PART – A

Answer all questions. Each question carries 2 marks. (10×2 = 20 Marks)

1. Represent the cell corresponding to the cell reaction

$$\text{Cu} + 2 \text{Ag}^+ \rightarrow \text{Cu}^{2+} + 2 \text{Ag} \quad \text{and calculate the EMF at } 25^\circ \text{C}$$

$$\left( \frac{0.1 \text{ M}}{0.01 \text{ M}} \right)$$

$$\left( E^\circ = + 0.46 \text{ V} \right)$$

2. Calculate the hardness of 0.01 M AlCl$_3$ solution.

3. Explain the working of a catalytic convertor in an automobile.

4. Describe the ‘Laser ablation’ technique for the preparation of nano materials.

5. How ‘Biodiesel’ is prepared?

6. What are ‘corrosion inhibitors’? Explain with two examples.

7. List out the advantages of a Fuel Cell.

8. Describe the preparation of PMMA. What are its uses?


10. State and explain ‘Beer Lamberts Law’.
PART - B

Answer any one question from each Module. Each question carries 20 marks.

(20x4 = 80 Marks)

Module – I

11. a) I-R stretching frequency of CO is 2140 cm⁻¹. Calculate the force constant of the chemical bond. Given the atomic mass of C = 12 amu and that of O = 16 amu respectively.

b) Discuss the theory and applications of Thermo Gravimetric Analysis with suitable examples.

12. a) Describe the preparation, properties and applications of PHBA and PLA.

b) Outline the principles and applications of Gas Chromatography.

Module – II

13. a) What are concentration cells? Describe its applications.

b) Explain the construction and working of a Lithium ion cell.

14. a) Discuss the mechanism of Electrochemical corrosion.

b) What is paint? Describe the functions of its components with suitable examples.

Module – III

15. a) Discuss the various steps involved in the treatment of Municipal water.

b) Differentiate between Biological Oxygen Demand and Chemical Oxygen Demand. Outline the principles involved in their estimations.

16. a) Identify the important air pollutants, their sources, effects and control measures.

b) Write a note on:
   i) Reverse Osmosis and
   ii) Composting of solid waste
Module – IV

17. a) Discuss the steps involved in Proximate Analysis of a given sample of coal.
   
b) Describe the method of preparation of Silicon Carbide refractories. Describe their properties and uses.

18. a) Define HCV and LCV of a fuel. How are they related? Calculate the values for a fuel containing 90% C, 6% H₂, 2% S and 1.6% O₂.
   
b) Discuss the manufacture of Portland Cement.