

**Indian Maritime University**  
**(A Central University, Govt of India)**  
**End Semester Examinations – December 2024**  
**Programme Name: B Tech (ME)**  
**Semester: I**  
**Subject Code: UG11T5103**  
**Subject Name: ENGINEERING CHEMISTRY**

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Date: 17.12.2024

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

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General Instructions

- (i) All Questions in Sections A & B are Compulsory.
- (ii) Attempt any 5 Questions in Section-C.

**Section A**

1. Which of the following is a characteristic of synthetic rubber?
  - A) High elasticity
  - B) Good weather resistance
  - C) Low cost
  - D) All of the above
2. Which of the following is not a result of the excess of impurities in boiler-feed?
  - a) Caustic embrittlement
  - b) Decomposition
  - c) Corrosion, priming and foaming
  - d) Scale and sludge formation
3. Which of the following is a property of refractory materials?
  - A) High thermal conductivity
  - B) High melting point
  - C) Low tensile strength
  - D) High solubility in water
4. What is breakpoint chlorination?
  - A) Adding chlorine to water until all organic matter is oxidized
  - B) A method for testing hardness of water
  - C) A method for testing softness of water
  - D) Removing chlorine from waste water

5. Which process is used for the removal of hardness from water?

- A) Filtration
- B) Distillation
- C) Ion exchange
- D) Sedimentation

6. Caustic Embrittlement in boiler is caused by,

- a) Increase in caustic soda concentration in minute cracks in the boiler
- b) Increase in entrapped air in the boiler water
- c) Contamination with oil
- d) Increase in acidity of boiler water

7. Erosion Corrosion is the result of \_\_\_

- a) Rapid flow of turbulent fluid
- b) Cyclic loading
- c) Electro chemical corrosion due to metal with different electrical potentials are connected.
- d) None of these

8. What is the primary purpose of corrosion inhibitors?

- A) To enhance metal properties
- B) To slow down the corrosion process
- C) To improve electrical conductivity
- D) To increase metal strength

9. What is the primary function of surfactants?

- A) Increase viscosity
- B) Decrease surface tension
- C) Enhance pH
- D) Stabilize temperature

10. What does the Hydrophilic-Lipophile Balance (HLB) indicate?

- A) The stability of a suspension
- B) The solubility of a surfactant in oil or water
- C) The viscosity of a solution
- D) The acidity of a liquid

## **Section B**

Five Questions of 02 Marks each

11. What are the major differences between thermoplastics and thermosetting plastics?
12. What are the common methods to remove scales in boiler?
13. What are the effects of corrosion?
14. What are Surfactants? Name types of Surfactants.
15. What does Biofouling mean?

## **Section C**

Seven Questions of 10 Marks each of which any 05 questions to be answered.

16.a) Describe Classification of Polymer based on source of availability and structure of monomer chain. (5 Marks)

(b) Discuss the difference between addition and condensation polymerization with examples. [5 Marks]

17.a) Write down short notes on FRP and GRP materials. (5 Marks)

(b) Compare the injection moulding and compression moulding for the fabrication of plastics. [5 Marks]

(18

a) Explain phenomenon of Reverse Osmosis and its applications. (6 Marks)

(b) Describe the ion exchange process for softening water and its significance in maritime applications. (4 Marks)

19.a) Define the following: Hydrogen ion, Hydroxyl ion, pH, Litmus test (4 Marks)

b) Explain Hardness test and Phosphate test (6 Marks)

(20)(a) Define corrosion and explain the basic principles behind it. What are the key factors that influence the rate of corrosion? [5 Marks]

(b) What is dry corrosion, and how does it differ from wet corrosion? [5

Marks]

21.a) Discuss Protective coating, Metallic coatings ,Organic and Inorganic coatings and protection by paints.( 7 Marks)

b)What does Antifouling Coating mean? ( 3 Marks)

(22)(a) Explain the mechanism of emulsification by surfactants. What role do surfactants play in stabilizing emulsions? [5 Marks]

(b) Explain microemulsions? How do they differ from traditional emulsions?  
[5 Marks]

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