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: INUSTRIAL 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 _____

a) Temporary hardness.
b) Permanent hardness.
c) Acidity.
d) Alkanity.

(5) In boilers, the feed water treatment is done mainly for removing _____

a) Corrosion.
b) Scale formation.
c) Caustic embrittlement.
d) All of these.

(**6)** The phenomenon during which the boiler material becomes brittle due to the accumulation of caustic substances is known as _____

a) Foaming.
b) Priming.
c) Corrosion.
d) Caustic embrittlement.

(7) Corrosion involves _____ reactions.

a) Oxidation
b) Reduction
c) Oxidation and Reduction both
d) Displacement

(8) 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.

(9) The principle constituents of a fuel are _____

a) Carbon and hydrogen
b) Oxygen and hydrogen
c) Sulpher and oxygen
d) Sulpher and hydrogen

(10) The process of breaking bigger hydrocarbons into simpler low boiling point fractions is called

a) Reforming
b) Cracking
c) Refining
d) 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 ($C_6H_{12}O_6$) are dissolved in 300 g of water. Find the boiling point of solution, if ebullioscopy constant Kb 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]

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