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**PRESIDENCY UNIVERSITY
BENGALURU**

SET B

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2024**

Semester : Semester V - 2021

Course Code : CIV2047

Course Name :Water Infrastructure Systems

Program : B.Tech.

Date : 04-JAN-2024

Time : 9:30AM - 12:30 PM

Max Marks : 100

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.*
 - (ii) Question paper consists of 3 parts.*
 - (iii) Scientific and non-programmable calculator are permitted.*
 - (iv) Do not write any information on the question paper other than Roll Number.*
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PART A

ANSWER ALL THE QUESTIONS

4 X 5M = 20M

1. Define intake and what are the factors influencing selection of suitable site for intake.
(CO1) [Knowledge]
2. List the methods of disinfection? Explain any one chemical methods of disinfection
(CO2) [Knowledge]
3. Reaction time and pH are both identified as significant factors during chlorination. Explain the following types of chlorination and also mention their suitable conditions
a) Plain chlorination c) Post chlorination
(CO2) [Knowledge]
4. Zeolite process is a method of removing the permanent as well as temporary hardness of the water. Explain the process of zeolite reaction with equations?
(CO3) [Knowledge]

PART B

ANSWER ALL THE QUESTIONS

5 X 10M = 50M

5. The following population data has been noted from census department.

Year	Population
1950	9000
1960	13000
1970	18000
1980	23500

Compute the probable population in the year 1990,2000, 2010 using Geometric increase method.

(CO1) [Comprehension]

6. The maximum daily demand at a water purification plant has been estimated to be 13 million liters per day. Design the dimensions of a suitable sedimentation tank for the raw supplies assuming a detention period of 5 hours and velocity of flow as 22cm per minute.

(CO1) [Comprehension]

7. Rapid sand filtration is a purely physical drinking water purification method. Rapid sand filters (RSF) provide rapid and efficient removal of relatively large suspended particles. Write a short note on operational troubles of rapid sand filters.

(CO2) [Comprehension]

8. Filtration, the process in which solid particles in a liquid or gaseous fluid are removed by the use of a filter medium that permits the fluid to pass through but retains the solid particles. With neat diagram explain slow sand filter.

(CO2) [Comprehension]

9. A reservoir is an artificial lake created in a river valley by the construction of a dam. List and explain the types of reservoirs depending on elevation with respect to ground level.

(CO3) [Comprehension]

PART C

ANSWER ALL THE QUESTIONS

2 X 15M = 30M

10. A particle in stationary air will settle under the action of gravity and reach a terminal velocity quite rapidly.

a) Discuss the Types of Settling in sedimentation process. [07 Marks]

b) Find the settling velocity of a discrete particle in water under conditions when Reynolds number is less than 0.5.

The diameter and specific gravity of the particle is 5×10^{-3} cm and 2.65 respectively.

Water temperature is 20°C (Kinematic viscosity ν of water at 20°C = 1.01×10^{-2} cm²/sec). [08 Marks]

(CO2) [Application]

11. In a slow sand filter impurity in the water are removed by a combination of processes: sedimentation, straining, adsorption, and chemical and bacteriological action. List the components of the Slow sand filter.

Design eight slow sand filter beds from the following data:

Population = 50000 persons

Per capita demand = 150 liters/person/day

Rate of filtration = 180 liters/hr/m²

L=2B.

Assume more demand as 1.8 times average daily demand.

Also assume 1 unit out of 8 is standby.

(CO3) [Application]