

CBCS SCHEME

18CHE12/22

USN

--	--	--	--	--	--	--	--	--	--

First/Second Semester B.E. Degree Examination, June/July 2023 Engineering Chemistry

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- Define single electrode potential and derive Nernst equation for single electrode potential. (07 Marks)
 - Two silver electrodes separately placed in AgNO_3 solutions of equal concentrations to form a cell.
 - What is the cell voltage?
 - What is the voltage of the cell if one of the solutions concentrations is 100 times more than the other? (06 Marks)
 - What are reference electrodes? Describe the construction and working of calomel electrode. Mention its advantages. (07 Marks)

OR

- Describe the construction and working principle of Li-ion battery. Mention its applications. (07 Marks)
 - Calculate the emf of a cell formed by coupling of zinc electrode in 0.05M ZnSO_4 solution and cadmium electrode in 0.25M CdSO_4 solutions. Write the cell representation and reactions. Given standard electrode potential Z_n and C_d are -0.76 and -0.40V respectively. (06 Marks)
 - Explain how P^{H} of the given solution measured using a glass electrode. Mention the advantages of glass electrode. (07 Marks)

Module-2

- What is Corrosion? Explain electro chemical theory of corrosion taking iron as an example. (07 Marks)
 - What is Cathodic protection? Explain sacrificial anode and impressed current methods. (06 Marks)
 - What is electroless plating? Explain electroless plating of Nickel. (07 Marks)

OR

- Explain the type of corrosion taking place in the following case
 - Copper bolt in iron vessel
 - Dust deposition on a metal surface for a long time. (07 Marks)
 - What is metal finishing? Mention the technological importance of metal finishing. (06 Marks)
 - Explain the effect of the following factor on the rate of corrosion.
 - Nature of corrosion product
 - Relative area of anode and cathode
 - Temperature. (07 Marks)

Module-3

- How is Calorific value of a solid fuel measured using a Bomb calorimeter. (07 Marks)
 - What are fuel cells? Explain the construction and working of solid oxide fuel cell. (06 Marks)
 - What is Biodiesel? Explain the synthesis of Biodiesel. Mention the advantages of Biodiesel. (07 Marks)

OR

- 6 a. Define GCV and NCV.
0.75g of a coal sample containing 70% C, 5% H₂ and 6% ash was burnt in a Bomb calorimeter. The rise in temperature of 2500g of water was 3°C. Find GCV and NCV if water equivalent of calorimeter is 500g, specific heat of water is 4.187 kJ/Kg°C and Latent heat of steam is 2454 kJ/Kg. (07 Marks)
- b. What is knocking in IC engine? Explain the mechanism of knocking and mention its ill effects. (06 Marks)
- c. Describe the synthesis of solar grade silicon by union-carbide process. (07 Marks)

Module-4

- 7 a. Explain the mechanism of ozone depletion. Mention its ill effects. (07 Marks)
- b. What are scales and Sludges? Mention their ill effects and explain the method of prevention. (06 Marks)
- c. What are the sources, effects and control methods of oxides of sulphur. (07 Marks)

OR

- 8 a. Write a note on Fluoride estimation in drinking water. Mention its ill effect. (07 Marks)
- b. What is desalination of water? Explain reverse osmosis method of desalination. (06 Marks)
- c. Define BOD and COD.
25cm³ of waste water with 10ml of 0.1N K₂Cr₂O₇ under acidic conditions required 15ml of 0.05N FAS solution, under similar conditions, 10ml of same K₂Cr₂O₇ and 20ml distilled water required 35ml of 0.05N FAS solution. Calculate COD. (07 Marks)

Module-5

- 9 a. Explain the theory, instrumentation of flame photometry and its application in the estimation of Na. (07 Marks)
- b. What are nano-materials? Explain the synthesis of nano-materials by Sol-gel method. (06 Marks)
- c. Explain the theory of conductometry for the estimation of a mixture of strong acid and a weak acid against a strong base. (07 Marks)

OR

- 10 a. Explain the theory of calorimetry and its application in the estimation of Cu in CuSO₄ solution. (07 Marks)
- b. Write a note on fullerenes. (06 Marks)
- c. Explain the theory and instrumentation of potentiometry. (07 Marks)
