



First/Second Semester B.E./B.Tech. Degree Examination, June/July 2026
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 Nernt Equation for single electrode potential. (07 Marks)
- b. What are Reference Electrodes? Explain construction and working of Calomel Electrode. (07 Marks)
- c. What is a Battery? Explain classification of Batteries. (06 Marks)

OR

- 2 a. Explain the construction, working and applications of Li-Ion Batteries. (07 Marks)
- b. What are ion selective electrodes? Explain construction and working of Glass Electrode. (07 Marks)
- c. For the cell $\text{Fe} | \text{Fe}^{2+} (0.01\text{M}) || \text{Ag}^+ (0.1\text{M}) | \text{Ag}$, write the cell reaction and calculate the e.m.f of the cell at 298 K, if standard electrode potentials of Fe and Ag electrodes are -0.44V and 0.8V respectively. (06 Marks)

Module-2

- 3 a. Define Metallic Corrosion. Explain Rusting of Iron with electrochemical theory. (07 Marks)
- b. Explain (i) Differential Metallic Corrosion (ii) Water Line Corrosion. (06 Marks)
- c. What is meant by Metal Finishing? Mention any 5 technological importance of metal finishing. (07 Marks)

OR

- 4 a. What is Electroplating? Explain Electroplating of Chromium. (06 Marks)
- b. What is Electroless plating? Explain Electroless plating of copper. (07 Marks)
- c. What is Cathodic Protection? Explain sacrificial anode and impressed voltage methods of cathodic protection. (07 Marks)

Module-3

- 5 a. Explain the synthesis and applications of Polyurethane. (07 Marks)
- b. Explain the synthesis, properties and applications of Polylactic Acid. (07 Marks)
- c. What are Nanomaterials? Explain any 2 size dependent properties of Nanomaterials. (06 Marks)

OR

- 6 a. What are Nanomaterials? Explain the synthesis of Nanomaterial by Sol-gel process. (07 Marks)
- b. Briefly explain the carbon nanotubes with properties and applications. (07 Marks)
- c. What are the Conducting Polymers? Explain the mechanism of conduction in Poly Aniline. (06 Marks)

Module-4

- 7 a. What is Green Chemistry? Briefly explain any 6 basic principles of green chemistry. (07 Marks)
- b. Explain the synthesis of Adipic Acid by conventional route from Benzene and green route from Glucose. (07 Marks)
- c. Explain construction, working and applications of $\text{CH}_3\text{OH}-\text{O}_2$ Fuel Cell. (06 Marks)

OR

- 8 a. Explain the synthesis of Paracetamol by conventional and green route from phenol. (07 Marks)
- b. Explain briefly
(i) Microwave Synthesis (ii) Solvent free reactions. (06 Marks)
- c. Explain construction, working and application of photovoltaic cell. (07 Marks)

Module-5

- 9 a. Explain the determination of Total Hardness by EDTA Method. (07 Marks)
- b. Define the following units of standard solution:
(i) Molarity (ii) Normality (iii) PPM (07 Marks)
- c. Explain theory and Instrumentation of Flame Photometry. (06 Marks)

OR

- 10 a. Explain theory, instrumentation and applications of colorimetry. (07 Marks)
- b. Explain theory, instrumentation and applications of conductometry. (06 Marks)
- c. In a C.O.D test 30.5 cm^3 and 15.5 cm^3 of 0.05N F.A.S solutions are required for Blank and Sample titration respectively. The volume of test sample used was 25 cm^3 . Calculate the C.O.D of the sample solution. (07 Marks)

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