

**Indian Maritime University**  
**(A Central University, Govt of India)**

**September/October 2024 Supplementary Examinations**  
**Programme Name: B. Tech (Marine Engineering)**

**Semester: I**

**Subject Code: UG11T4104**

**Subject Name: INDUSTRIAL CHEMISTRY**

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Date: 05.09.2024

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

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General Instructions

- (i) All Sections (A, B & C) are to be attempted.
- (ii) Options, if any, are specified in respective section.

**Section A**

Ten MCQs/Fill in the Blanks of 01 Mark each – Choose the correct answer as applicable.

1. Corrosion involves \_\_\_\_\_ reactions.
  - a) Oxidation
  - b) Reduction
  - c) Oxidation and Reduction both
  - d) Displacement
  
2. Which of the following is not a method for disinfection of water?
  - (a) Chlorination
  - (b) Ozonisation
  - (c) Electrodialysis
  - (d) UV treatment

3. Carbonates in water produce \_\_\_\_\_
- a) Temporary hardness.
  - b) Permanent hardness.
  - c) Acidity
  - d) Alkalinity
4. Which portable water treatment method is most effective at removing microbiological contaminants like bacteria and viruses from untreated water sources?
- (a) Activated carbon filtration
  - (b) UV (Ultraviolet) disinfection
  - (c) Chemical flocculation
  - (d) Reverse osmosis filtration
5. Which of the following mechanisms is NOT a typical way that paints provide protection to surfaces?
- (a) Barrier protection
  - (b) Cathodic protection
  - (c) Inhibitive protection
  - (d) Sacrificial protection
6. Indicator used in the calcium hardness is
- (a) EBT
  - (b) SBT
  - (c) Murexide
  - (d) Methyl Orange
7. Which type of dry corrosion results in the formation of a fine, powdery oxide on the metal surface?
- (a) Crevice corrosion
  - (b) Intergranular corrosion

- (c) Fretting corrosion  
(d) Erosion corrosion
8. Which of the following gases is the primary component of natural gas?  
(a) Oxygen ( $O_2$ )  
(b) Methane ( $CH_4$ )  
(c) Carbon dioxide ( $CO_2$ )  
(d) Hydrogen ( $H_2$ )
9. The process of breaking bigger hydrocarbons into simpler low boiling point fractions is called  
a) Reforming  
b) Cracking  
c) Refining  
d) Knocking
10. Select the incorrect statement from the following option  
(a) Lubricant reduces the frictional heat  
(b) Lubricant acts as a seal and keeps out dirt  
(c) Lubricant transmits fluid power  
(d) Lubricant enhances corrosion

### **Section B**

Five Questions of 02 Marks each

11. Distinguish between scale and sludge.
12. Explain the principle of cathodic protection
13. Explain relationship between molecular weight and depression at the freezing point
14. What is corrosion? Also write the effects of corrosion
15. Define saturated solution and suspension

### **Section C**

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

16. a. Explain elevation of boiling point and depression of freezing point and how Van't Hoff factor affects the boiling point of a strong electrolyte solution. (6 Marks)
- b) Explain phenomenon of Reverse Osmosis and its applications. (4 marks)
17. a) Describe the mechanical and chemical method of removal of DO, CO<sub>2</sub> and acids from the boiler water. (5 Marks)
- b) Appraise causes and effect of priming and foaming in the boiler and evaluate that proper boiler water chemistry control is essential to minimize it. (5 Marks)
18. a) Devise the ultimate analysis of hydrocarbon fuel for carbon and hydrogen (5 Marks)
- b) Define lubrication and outline mechanism of lubrication (5 Marks)
19. Explain briefly about the cloud and Pour point with suitable diagram (10 Marks)
20. a) Explain the mechanism of Dry and Wet corrosion [5 Marks]
- b) Write a short notes on (i) Pitting corrosion (ii) Crevice corrosion [5 Marks]
21. a) Write a short note on desalination and discuss Electro dialysis method in detail [5 Marks]
- b) Explain the ion exchange process for the purification of water with a neat diagram [5 Marks]
22. Determine the calorific value of a fuel using Bomb Calorimeter? ( 10 Marks)