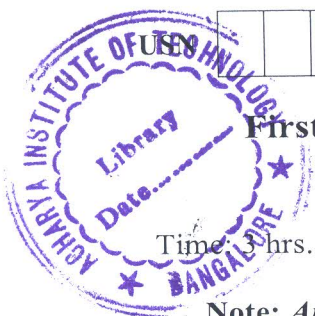


CBCS SCHEME

15CHE12/22



Time _____ hrs.

First/Second Semester B.E. Degree Examination, Jan./Feb.2021 Engineering Chemistry

Max. Marks: 80

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

Module – 1

- 1 a. Derive Nernst's equation for single electrode potential. (06 Marks)
- b. What are reference electrodes? Explain the construction and working of a Calomel electrode. (06 Marks)
- c. Explain the following battery characteristics: (04 Marks)
(i) Capacity (ii) Energy efficiency

OR

- 2 a. Explain the determination of pH of a solution using glass electrode. (05 Marks)
- b. Discuss the construction and working of Zinc-Air battery. (05 Marks)
- c. What are fuel cells? Describe the construction and working of Methanol-oxygen fuel cells. (06 Marks)

Module – 2

- 3 a. Explain the electrochemical theory of corrosion with reference to iron. (06 Marks)
- b. Explain the following factors that influence the rate of corrosion: (05 Marks)
(i) Relative area of anode and cathode (ii) Temperature
- c. Write the technical importance of metal finishing. (05 Marks)

OR

- 4 a. What is cathodic protection? Discuss the sacrificial anode method of control of corrosion. (06 Marks)
- b. Explain the following factors influencing the nature of electrodeposit : (i) Current density (ii) pH of the plating bath. (04 Marks)
- c. Explain the electroless plating of copper in PCB. (06 Marks)

Module – 3

- 5 a. Explain the determination of calorific value of a solid fuel using bomb calorimeter. (06 Marks)
- b. What is reformation of petrol? Write any three reforming reactions. (04 Marks)
- c. Explain the construction and working of photovoltaic cell. (06 Marks)

OR

- 6 a. On burning 0.85×10^{-3} kg of a solid fuel in a bomb calorimeter, the temperature of 2.8 kg of water is increased from 26°C to 29°C . The water equivalent of calorimeter and latent heat of steam are 0.495 kg and 2457 kJ/kg respectively. Calculate its GCV and NCV. Given specific heat = 4.187 kJ/kg and % of H_2 is 2.6. (06 Marks)
- b. Discuss the production of solar grade silicon by union carbide process. (05 Marks)
- c. Explain the zone refining technique for the purification of silicon. (05 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.

Module – 4

- 7 a. Explain the free radical mechanism of addition polymerization by taking Vinyl Chloride monomer. (06 Marks)
- b. What are adhesives? Explain the synthesis and applications of epoxy resin. (05 Marks)
- c. What is glass transition temperature (T_g)? Explain the following factors influencing T_g : (05 Marks)
- (i) Chain flexibility (ii) Molecular mass

OR

- 8 a. Write the synthesis and applications of the following : (06 Marks)
- (i) Poly Methyl Meth Acrylate (PMMA) (ii) Polyurethane
- b. Explain synthesis, properties and applications of Kevlar. (05 Marks)
- c. What is conducting polymers? Explain the mechanism of conduction in polyaniline. (05 Marks)

Module – 5

- 9 a. How scale is formed in boilers? How it can be prevented? (05 Marks)
- b. Define COD. In a COD test, 27.5 cm³ and 13.0 cm³ of 0.05 N FAS solution were required for blank and sample titration respectively. The volume of test sample used is 25 cm³. Calculate the COD of the sample solution. (05 Marks)
- c. What are nanomaterials? Explain the synthesis of nano materials by sol-gel method. (06 Marks)

OR

- 10 a. What is desalination? Explain the desalination of water by electro-dialysis. (06 Marks)
- b. Write a note on carbon nanotubes. (05 Marks)
- c. What are fullerenes? Explain the synthesis and properties of fullerenes. (05 Marks)

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