

CBCS SCHEME

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17CHE12/22

First/Second Semester B.E. Degree Examination, Dec.2023/Jan.2024 Engineering Chemistry

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. What are ion selective electrode? Explain the determination pH of a solution using glass electrode. (07 Marks)
- b. What is reference electrode? Explain the construction and working of a Calomel electrode. (07 Marks)
- c. Describe the construction and working of Ni-MH battery. Mention its applications. (06 Marks)

OR

- 2 a. What are fuel cells? Explain the construction and working of methanol-oxygen fuel cell. (07 Marks)
- b. Explain the following battery characteristics :
- (i) Cycle life
 - (ii) Capacity
 - (iii) Energy efficiency. (06 Marks)
- c. What are concentration cells? Derive an expression for the EMF of a concentration cell. (07 Marks)

Module-2

- 3 a. Define corrosion. Explain the electrochemical theory of corrosion taking iron as example. (07 Marks)
- b. What is cathodic protection? Explain Sacrificial and impressed current techniques for prevention of corrosion. (07 Marks)
- c. Describe electroplating of Nickel using Watt's bath. Mention its applications. (06 Marks)

OR

- 4 a. What is electroless plating? Explain electroless plating of copper giving relevant equation. (07 Marks)
- b. Explain the following factors influencing the nature of electro deposit :
- (i) Current density
 - (ii) pH of electrolytic bath
 - (iii) Temperature. (06 Marks)
- c. What is galvanization and Tinning? Explain galvanization process by Hot dipping method. (07 Marks)

Module-3

- 5 a. Define calorific value of a fuel. Explain how calorific value of solid fuel is determined by Bomb calorimeter. (07 Marks)
- b. What is meant by reforming of petrol? Explain the process of reforming of petrol with necessary reaction. (06 Marks)
- c. Explain the production of solar grade silicon by union carbide process. (07 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Explain the construction and working of silicon photovoltaic cell. (06 Marks)
- b. On burning 0.83×10^{-3} kg of a solid fuel in a bomb calorimeter, the temperature of 3.5 kg of water increased from 26.5°C to 29.2°C . The water equivalent of calorimeter and latent heat of steam are 0.385 kg and 4.2×587 kJ/kg respectively. If the fuel contains 0.7% hydrogen, calculate its gross and net calorific values. (07 Marks)
- c. What is biodiesel? Explain the biodiesel production by trans-esterification of triglyceride. (07 Marks)

Module-4

- 7 a. Explain the free radical mechanism of addition polymerization taking vinyl chloride as an example. (07 Marks)
- b. What are conducting polymers? Explain the mechanism of conduction in polyaniline and give the applications. (07 Marks)
- c. Explain the synthesis and applications of,
 (i) Plexiglass
 (ii) Polycarbonate (06 Marks)

OR

- 8 a. What is glass transition temperature? Explain the following factors affecting glass transition temperature : (i) Chain flexibility (ii) Intermolecular forces. (07 Marks)
- b. What are Adhesives? Give the synthesis and applications of epoxy resin. (07 Marks)
- c. Describe the synthesis and applications of Kevlar fiber. (06 Marks)

Module-5

- 9 a. What are boiler feed water? Explain scale and sludge formation in boiler. Mention their disadvantages. (07 Marks)
- b. What is desalination? Explain the desalination of saline water by electrodialysis. (07 Marks)
- c. Write a note on carbon nano tubes. (06 Marks)

OR

- 10 a. What are nano materials? Explain the synthesis of nanomaterial by sol-gel method. (07 Marks)
- b. Write a note on : (i) Dendrimers (ii) Fullerenes (06 Marks)
- c. Define the terms BoD and CoD. What are the steps involved in the tertiary treatment of sewage? (07 Marks)

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