

Indian Maritime University
(A Central University, Govt of India)
Supplementary Examinations – March/April 2025
Programme Name: B Tech (ME)
Semester: I
Subject Code: UG11T4104
Subject Name: INDUSTRIAL CHEMISTRY

Date: 06.03.2025

Max Marks: 70

Duration: 03 Hrs

Pass Marks: 35

General Instructions

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

Section A

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

(1) Air is a _____

- a) Pure compound.
- b) Mixture of only compounds
- c) Mixture of only elements.
- d) Mixture of both elements and compounds.

(2) Colligative properties depend on _____

- a) The nature of the solute particles dissolved in solution.
- b) The number of solute particles in solution.
- c) The physical properties of the solute particles dissolved in solution.
- d) The nature of solvent particles.

(3) On addition of non-volatile potassium iodide in water at 298 K it is noticed that vapour pressure reduces from 23.8 mm Hg to 2.0 cm Hg. What is the mole fraction of solute in the solution?

- a) 0.916
- b) 0.160
- c) 0.084
- d) 0.092

- (4) Carbonates in water produce _____
- Temporary hardness.
 - Permanent hardness.
 - Acidity.
 - Alkanity.
- (5) In boilers, the feed water treatment is done mainly for removing _____
- Corrosion.
 - Scale formation.
 - Caustic embrittlement.
 - All of these.
- (6) The phenomenon during which the boiler material becomes brittle due to the accumulation of caustic substances is known as _____
- Foaming.
 - Priming.
 - Corrosion.
 - Caustic embrittlement.
- (7) Corrosion involves _____ reactions.
- Oxidation
 - Reduction
 - Oxidation and Reduction both
 - Displacement
- (8) Select the incorrect statement from the following option.
- Lubricant reduces the frictional heat.
 - Lubricant acts as a seal and keeps out dirt.
 - Lubricant transmits fluid power.
 - Lubricant enhances corrosion.
- (9) The principle constituents of a fuel are _____
- Carbon and hydrogen
 - Oxygen and hydrogen
 - Sulphur and oxygen
 - Sulphur and hydrogen
- (10) The process of breaking bigger hydrocarbons into simpler low boiling point fractions is called
- Reforming
 - Cracking
 - Refining
 - Knocking

Section B

(Five Questions of 02 Marks each)

- (11) Define saturated solution and suspension.
- (12) What is reverse osmosis and its application.
- (13) Distinguish between scale and sludge.
- (14) Define calorific value of fuel, LHV and HHV.
- (15) What is corrosion? Also write the effects of corrosion.

Section C

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

- (16)(a) What is colligative properties and explain any two properties out of them. **[6 Marks]**

- (b) 6 g of urea (NH_2CONH_2) and 9 g of glucose ($\text{C}_6\text{H}_{12}\text{O}_6$) are dissolved in 300 g of water. Find the boiling point of solution, if ebullioscopy constant K_b is 0.52 K Kg/ Mol. **[4 Marks]**

- (17)(a) Define Henry's law. What are the factors effecting the solubility of solid in liquid. **[5 Marks]**

- (b) What is abnormal colligative properties and how it is related to Vant Hoff's factor? **[5 Marks]**

- (18)(a) Write a short note on desalination and Discuss Electrodialysis method in detail. **[5 Marks]**

- (b) Explain the ion exchange process for the purification of water with a neat diagram. **[5 Marks]**

- (19)(a) Define boiler feed water. What are the properties and essential requirements of boiler feed water? **[5 Marks]**

- (b) What is potable water and treatment process for removal of impurities? **[5 Marks]**

- (20)(a) Explain the mechanism of Dry and Wet corrosion. **[6 Marks]**

- (b) Write a short notes on (i) Pitting corrosion (ii) Crevice corrosion **[4 Marks]**

(21)(a) Discuss the various methods of controlling the corrosion.

[5 Marks]

(b) Write a short note on corrosion inhibitors. Explain their functions.

[5 Marks]

(22)(a) Define (i) Flash point (ii) Fire point (iii) Cloud point (iv) Pour point

[4 Marks]

(b) Define Viscosity and explain the determination of viscosity of lube oil using redwood viscometer?

[6 Marks]

T M M