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PRESIDENCY UNIVERSITY, BENGALURU
SCHOOL OF ENGINEERING

Max Marks: 80

Max Time: 120 Mins

Weightage: 40 %

ENDTERM FINAL EXAMINATION

I Semester AY 2017-18

Course: **CIV217 Environmental Engineering-1**

21 DECEM 2017

Instructions:

- i. Write legibly
 - ii. Scientific and non programmable calculators are permitted
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Part A

[4 Q x 4 M= 16 Marks]

1. What is meant by disinfection in water treatment? Give the requirements of an ideal disinfectant.
2. Give a comparison of continuous and intermittent system of water supply.
3. Define Filtration and list the mechanism's involved in filtration
4. Define the following
 - a) Plain chlorination
 - b) Pre chlorination
 - c) Post chlorination
 - d) Super chlorination

Part B

[4 Q x 6 M= 24 Marks]

5. If chlorine usage at the treatment plant is 12 kg/day to treat 24 MLD of water. If chlorine demand of water is 0.4 mg/l, find the residual chlorine concentration in water.
6. Design an ion exchanger to treat 2.5 MLD of with a total hardness of 250 mg/l as CaCO_3 . Water applied at a rate of $0.5 \text{ m}^3/\text{min}/\text{m}^2$ and hardness adsorbing capacity of ion exchanger is $100 \text{ kg} / \text{m}^3$.
7. A water treatment plant is required to process $28800 \text{ m}^3/\text{day}$ of raw water (density = $1000 \text{ kg} / \text{m}^3$, kinematic viscosity = $10^{-6} \text{ m}^2/\text{s}$). The rapid mixing tank imparts a velocity gradient of 900 S^{-1} to blend 35 mg/l of alum with the flow for a detention time of 2 minutes. The power input (W) required for rapid mixing is?
8. For water, the dosage of break point is 1.5 mg/l and residual chlorine at that time found to be 0.3 mg/l. If cumulative chlorine added is 2 mg/l, the residual chlorine will be.

Part C

[2 Q x 10 M= 20 Marks]

9. At a town of present population 50,000 have average per capita water demand of 160 lpcd. Water is pumped in to an overhead tank at a uniform rate continuously for 24 hours of the day. The demand pattern is shown below.

Hours	0 - 8	8 - 10	10 - 16	16 - 20	20 - 24
Demand in % of 24 hours demand	5	40	20	25	10

Determine the required balancing storage capacity of the overhead tank.

10. Find out the percentage of HOCL found in water, when water is disinfected with a chlorine dose of 0.6 mg/l at a pH = 7. Also find out HOCL concentration in mg/l.
Take ionization constant $K = 2.7 \times 10^{-8}$ mol/lit.

Part D

[2 Q x 10 M= 20 Marks]

11. A water treatment plant is designed to treat 0.45 m³/sec of turbid water. Number of filter units is equal to 4, rate of filtration is 5 m³/m²/hr, back wash rate = 6 times rate of filtration.
Take L: B = 2:1.
- Determine the length and breadth of filter unit
 - Determine flow rate in wash water trough , if two troughs are provided
12. Calculate the amount of lime and soda required to treat two million litre (ML) of hard water, containing carbonate hardness equal to 150 mg/l as CaCO₃, and magnesium hardness equal to 90 mg/l as CaCO₃, and a total hardness of 240 mg/l as CaCO₃.



PRESIDENCY UNIVERSITY, BENGALURU
SCHOOL OF ENGINEERING

Max Marks: 20

Max Time: 60 Mins

Weightage: 20 %

TEST 2

1 Semester 2017-2018

Course: **CIV 217 Environmental Engineering-1**

24 OCT 2017

Instructions:

- i. Write legibly
 - ii. Scientific and non programmable calculators are permitted
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Part A

(3 Q x 3 M= 9 M Marks)

1. In a water treatment plant, the pH values of incoming and outgoing waters are 7.2 and 8.4 respectively. Assuming a linear variation of pH with time, the average pH value of water is?
2. In water sample, concentration of CO_3^{2-} ions = 90 mg/l and HCO_3^- ions = 61 mg/l. What is the alkalinity of water sample in mg/l as CaCO_3 ?
3. For a water sample the total alkalinity is 200 mg/l as CaCO_3 . The concentration of Ca^{2+} ions is 120 mg/l, and Mg^{2+} ions is 60 mg/l. What is the total hardness, carbonate hardness and non-carbonate hardness in mg/l as CaCO_3 ?

Part B

(1 Q x 5 M= 5 Marks)

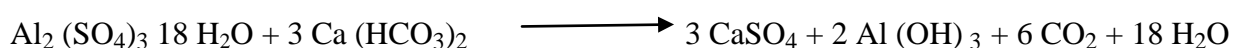
4. A rectangular sedimentation tank is designed for a surface overflow rate of 12,000 liters/hr/m². What percentage of suspended particles of diameter 0.03 mm will be removed in the tank. Take kinematic viscosity (ν) = 0.897 mm²/sec and specific gravity of particles 2.65.

Part C

(1 Q x 6 M= 6 Marks)

5. If 8 mg/l of alum dose is added to 5 MLD of water.
 - a) What is total amount of alum added per day?
 - b) What is the amount of hardness imparted to the water in terms of kg/day?

Use the following chemical equation





PRESIDENCY UNIVERSITY, BENGALURU

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Max Marks: 20

Max Time: 60 Mins

Weightage: 20 %

TEST 1

1 Semester 2017-2018

Course: **CIV 217 Environmental Engineering-1**

21 SEPT 2017

Instructions:

- i. Write legibly
- ii. Scientific and non programmable calculators are permitted

Part A

(1 Q x 5 M= 5 Marks)

1. Define the following terms
 - a) Per capita water demand
 - b) Total draft
 - c) Coincident draft
 - d) Maximum hourly draft
 - e) Maximum daily draft

Part B

(2 Q x 5 M= 10 Marks)

2. Population statistics pertaining to a town are given below. Find the population in the year 2020 and 2030 by decrease in growth rate method.

Year	1970	1980	1990	2000	2010
Population	25000	28000	34000	42000	47000

3. A centrifugal pump driven by an electric motor lifts water through a total height of 50 m from the reservoir to the discharge end. The pump efficiency is 77 percent and the motor efficiency is 85 percent. The lift is through 300 m length of 10 cm diameter pipe and the pumping rate is 1500 liters per minute. If $4f = 0.025$, and power cost ₹ 2.25 p per kilowatt hour, what is the cost of power for pumping 5 million liters of water.

Part C

(1 Q x 5 M= 5 Marks)

4. Find out the fire demand for a town of population 1 lakh. Assuming that one fire accident breakout per month and which loss for 5 hrs. Use national board of fire underwriter's formula and express fire demand in lpcd.