BACHELOR OF ENGINEERING (CIVIL ENGINEERING) EXAMINATION 2024

[Third Year; Second Semester]

WATER SUPPLY ENGINEERING

Total Time: Three Hours | Full Marks 100

Group A : Answer any four questions **4x15**

1. Derive the Stokes Law for a settling particle in laminar flow

   Calculate the settling velocity of a discrete particle in water, under the condition when Reynolds number is less than 0.5. The specific gravity is 2.65 and diameter is 0.005mm. Assume kinematic viscosity is 1.01×10^{-2} cm^2/sec.

2. Discuss the different mechanism for coagulation.

   Determine the quantity of alum required in order to treat 20 million litter of water per day at a treatment plant where by 'Jar test' the alum dose is fixed on 20PPM.

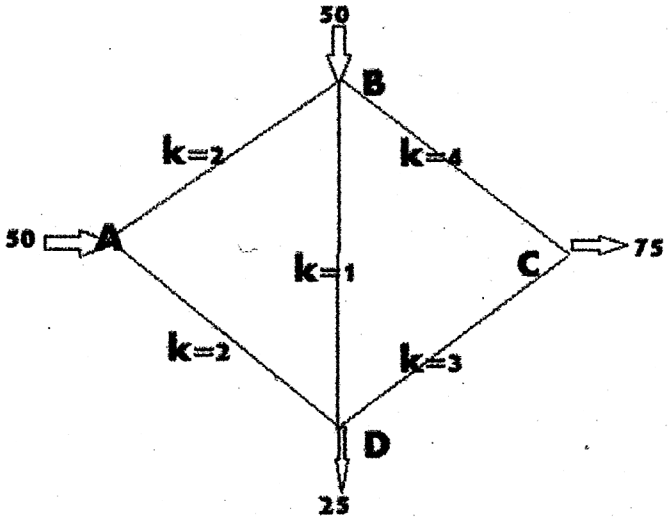
3. Discus the different stages of Chlorination with showing graphically the different stages.

   Laboratory data show that 99.9% kill of microorganisms could be obtained in 10 min with a concentration of 12 mg/l. What should be the contact time to obtain 99.99% kill with the same dose of disinfection.

4. . Determine the future population for the year 2041 from the following data for a town; estimate by Arithmetical increase and Incremental increase method.

Year	Population
1971	75,000
1981	80,000
1991	1,25,000
2001	1,80,000
2011	2,25,000

5. Determine the distribution of flow in each pipe network shown in the following Fig. for an inflow of 50 units at the junction A and 50 units at B and outflow of 75 units and 25 units at C and D respectively. The K values for different pipes are shown in the Fig.



6. Deduce the Dupuit Formula for Unconfined Aquifers (Gravity Wells).

   A 30 cm diameter well penetrates 25m below the static water table. After 24 hours of pumping @ 5400 litres/minute the water level in a test well at 90 m distance is lowered by 0.53m and in a well 30 m distance the drawdown is 1.11m a) what is the permeability of the aquifer?
   b) Also determine the drawdown in the main well (which is 30 m away).

7. The estimated hourly consumptions of water for a town for one day are given in the table. Determine the capacity of the distribution reservoir if the pump installed can supply the water in the reservoir at a uniform rate of 1.45 cu. m/sec.

Time in hr	Consump. in Million litre /hr
1	2.45
2	2.25
3	2.14
4	2.30
5	2.55
6	2.60
7	3.50
8	5.25

9	6.10
10	6.55
11	7.25
12	7.35
13	7.55
14	6.35
15	5.95
16	5.75
17	5.65
18	7.45
19	7.30
20	7.25
21	5.65
22	4.50
23	3.70
24	2.85

Group B : Answer any four questions **4x10**

8. Discuss the different processes bring about the purification taking place in a filter bed.

9. Define the following
   a) Aquifer, b) Aquifuge, c) Aquitard, d) Aquiclude

10. Discuss the Bacteriological quality guideline for water in distribution system.

11 What is the acceptable limit for drinking water for followings
   a) Turbity (units in J.T,U) , b) Total dissolved solid (mg/l) , c) Iron as Fe (mg/l) , d) Arsenic as As (mg/l) , e) Total Hardness as $CaCO_3$

12 For a city of a population 1,50,000, find the followings
   i) Domestic and non-domestic demand
   ii) Fire demand
   iii) Maximum hourly demand for the maximum day

13. What are the factors affecting per capita water demand?

14. Discus the Factors affecting losses and wastes of water in a water supply scheme.

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