

# CBCS SCHEME

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21CHE12/22

## First/Second Semester B.E. Degree Examination, Jan./Feb. 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 is electrode potential? Derive Nernst equation for single electrode potential. (07 Marks)  
b. Explain construction, working and applications of glass electrode. (07 Marks)  
c. Explain the classification of batteries with suitable examples. (06 Marks)

OR

- 2 a. Discuss the construction, working and applications of Li – ion battery. (07 Marks)  
b. Explain Recycling of Li – ion battery by direct cycling method. (07 Marks)  
c. An electrochemical cell consists of a copper electrode dipped in 0.5m CuSO<sub>4</sub> and silver electrode dipped in 0.25m AgNO<sub>3</sub> solution. Write the cell scheme, cell reaction. Also calculate the emf. (Standard electrode potential of Cu and Ag are 0.34 and 0.80V respectively). (06 Marks)

### Module-2

- 3 a. Explain electrochemical theory of a corrosion by taking Fe as an example. (07 Marks)  
b. What is cathodic protection? Discuss sacrificial anodic method. (07 Marks)  
c. Discuss electroplating of chromium with applications. (06 Marks)

OR

- 4 a. Define electroless plating. Discuss electroless plating of copper. (07 Marks)  
b. What is metal finishing? Mention any 5 technological importance. (07 Marks)  
c. Explain the influence of following factors on corrosion rate :  
i) Ratio of anodic to cathodic area  
ii) Nature of corrosion product  
iii) pH. (06 Marks)

### Module-3

- 5 a. Explain the synthesis and applications of polyurethane. (07 Marks)  
b. What are biodegradable polymer? Explain the synthesis and applications of polylactic acid. (07 Marks)  
c. Give the properties and applications of carbon nanotubes. (06 Marks)

OR

- 6 a. Explain synthesis of nanomaterials by Sol-Gel method. (07 Marks)  
b. What are conducting polymers? Explain the mechanism of conduction in polyaniline. (07 Marks)  
c. What are polymer composites? Explain the synthesis and properties of Kevlar Fiber. (06 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 any six basic principle of green chemistry. (07 Marks)  
b. Explain the synthesis of Adipic acid from benzene and green synthesis from glucose. (07 Marks)  
c. Discuss the construction and working of photovoltaic cell. (06 Marks)

**OR**

- 8 a. Explain the construction and working of methanol-oxygen fuel cell. (07 Marks)  
b. Briefly explain the impacts of oxides of nitrogen and oxides of sulphur on environment. (07 Marks)  
c. Write short notes on microwave synthesis and bio catalyzed reaction with examples. (06 Marks)

**Module-5**

- 9 a. What is hard water? Explain the determination of hardness using EDTA titration. (07 Marks)  
b. In a COD test, 28.1 and 14.0 cm<sup>3</sup> of 0.05N FAS (Ferrous Ammonium Sulphate) solution was required for blank and sample titration respectively. The volume of test sample taken was 25cm<sup>3</sup>. Calculate the COD of the sample. (07 Marks)  
c. Explain conductometric titration method for the determination of mixture of strong acid and weak acid with strong base. (06 Marks)

**OR**

- 10 a. Explain the principle and instrumentation of colorimetry. (07 Marks)  
b. Define the terms normality, molarity and molality. (07 Marks)  
c. Define primary and secondary standard solutions, explain briefly the requirement of primary standard solution. (06 Marks)

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