

CBCS SCHEME



21CHE12/22

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Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Define electrode potential. Derive Nernst's equation for single electrode potential. (07 Marks)
- b. Define reference electrode. Explain construction and working of calomel electrode. (07 Marks)
- c. Explain classification of batteries. (06 Marks)

OR

- 2 a. Explain construction, working and application of Lithium – ion battery. (07 Marks)
- b. Explain determinations of P^H of a solutions using glass electrodes. (07 Marks)
- c. A cell is constructed by dipping copper electrode in 0.5M. Copper sulphate and zinc electrode in 0.05M zinc sulphate solution. Write cell representation, cell reaction and calculate emf of the cell at 25°C. Given that, $E_{Cu}^0 = 0.34V$ and $E_{Zn}^0 = -0.76V$. (06 Marks)

Module-2

- 3 a. Define Corrosion – Explain electrochemical theory of corrosion taking rusting of iron as an example. (08 Marks)
- b. Explain the following factors affecting the rate of corrosion
 - i) Nature of corrosion products
 - ii) Relative anodic area and cathodic areas
 - iii) P^H of the medium
- c. Define electroless plating. Explain electroless plating and copper mention its applications. (06 Marks)

OR

- 4 a. Distinguish between electroplating and electroless plating. (06 Marks)
- b. Define electroplating. Explain electroplating of chromium with applications. (07 Marks)
- c. What is the principle of cathodic protection methods? Explain sacrificial and impressed current methods. (07 Marks)

Module-3

- 5 a. What are polymer composites? Explain synthesis, properties and applications of Kevlar fiber. (07 Marks)
- b. Explain synthesis and mechanism of conduction in polyaniline. (07 Marks)
- c. Explain the synthesis and nanomaterial by sol-gel process. (06 Marks)

OR

- 6 a. Explain size dependent properties of nanomaterials with respect to
 - i) Surface area
 - ii) Optical properties
 - iii) Catalytic properties.
- b. Explain synthesis, properties and applications of Poly-Lactic acid. (08 Marks)
- c. Write a brief note on properties and applications of i) Fullerenes ii) Carbon nanotubes. (06 Marks)

Module-4

- 7 a. Explain sources, effects and controlling of Oxides of nitrogen pollution. (07 Marks)
- b. Explain synthesis of paracetamol by green route. (06 Marks)
- c. Explain construction and working of methanol – Oxygen fuel cells. (07 Marks)

OR

- 8 a. Define solar cell. Explain construction and working of PV cell. (07 Marks)
- b. Explain synthesis and Adipic acid by conventional route. (06 Marks)
- c. Explain sources, effects and controlling of oxides of sulphur pollutants. (07 Marks)

Module-5

- 9 a. 25 cm³ of hard water sample titrated against 0.01 Molar EDTA solution consumed 22.6 cm³ of EDTA solution. 25 cm³ of same sample of hard water was boiled, filtered and titrated against 0.01 MEDIA soil consumed 17.6 cm³ of EDTA solution. Calculate total, permanent and temporary hardness of the water sample. (07 Marks)
 - b. Define BOD, explain determination of COD of waste water. (06 Marks)
 - c. Explain theory, Instrumentation and any one applications of colorimeter. (07 Marks)
- OR
- 10 a. Explain theory, instrumentations and any one application of conductometry. (07 Marks)
 - b. Explain theory, instrumentations and applications if flame photometry. (07 Marks)
 - c. Define COD. An industrial waste water require 33.0 ml of 20.5 ml of 0.05N FAS solutions for blank and main titrations respectively. Volume of water sample taken is 25 ml. Calculate COD of water. (06 Marks)

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