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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**TEST 1**

**Winter Semester:** 2021 - 22

**Course Code:** CIV 2011

**Course Name:** Environmental Engineering

**Program & Sem:** B.Tech & IV Sem

**Date:** 27-04-2022

**Time:** 11:30AM – 12:30PM

**Max Marks:** 30

**Weightage:** 15%

**Instructions:**

(i) Read the all questions carefully and answer accordingly.

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries TWO marks.**

**(5Qx 2M= 10M)**

1 Physical water parameter is important to analyze for drinking water purposes. Define Turbidity and its unit. (C.O.No.1) [Knowledge]

2 According to IS Code 10500:2012, the permissible limit for hardness is \_\_\_\_\_ units and for pH is \_\_\_\_\_ for drinking purposes. (C.O.No.1) [Knowledge]

3 Wholesome water should be colourless. In this context, define 1 unit of colour. Name the instrument used to measure colour. (C.O.No.1) [Knowledge]

4 What is meant by Hardness of water? Explain the types of hardness of water.

(C.O.No.1) [Knowledge]

5 A 12.5 mL sample of treated waste-water requires 187.5 mL of odour-free distilled water to reduce the odour to a level that is just perceptible What is the threshold odor number (TON) for the wastewater sample? (C.O.No.1) [Knowledge]

**Part B [Thought Provoking Questions]**

**Answer all the Questions. Each question carries FOUR marks.**

**(3Qx4M = 12M)**

6 It is important to monitor the quality of water before and after treatment. Under the present scenario of changing climate and urbanization, real-time water quality testing and monitoring is crucial. Give four reasons to support this statement with respect to Indian Scenario.

(C.O.No.1) [Comprehension]

7 Identify the cause of presence of the following in water:

a) Odour b) Hardness c) Turbidity d) Pathogens

(C.O.No.1) [Comprehension]

8 Turbidity of water is a measure of opaqueness in water. It is due to the presence of various types of impurities. Find out possible types of impurities and classify them based on their size and nature. Briefly explain them. (C.O.No.1) [Comprehension]

**Part C [Problem Solving Questions]**

**Answer both the Questions. Each question carries FOUR marks. (2Qx4M=8M)**

9 A water sample contains  $10^{-5.6}$  mmol/L of OH ions at 25 degree Celsius.

Find out the following parameters

a) Concentration of [H] ions and [OH] ions in moles/litre

b) Concentration of [H] ions and [OH] ions in mg/litre

c) pH and p OH of water sample. (C.O.No.1) [Comprehension]

10 Ca<sup>2+</sup> concentration, Mg<sup>2+</sup> concentration and HCO<sub>3</sub><sup>-</sup> of a water sample are 101 mg/l, 7mg/l and 252 mg/l as their ions respectively. Find the total hardness and the total carbonate hardness of the water sample in terms of calcium carbonate in mg/l. (C.O.No.1) [Comprehension]



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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**TEST 2**

**Winter Semester:** 2021 - 22

**Course Code:** CIV 2011

**Course Name:** Environmental Engineering

**Program & Sem:** B.Tech Civil & IV Sem

**Date:** 2<sup>nd</sup> June 2022

**Time:** 11.30 AM to 12.30 PM

**Max Marks:** 30

**Weightage:** 15%

**Instructions:**

- (i) *Read the all questions carefully and answer accordingly.*

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries 2 marks.**

**(4Qx 2M= 8M)**

Q.NO. 1 Sedimentation aided with coagulation gives better efficiency. Define coagulation and flocculation. (C.O.No.1) [Knowledge]

Q.NO. 2 \_\_\_\_\_ is a commonly used coagulant in water treatment unit. It has a working p H of \_\_\_\_\_. (C.O.No.1) [Knowledge]

Q.NO. 3 Disinfection can be achieved by using UV rays, Ozone, chlorine etc. but chlorine is very popular. List any two advantages of using Chlorine as a common disinfectant.

(C.O.No.1) [Knowledge]

Q.NO. 4 If the design settling velocity of a particle is 0.3mm/sec and overflow rate of a sedimentation tank is 0.5mm/sec. identify the percentage removal of such particles in the sedimentation tank.

(C.O.No.1) [Knowledge]

**Part B [Thought Provoking Questions]**

**Answer all the Questions. Each question carries 4 marks.**

**(3Qx4M = 12M)**

Q.NO. 5 Filtration is an essential unit to capture small colloidal impurities that do not settle in the sedimentation tank. They can be gravity filters and pressure filters. Considering the classification of gravity filters, Compare slow sand filters and rapid sand filters. Mention at least four key differences.

[4M] (C.O.No.1) [Comprehension]

Q.NO. 6 Water treatment is crucial to bring down the parameters up to standard quality. It involves various physical, chemical and biological processes. The impurities are removed in the order of their size. With the help of a flowchart, explain the process of treatment for surface water.

[4M] (C.O.No.1) [Comprehension]

Q.NO. 7 Define the following terms:

a) Detention period b) Overflow rate c) Eutrophication d) BOD

[4M] (C.O.No.2) [Comprehension]

### Part C [Problem Solving Questions]

Answer both the Questions. Each question carries 5 marks.

(2Qx 5M= 10M)

Q.NO. 8 A plain sedimentation tank with a length of 20m, width of 10 m, and a depth of 3 m is used in a water treatment plant to treat 4 million liters of water per day (4 MLD). The average temperature of water is 20 degrees Celsius. The dynamic viscosity of water is 0.0013 N-s/m<sup>2</sup>. Density of water is 1000 kg/m<sup>3</sup>. Average specific gravity of particles is 2. What is the surface overflow rate in the sedimentation tank and what is the minimum diameter of the particle which can be removed with 100% efficiency in the above Sedimentation tank?

