Reg No.:_____ **00000CE405121902** Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Seventh semester B.Tech examinations (S), September 2020

Course Code: CE405
Course Name: ENVIRONMENTAL ENGINEERING- I

Max. Marks: 100 Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks. Marks

1 a) With the help of neat sketches, explain Infiltration gallery and Infiltration well? (4)

b) Enlist any four type of pumps usually used in water supply systems and the main factors which are to be considered while selecting a suitable pump. (5)

c) Explain logistic curve method of population forecasting? (6)
The present population of a city is 3,00,000 which was 1,70,000 twenty years ago and it was 30,000 forty years ago. Determine the population after next 20 years by logistic curve method?

2 a) Define per capita water demand? List any four major factors affecting the rate of demand of water and explain the concept of fluctuations in water demand? (6)

b) The population statistics pertaining to a town are given below. Estimate the population expected in the year 2020 by Geometrical and incremental increase method? (6)

Year	1960	1970	1980	1990	2000
Population	70,000	1,00,000	1,50,000	2,10,000	2,50,000

c) Explain the significance of indicator organisms like *E.coli* in bacteriological analysis of water? List various methods of enumerating them. (3)

3 a) Explain the significance and analysis of any four important physical characteristics and any six chemical characteristics of drinking water. (10)

b) Define intake works in a water supply scheme? With the help of a neat figure, explain any one type of intake structure? (5)

PART B

Answer any two full questions, each carries 15 marks.

4 a) Distinguish between slow sand and rapid gravity filters? (5)

b) A water treatment plant treating 50 MLD of water requires 20 mg/l of filtered alum? If this water has 5 mg/l of alkalinity as $CaCO_3$, determine the quantity of alum and quick lime required per day? (5)

c) Distinguish between discrete particle settling and flocculent settling. Derive an expression for settling velocity of a discrete particle in water. (5)

5 a) Design a mechanical rapid mix unit for treating water at the rate of $6000 m^3$ / day. Assume a detention period of 30 seconds and velocity gradient of $600\ s^{-1}$ (8)

b) A circular sedimentation tank (bottom slope of 1V:12H) fitted with standard sludge removal equipment is to handle 3.6 MLD of water? If the detention period of the tank is 5 hours and the depth of the tank is 3m, what should be the diameter of the tank? (4)

c) Write a note on any three operation troubles in filters. (3)

6 a) Design the principal components of a Rapid sand filter including manifold and under drainage system for treating 4 MLD of water? (12)

b) Compare alum and iron salts as coagulant. (3)

PART C

Answer any two full questions, each carries 20 marks.

7 a) Enlist and explain the different layout of distribution networks with their merits and demerits ? (6)

b) Explain Hardy-Cross method of analysis of complex pipe networks? (8)

c) Differentiate fluoridation and defluoridation process. Give an example for each case. (6)

8 a) Explain Equivalent pipe method of water distribution network analysis. (6)

b) List out common methods of disinfection usually employed in water treatment. Determine the annual requirement of bleaching powder to treat 6MLD of water which requires 0.3ppm of chlorine. The available chlorine in bleaching powder was found to be 25% only. (9)

c) What are the requirements of a good water distribution system? (5)

9 a) Enlist any four factors affecting the efficiency of chlorination. Calculate the dosage of chlorine in mg/l and the chlorine demand of water if chlorine usage in the treatment of 20,000m^3 of water per day is 10 kg/day. A residual chlorine after 10 minutes of contact is to be maintained at 0.2 mg/l. (5)

b) Enlist various pipe appurtenances in a water distribution network and with neat sketches explain any two of them. (10)

c) Discuss demineralisation process and electro dialysis in water treatment. 5

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