CBCS SCHEME

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17CHE12/22

First/Second Semester B.E. Degree Examination, Jan./Feb. 2021
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. Justify that it is a reversible electrode. **(07 Marks)**

b. What are Concentration Cells? Explain the construction and working of electrolyte concentration cells. **(07 Marks)**

c. What are batteries? Describe the construction and working of Li-MnO_2 battery with one application. **(06 Marks)**

OR

2 a. Define standard electrode potential. Derive Nernst equation for single electrode potential. **(06 Marks)**

b. Write any two differences between conventional cells and fuel cells. Explain the construction and working of methanol oxygen fuel cell with one application. **(08 Marks)**

c. Describe the construction and working of Ni-MH battery with one application. **(06 Marks)**

Module-2

3 a. What is differential aeration corrosion? Explain its types. **(07 Marks)**

b. Define anodization. Explain anodization of aluminium with one application. **(07 Marks)**

c. What is metal finishing? Mention the technological importance of metal finishing. **(06 Marks)**

OR

4 a. What is tinning? Explain the steps involved in it diagrammatically. **(06 Marks)**

b. Write a short note on :
(i) Polarization (ii) Decomposition potential **(06 Marks)**

c. What are the advantages of electroless plating over electroplating? Explain electroplating of chromium for Hard Purpose. **(08 Marks)**

Module-3

5 a. What is knocking in IC engines? Explain its mechanism with chemical reactions. How can it be prevented? **(08 Marks)**

b. Write a note on biodiesel and power alcohol. **(06 Marks)**

c. What is doping? Explain the purification of silicon by zone refining. **(06 Marks)**

OR

6 a. Define Net and Gross calorific value of fuel. Explain the experimental determination of calorific value of solid fuel using Bomb calorimeter. **(08 Marks)**

b. What is photovoltaic cell? Explain the working of photovoltaic cell with neat diagram. **(06 Marks)**

c. Explain doping of silicon by diffusion technique. **(06 Marks)**

Module-4

7 a. What is conducting polymer? Explain the mechanism of conduction in polyaniline and give the applications. **(07 Marks)**

b. Explain the following factors influencing the T_g :
(i) Flexibility
(ii) Branching and Cross linking
(iii) Intermolecular forces. **(06 Marks)**

c. Explain the manufacture, properties and uses of polycarbonates. **(07 Marks)**

OR

8 a. What are adhesives? Explain the synthesis and applications of epoxy resin. **(07 Marks)**

b. Explain structure-property relationship of polymers with respect to
(i) Crystallinity (ii) Chemical resistivity (iii) Elasticity. **(06 Marks)**

c. What are polymer composites? Explain the preparation, properties and uses of Kevlar fiber. **(07 Marks)**

Module-5

9 a. Explain Winkler's method of determination of dissolved oxygen. Give the reactions involved. **(07 Marks)**

b. Define COD. 25 ml of industrial effluent requires 12.5ml of 0.5N $K_2Cr_2O_7$ for complete oxidation. Calculate COD of the sample. Assuming that the effluent contains only oxalic acid, calculate the amount of oxalic acid present in 1 dm^3 of water. Given equivalent mass of oxalic acid is 45. **(07 Marks)**

c. Explain any three size dependent properties of nanomaterials. **(06 Marks)**

OR

10 a. What are scales and sludge? What are their causes and harmful effects? How are they prevented? **(08 Marks)**

b. Explain synthesis of nano materials by sol-gel process. **(06 Marks)**

c. Write a note on fullerences. Mention its applications. **(06 Marks)**

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