict its population in the year 2000 and Compare the results through Arithmetical progression, Geometrical progression, Incremental increase method and changing Increase Rate method.
9. Discuss the various Physical, Chemical and Biological characteristics of water.
10. Name the various methods of population forecast and explain the circumstances under which it is applicable.
11. Explain the different sources of water and their characteristics with respect to turbidity, hardness, chloride and microbiology.
12. In two periods each of 20 years a city has grown from 50000 to 110000 and 160000 find the population expected in the next 20 years and also the saturation population.
13. Explain the different methods of population forecasting. (8)
14. Explain the significance of different water quality parameters. (8)
15. Determine 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. (8)

Year	1961	1971	1981	1991	2001
population	25000	52000	94000	164000	247000

16. Draw the cross section of an intake structure and list the factors to be considered in location of intake structures. (8)
17. The population of a town as per part census records is given below for the years 1951 to 2001. Forecast the population in the years 2026 and 2041 respectively using the following methods. i. Arithmetical increase method ii. Incremental increase method iii. Geometrical increase method.

Census year	1951	1961	1971	1981	2001
population	44487	62356	78538	98861	133582

18. List out 10 parameters of water quality standards as per the Tamilnadu pollution control board standards. (8)
19. Write a short note on various characteristics of water.

UNIT II

PART A

1. Draw the typical line sketch of 'Dead end system'.
2. What major precautions are taken in handling and laying water pipe lines?
3. What are the factors be considered for locating a pumping station?
4. What are the requirements of a good distribution system?
5. Compare the merit and demerits of continuous and intermittent supply system water
6. What are the objectives of public water supply scheme?
7. What are the intakes?
8. Differentiate between 'dry' and 'wet' intake.
9. What are the different materials used for water supply pipes?
10. Mention any two differences between intermittent and continuous water supply.
11. Give any two methods of leak detection in pipes.
12. How do you select pipe material for water supply scheme?
13. What is the loss of head in a CI transmission main of 300 mm in diameter and 2 km length with C- value 100, when it carries a flow of 10 m³/ min?
14. What are the two types of Intake according to their position?

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.

UNIT III

PART A

1. What is meant by super chlorination?
2. List out four coagulants used in treatment of water.
3. What do you mean by 'tuberculation' in pipelines?
4. Draw the sequence of treatment you would recommend for ground water free from pollution but containing dissolved salts in large concentrations.
5. What do you mean by disinfection?
6. What is the purpose of coagulation?
7. How can you classify filters into different categories?
8. Sketch the layout plan of water treatment plan.
9. What are various processes required to remove the various types of impurities?
10. List the commonly using disinfectant.
11. What is the difference between Unit operations and Unit Process?
12. What are the advantages of chlorine as disinfectant?
13. State the purpose and the design principle of Flash mixer.
14. Distinguish between Demineralisation and Disinfection.
15. Define: Detention time and surface overflow rate for a sedimentation tank.

16. Distinguish the objectives of Screen chamber and Grit chamber.

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 9×10^6 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 slow sand 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 $30 \text{ m}^3/\text{m}^2/\text{day}$. Check the adequacy of detention time. Draw the plan of the water treatment plant.
11. With the help of the diagram, explain the process of Rapid sand filter.
12. (a) Draw the longitudinal section of a rectangular sedimentation tank indicating the various zones.
(b) The following data are corresponding to a clariflocculator find the volume of a flocculation and its diameter
Detention time: 30 min, Depth: 3 m, Outer diameter of the inlet shaft = 0.9 m, water to be treated: 10 ML/d
13. (a) with a neat sketch (cross section) explain the working of a slow sand filter.
(b) Write a short note on 'break point chlorination'
14. (a) determine the size of a Flocculator and Clarifier to treat 1 million litres of water per day.
(b) Explain the need and methods for softening and Disinfection of water.

UNIT IV

PART A

1. Mention the type of aerators used in the water treatment.
2. Define desalination.
3. What is aeration.
4. Write a short note about demineralization.
5. Distinguish between demineralization and desalination.
6. Write a short note on membrane process.
7. What is aerator?
8. Write some advance treatment methods for water treatment.
9. Define reverse osmosis.
10. Define water softening.
11. Write a short note for removal of manganese.
12. Describe the maintenance aspects for water treatment plant.
13. List the methods available for defluoridation.
14. Write any two effects of hardness in water
15. Explain defluoridation.
16. Write a short note for removal of iron.

PART B

1. Explain the Nalgonda technique of defluoridation 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 V

PART A

1. What are the layouts of water distribution system?
2. What is ferrule in house service connection?
3. What is the role of computer applications in water supply systems?
4. How do you identify leakage in pipelines?
5. What are the advantages of steel pipes in water supply project?
6. What are the general considerations of the water distribution system design?
7. Distinguish between Gravity system of distribution and pumping system of distribution?
8. What are the various methods of distributing water?
9. What do you mean by 'hydraulically balanced network'?
10. What do you mean by 'appurtenances'?
11. Sketch any two types of joints used for water mains.
12. What are the four different systems of distribution?
13. Draw a neat sketch of a rain water harvesting structure?
14. What are 'Air Valves'?

15. What are the different types of valves?
16. Mention any three pipe appurtenances?
17. List some of the advantages of cement concrete pipes?
18. Explain Hardy Cross method of pipe network analysis.
19. Define service reservoir?
20. List the various types of layout of distribution system

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.
11. Explain and Sketch any two types of joints used for water mains.
12. What are the points to be considered for public water supply?
13. What are the different method of analyzing a given distribution system? Explain Hardy Cross method of pipe network analysis.
14. Mention any three pipe appurtenances with neat sketches.
15. Discuss in detail about 'Radial method' of layout of distribution pipes (6)
16. What are the points to be considered in the maintenance of distribution system of water supply?
17. (a) What considerations govern the choice of a particular type of pump in water supply project? (6)
 (b) List out the advantages of cement concrete pipes in water supply project. (6)
19. What are 'Air Valves'? Explain their working in detail. (4)
20. Describe the various methods for laying the distribution lines.