CBCS SCHEME

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15CHE12/22

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

Time: 3 hrs. 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:
(i) Capacity (ii) Energy efficiency **(04 Marks)**

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:
(i) Relative area of anode and cathode (ii) Temperature **(05 Marks)**

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)**

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 (Tg)? Explain the following factors influencing Tg :
(i) Chain flexibility (ii) Molecular mass (05 Marks)

OR

8 a. Write the synthesis and applications of the following :
(i) Poly Methyl Meth Acrylate (PMMA) (ii) Polyurethane (06 Marks)
b. Explain synthesis, properties and applications of Kevlor. (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 cm^3 and 13.0 cm^3 of 0.05 N FAS solution were required for blank and sample titration respectively. The volume of test sample used is 25 cm^3. 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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