



- Notes :
1. All questions carry marks as indicated.
 2. Solve Question 1 OR Questions No. 2.
 3. Solve Question 3 OR Questions No. 4.
 4. Solve Question 5 OR Questions No. 6.
 5. Solve Question 7 OR Questions No. 8.
 6. Solve Question 9 OR Questions No. 10.
 7. Solve Question 11 OR Questions No. 12.
 8. Due credit will be given to neatness and adequate dimensions.
 9. Assume suitable data whenever necessary.
 10. Diagrams and chemical equations should be given whenever necessary.
 11. Illustrate your answers whenever necessary with the help of neat sketches.
 12. Use of non programmable calculator is permitted.

1. a) Describe in brief the methods of collection for various types of waste in the conservancy system. **6**
- b) The following data is available regarding various types of area and the corresponding impermeability factors of a town. **7**

Type	% Area	Impermeability coefficient
1) Roof	15%	0.9
2) Pavement	20%	0.8
3) Lawn, garden, vegetation	40%	0.15
4) Unpaved	15%	0.20
5) Wooded	10%	0.05

If the total area of the district is 20 hectares, determine the maximum storm water flow for a rainfall intensity of 50 mm/hr having a frequency of once in five years. Use Rational formula.

OR

2. a) Write notes on **any two**. **6**
 - i) Self - cleansing velocity
 - ii) Non - scouring velocity
 - iii) Hydraulic Equivalent section
 - iv) Circular and Egg shaped sewer section
- b) A main combined sewer is to be designed to serve an area of 12 sq.km with a population density of 250 person/ hectare. The average rate of sewage flow is 250 litres/capita / day. The maximum flow is 100% in excess of average together with the rainfall equivalent of 15 mm in 24 hours, all of which are runoff. Determine the capacity of the sewer. Taking the maximum velocity of flow as 3m/sec. Determine the size of the circular sewer. **7**
3. a) Write a note on different types of sewer and the function of each. **6**
- b) Explain with the help of neat sketches, various system of house plumbing for drainage of a building. **7**

OR

4. a) Discuss various points that should be kept in mind while selecting the site for a sewage pumping station. 7
- b) Enlist the sewer appurtenances. Explain with the help of neat sketch "Drop manhole". 6
5. a) The BOD of a sewage incubated for one day at 30°C has been found to be 100 mg/l. What will be the 5 - day 20°C BOD. Assume $K = 0.12$ (base 10) at 20°C. 7
- b) Draw a layout of a conventional sewage treatment plant and state function of each unit. 7
- OR**
6. a) Explain physical & chemical characteristics of waste water. 6
- b) Design a primary settling tank of rectangular shape for a town having a population of 50,000 with a water supply of 180 litres per capita per day. 8
7. a) What do you understand by secondary treatment (or biological treatment) of waste water? Enumerate various treatment techniques used for biological treatment. 7
- b) Write the difference between Activated sludge process and trickling filter. 7
- OR**
8. a) Draw a neat sketch of "oxygen sag curve" and explain the characteristics of each zone. 6
- b) Write short notes on - **any two**. 8
- i) Zero discharge concept ii) Sludge Digestion Tank
- iii) Sludge drying bed iv) Activated sludge process
9. a) Draw neat sketch and explain the working of "Aqua Privy". 6
- b) Design a septic tank for a hostel having 125 persons. Assume data if necessary. 7
- OR**
10. a) Write short note on sullage collection and disposal. 6
- b) Discuss in brief various treatment processes adopted for treating Industrial wastewater. 7
11. a) Write a note on "Effect of air pollution on man and materials". 6
- b) Give the classification of "Air Pollutants" with their sources. 7
- OR**
12. a) Give the list of Air Pollution controlling equipments and explain any one in detail. 7
- b) Write short notes on **any two**. 6
- i) Effect of Air Pollution on Plants & Animals.
- ii) Climate change
- iii) Carbon credit system.
