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**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
END TERM EXAMINATION - JAN 2023**

Semester : Semester V - B.Tech CIV - 2020

Course Code : CIV2047

Course Name : Sem V - CIV2047 - Water Infrastructure Systems

Program : B.Tech. Civil Engineering

Date : 4-JAN-2023

Time : 9.30AM - 12.30PM

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.
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PART A

ANSWER ALL THE SIX QUESTIONS

6 X 5 = 30M

1. Write down the minimum domestic water consumption (Annual Average) for weaker section and LIG colonies in small Indian town and cities per IS: 1172-1993.
(CO1) [Knowledge]
2. Coagulation is a process used to remove turbidity, color, and some bacteria from water. In relation to this what are Primary coagulants and Coagulant aid with examples.
(CO2) [Knowledge]
3. Wholesome water chemically may not be pure but doesn't contain anything harmful to human being. Write the requirements of wholesome water.
(CO1) [Knowledge]
4. Find number 20 X 10 m size slow sand filters required to treat 10 MLD of water with ROF 200 liters/hr/m².
(CO2) [Knowledge]
5. Dialysis is the separation of salutes by means of their unequal diffusion of membranes. Write the operation of dialysis.
(CO3) [Knowledge]
6. Distribution reservoirs, also called service reservoirs, are the storage reservoirs, which store the treated water for supplying water during emergencies (such as during fires, repairs, etc.) and also to help in absorbing the hourly fluctuations in the normal water demand. Write a note on Surface reservoir.
(CO3) [Knowledge]

PART B

ANSWER ALL THE FIVE QUESTIONS

5 X 10 = 50M

7. Particles that will settle within a reasonable period of time can be removed in a sedimentation basin (also called clarifier). Sedimentation usually rectangular or circular with either a radial or upward flow pattern. Discuss across what zones the raw water passes during treatment.
(CO2) [Comprehension]
8. Design 6 slow sand filters (SSF) beds for the below town with:
Population = 50,000
Precipitate demand = 150 lpcd
Rate of filtration (ROF) = 180 ltr / hr/ m²
Length=2Breadth.
Assume maximum demand as 1.8 times average daily demand. Also assume that one unit out of six will be kept as stand by.
(CO2) [Comprehension]
9. Excess amounts of fluoride ions in drinking water can cause dental fluorosis, skeletal fluorosis, arthritis, bone damage, osteoporosis, muscular damage, fatigue, joint-related problems, and chronicle issues. Fluoride deficiency can cause tooth and bone weakness. In the body, most fluoride is contained in bones and teeth. Fluoride is necessary for the formation and health of bones and teeth. In relation to this discuss fluoridation and defluoridation.
(CO3) [Comprehension]
10. Distribution reservoir should be located as close as possible to the centre of demand. Water level in the reservoir must be at sufficient elevation to permit gravity flow at an adequate pressure. Discuss about elevated reservoir.
(CO3) [Comprehension]
11. pH of water can be defined as potential of hydrogen ion concentration in water. pH value denotes the concentration of hydrogen ions in the water and it is a measure of acidity or alkanity of a substance. Two samples of water A and B have pH values of 4.4 and 6.4 respectively. Determine how many times sample A is more acidic than B?
(CO1) [Comprehension]

PART C

ANSWER THE FOLLOWING QUESTION

1 X 20 = 20M

12. The process of passing the water through beds of sand or other granular materials is known as filtration. The original design is composed of a layer of gravel, then a layer of fine sand. Sometimes, however, there is an extra layer of bacteria on the top doing most of the purification. This layer of bacteria is called the Schmutzdecke. In relation to this illustrate the components of the Rapid sand filter with a neat diagram.
(CO2) [Application]
