

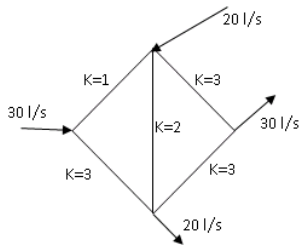
1. Forecast the population of the year 2020 for a city using arithmetic increase and geometric increase method. The population for the years 1970, 1980, 1990, 2000, 2010 were 70000, 100000, 150000, 200000, 240000 respectively.
(20 marks)

OR

2. (a) Elaborate on the physio-chemical characteristics of water. (15 marks)
(b) List down the various water demands. Mention the formula used for calculating fire demand. (5 marks)
3. Make a neat sketch of a typical water treatment plant and briefly explain the various treatment processes. (20 marks)

OR

4. A city with a population of 75,000 has to be supplied with water from an intake well from a river. The average per capita demand of the city is estimated to be 200 lpcd. Design a coagulation cum sedimentation tank for the city.
(20 marks)
5. Analyse the distribution network shown below using Hardy Cross method. Use Darcy's formula for calculation of head loss. (20 marks)



OR

6. Describe the working of trickling filter with a neat sketch. Also classify the different types of trickling filters. (20 marks)
7. A city has a population of 45,000 with a per capita demand of 200 lpcd. The average coefficient of runoff for different areas of the city is given in the table below. Calculate the total discharge for which a partially separate sewer has to be designed for the city. (20 marks)

% of total surface area	Type of surface	Coefficient of runoff
25	Roof top	0.85
28	Paved yards	0.63
27	Lawns	0.41
20	Forest	0.26

OR

8. With a neat flowchart, elaborate the different methods of sewage treatment of Bethany hostel of Karunya University. Also briefly explain the process of biogas plant at the premises of Bethany hostel. (20 marks)
9. With neat sketches, summarize the different layout of distribution networks. (20 marks)

Wishing you All the Best