[5M] (C.O.No.1) [Comprehension]

Q.NO. 9 A water treatment plant, treats 6000 m<sup>3</sup> of water per day. If it consumes 20 kg chlorine per day, then what is the chlorine dosage in mg/l. Also, if the residual chlorine is 0.1 mg/l find the chlorine demand.

[5M] (C.O.No.1) [Comprehension]



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**PRESIDENCY UNIVERSITY  
BENGALURU**

**SCHOOL OF ENGINEERING**

**END TERM EXAM**

**Winter Semester:** 2021 - 22

**Course Code:** CIV 2011

**Course Name:** Environmental Engineering

**Program & Sem:** B.Tech & IV Sem

**Date:** 4<sup>th</sup> July 2022

**Time:** 09.30 AM to 12.30 PM

**Max Marks:** 100

**Weightage:** 50%

**Instructions:**

- (i) *Read the all questions carefully and answer accordingly.*

**Part A [Memory Recall Questions]**

**Answer all the Questions. Each question carries 2 marks.**

**(10Qx 2M= 20M)**

- Q.NO. 1 Define BOD. Write down the maximum permissible limit for BOD of drinking water as per standards of BIS 10500. (C.O.No.2) [Knowledge]
- Q.NO. 2 List all the five methods of disposal of municipal solid waste. (C.O.No. 3) [Knowledge]
- Q.NO. 3 Define primary and secondary pollutants along with examples. (C.O.No.3) [Knowledge]
- Q.NO. 4 Define a) F/M ratio                      b) Eutrophication (C.O.No.2) [Knowledge]
- Q.NO. 5 Differentiate between aerobic and anaerobic decomposition. (C.O.No.2) [Knowledge]
- Q.NO. 6 Define coagulation. Name any two coagulants. (C.O.No.1) [Knowledge]
- Q.NO. 7 List various methods of disinfection of water used in the treatment. (C.O.No.1) [Knowledge]
- Q.NO. 8 Write down the units of each of these quantities.  
a) Turbidity                      b) Electrical conductivity  
c) Hardness                      d) TON (C.O.No.1) [Knowledge]
- Q.NO. 9 Define hardness of water. List the two types of hardness. (C.O.No.1) [Knowledge]
- Q.NO. 10 List important water quality parameters tested for drinking water purposes.  
(C.O.No.1) [Knowledge]

**Part B [Thought Provoking Questions]**

**Answer all the Questions. Each question carries 8 marks.**

**(4Qx8M = 32M)**

Q.NO. 11 Filtration is an essential unit to capture small colloidal impurities that do not settle in the sedimentation tank. They can be gravity filters and pressure filters. Considering the classification of gravity filters, Compare slow sand filters and rapid sand filters. Mention at least six key differences.

(C.O.No.1) [Comprehension]

Q.NO. 12 Waste water treatment is crucial to bring down the parameters up to standard quality. It involves various physical, chemical and biological processes. The impurities are removed in the order of their size. With the help of a flowchart, explain the process of waste water treatment.

(C.O.No.2) [Comprehension]

Q.NO. 13 Turbidity of water is a measure of opaqueness in water. It is due to the presence of various types of impurities. Find out possible types of impurities and classify them based on their size and nature. Briefly explain them.

(C.O.No.1) [Comprehension]

Q.NO. 14 Organic matter is the major component of sewage. Describe how the organic matter can be reduced in activated sludge process in waste water treatment plant with the help of a neat sketch/block diagram.

(C.O.No.2) [Comprehension]

### Part C [Problem Solving Questions]

**Answer all the Questions. Each question carries 12 marks.**

**(4Qx12M = 48M)**

Q.NO. 15 A water sample has a pH of 7.6. Find out the following parameters

- Concentration of [H] ions and [OH] ions in moles/litres
- Concentration of [H] ions and [OH] ions in mg/litres
- pOH of water sample.

(C.O.No.1) [Comprehension]

Q.NO. 16 for a waste water BOD test, 6ml of sample was diluted to 300ml and the test observations were as per the following data at 20 degrees Celsius:

(C.O.No.2) [Comprehension]

Initial DO = 7.89mg/l                      DO after 5 days = 3.45mg/l.

- Find out:
- BOD<sub>4</sub> for the waste water sample in mg/l.
  - BOD<sub>3</sub> for the sample at 30 degrees Celsius.

Use k (base e, at 20 degrees) = 0.23 per day,

$K \text{ (at any Temperature, } T) = k \text{ (20 degrees)} * 1.047^{(T-20)}$

Q.NO. 17 For a waste water discharge of 46,000 cubic metres per day, activated sludge process is used for secondary treatment with the following data:

Influent BOD = 250mg/l, Effluent BOD = 20mg/l, Volume of the tank = 12,000 cubic metres, Total microbial content = 2600mg/l

- Find out
- Aeration period (hours)
  - F/M ratio (per day)
  - Efficiency of BOD removal (%)

(C.O.No.2) [Comprehension]

Q.NO. 18 Ca<sup>2+</sup> concentration, Mg<sup>2+</sup> concentration and HCO<sub>3</sub><sup>-</sup> of a water sample are 230 mg/l, 35mg/l and 165 mg/l as their ions respectively. Find the total hardness and the total carbonate hardness of the water sample in terms of calcium carbonate in mg/l.

(C.O.No.1) [Comprehension]

