

CBCS SCHEME

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17CHE12/22

First/Second Semester B.E. Degree Examination, June/July 2023 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 reference electrodes? Explain the construction and working of Calomel Electrode. (07 Marks)
- b. What are Ion Selective electrodes? Explain the method of determination of pH of a solution using glass electrode. (07 Marks)
- c. Explain the following battery characteristics. : (06 Marks)
 - i) Cell Potential
 - ii) Capacity
 - iii) Cycle Life

OR

- 2 a. Describe the construction, working and applications of Zinc – Air battery. (07 Marks)
- b. Explain the construction and working of Methanol-Oxygen fuel cell. Mention its applications. (07 Marks)
- c. What are concentration cells? A concentration cell was constructed by immersing two silver electrodes in 0.02 M and 2 M AgNO₃ solution. Write the cell representation, cell reactions and calculate the EMF of the cell at 25°C. (06 Marks)

Module-2

- 3 a. Define Corrosion. Explain Electrochemical theory of corrosion by taking iron as an example. (07 Marks)
- b. What is Galvanization and Tinning? Explain with a diagram Galvanization process by Hot dipping method. (07 Marks)
- c. Explain the influence of following factors on the nature of Electrodeposit: (06 Marks)
 - (i) Current density
 - (ii) pH
 - (iii) Temperature

OR

- 4 a. Define metal finishing. Explain the technological importance of metal finishing. (07 Marks)
- b. What is Electroless plating? Explain the Electroless plating of Copper on PCB with suitable reactions. (07 Marks)
- c. Explain Pitting and Waterline corrosion. (06 Marks)

Module-3

- 5 a. Define Gross Calorific and Net Calorific value of a fuel. Explain with a neat diagram the determination of calorific value of a fuel using Bomb Calorimeter. (07 Marks)
- b. Define Knocking. Explain Knocking mechanism with reactions. (07 Marks)
- c. What are the photovoltaic cells? Explain the construction and working of a photovoltaic cell. (06 Marks)

OR

- 6 a. Explain the production of solar grade silicon by Union-Carbide process. (07 Marks)
- b. What are n and p type semiconductor? Explain the purification of silicon by zone refining technique. (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.

- c. Calculate the Gross and Net calorific value of coal sample from following data:
 Weight of coal = 0.95 g ; Weight of water = 2500 g ;
 Water equivalent of calorimeter = 400g ; Specific heat of water = 4.187 J/g/K ;
 Rise in temperature = 3 K % of hydrogen in coal = 6
 Latent heat of steam = 2454 J/g/K (06 Marks)

Module-4

- 7 a. Define Polymerization. Explain the free radical mechanism of polymerization taking vinyl chloride as an example. (07 Marks)
 b. Define glass transition temperature. Explain the following factors influencing glass transition temperature :
 i) Flexibility ii) Inter molecular forces iii) Branching and cross linking. (07 Marks)
 c. What are the polymer composites? Explain the preparation , properties and applications of Kevlar fiber. (06 Marks)

OR

- 8 a. Write the synthesis, properties and applications of PMMA and Polycarbonate. (07 Marks)
 b. Define an adhesive. Explain preparation , properties and applications of Epoxy resin. (07 Marks)
 c. Explain the mechanism of conduction in polyaniline. (06 Marks)

Module-5

- 9 a. What is boiler feed water. Explain boiler scale and sludge formation with reactions. (07 Marks)
 b. Define BOD and COD of waste water. Calculate COD of 25 cc of an industrial effluent required 12.5 cc of 0.015 M $K_2Cr_2O_7$ for complete oxidation. (07 Marks)
 c. Define a nano particle. Explain the synthesis of nano materials by sol-gel process. (06 Marks)

OR

- 10 a. Write a note on carbon nano tubes and nano wires. (07 Marks)
 b. What are fullerenes? Write a note on fullerenes. (07 Marks)
 c. What is desalination of water? Explain desalination of water by Reverse Osmosis. (06 Marks)
