CBCS SCHEME

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21CHE12/22

First/Second Semester B.E. Degree Examination, July/August 2022
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. Define Single Electrode Potential. Derive Nernst equation for Single Electrode Potential. **(07 Marks)**

b. Explain the construction and working of glass electrode. **(07 Marks)**

c. Describe the construction and working of lithium ion battery. Mention its applications. **(06 Marks)**

OR

2 a. What are Reference Electrodes? Discuss the construction and working of Calomel electrode. **(07 Marks)**

b. Calculate the single electrode potential of copper electrode at 28°C. Given that standard electrode potential of Cu is 0.34V and concentration of Cu^{2+} ions is 0.012m. **(07 Marks)**

c. Distinguish between Primary , Secondary and Reserve batteries. **(06 Marks)**

Module-2

3 a. Explain the following factors which affect the rate of corrosion :
i) Ratio of Anodic and Cathodic area ii) Nature of corrosion product. **(07 Marks)**

b. What is Electroless Plating? Distinguish between Electroplating and Electroless plating. **(07 Marks)**

c. Describe differential Metal corrosion and Water line corrosion. **(06 Marks)**

OR

4 a. Explain Sacrificial anode and Impressed current method of corrosion control. **(07 Marks)**

b. What is meant by Metal finishing? Mention technological importance of Metal finishing. **(07 Marks)**

c. A steel sheet area 400cm^3 (62 in^2) is exposed to moist air. After one year period it was found to experience a weight loss of 375g due to corrosion. If the density of steel is 7.9 g/cm^3, calculate the CPR in mpy and mmy^{-1}. Given that K = 534 in mpy and 87.6 in mmy^{-1}. **(06 Marks)**

Module-3

5 a. What are Polymer Composites? Explain the synthesis , properties and applications of Kevlar. **(07 Marks)**

b. Describe the mechanism of conduction in Polyaniline. **(07 Marks)**

c. Discuss the properties and applications of Carbon nanotubes. **(06 Marks)**

OR

6 a. Explain the synthesis , properties and application of Polymethane. **(07 Marks)**

b. What are Biodegradable polymers? Explain the synthesis , properties and applications of Polylactic acid. **(07 Marks)**

c. What are Nanomaterials? Describe the synthesis of Nano materials by Sol – Gel process. **(06 Marks)**

Module-4

7 a. Define Green chemistry. Briefly explain basic principles of Green chemistry. **(07 Marks)**
b. Discuss the synthesis of Adipic acid by conventional route from benzene and green route from glucose. **(07 Marks)**
c. Describe the construction and working of Methanol – Oxygen fuel cell. **(06 Marks)**

OR

8 a. Explain the synthesis of Paracetamol by conventional and green route from phenol. **(07 Marks)**
b. Describe the production of hydrogen by photocatalytic water Splitting method. **(07 Marks)**
c. Explain the construction and working of Photovoltaic cell. **(06 Marks)**

Module-5

9 a. Explain the Theory , Instrumentation and Applications of Colorimetry. **(07 Marks)**
b. Discuss the determination of hardness of water by EDTA method. **(07 Marks)**
c. Define the following terms :
i) Normality ii) Molarity iii) Mole fraction. **(06 Marks)**

OR

10 a. Explain the theory and any two applications of Conductometric Analysis. **(07 Marks)**
b. In a COD experiment, 24.8 and 16.6cm3 of 0.2N FAS solutions are required for blank and sample titration respectively. The volume of test sample used was 25cm^3. Calculate COD of the sample solution. **(07 Marks)**
c. What are Primary and Secondary standards? Explain the requirements of Primary Standard solution. **(06 Marks)**

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