

**B 709**

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2005.

First Semester

Common to All branches except Marine Engineering

CM 125/CM 131 — CHEMISTRY — I

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Distinguish between  $\Delta G$  and  $\Delta G^\circ$ .
2. Define chemical potential.
3. What are reference electrodes? Give two examples.
4. Mention any two applications of EMF measurements.
5. Define alkalinity of water.
6. What are zeolites? Give example.
7. Mention the additives added in the compounding of plastics.
8. Define functionality of a monomer.
9. What are composite reactions?
10. Define Threshold energy.

PART B — (5 × 16 = 80 marks)

11. (i) Discuss desalination by reverse osmosis process. (8)
- (ii) Define hardness of water. Explain the estimation of hardness of water by EDTA method. (8)

12. (a) (i) Define the terms Gibbs free energy and Helmholtz free energy. Discuss the variation of  $\Delta G$  with variation in temperature and pressure. (10)

(ii) Derive Maxwell's relations. (6)

Or

(b) (i) Derive Gibbs-Helmholtz equation for a process at constant pressure and at constant volume. Mention the applications of this equation. (8)

(ii) Derive Van't Hoff reaction isotherm. Calculate the equilibrium constant for a reaction at 298 K whose standard free energy is  $163.43 \text{ kJ.mol}^{-1}$ . (5 + 3)

13. (a) (i) Discuss the kinetics of chain reactions with suitable example. (8)

(ii) Explain Lindemann theory of unimolecular reactions. (8)

Or

(b) (i) Describe the mechanism of enzyme catalysed reactions and derive Michaelis-Menten equation. (10)

(ii) Discuss the order and molecularity of complex reactions. (6)

14. (a) (i) Derive Nernst Equation and mention its applications. (6)

(ii) Describe the standard hydrogen electrode and its use in the determination of single electrode potentials. (6)

(iii) Write the cell reaction and calculate the EMF of the cell  $\text{Fe/Fe}^{2+} (0.01 \text{ M}) \parallel \text{Cu}^{2+} (0.5 \text{ m}) \text{ Cu}$  at  $25^\circ\text{C}$ . The standard electrode potentials of iron and copper electrode are  $-0.44 \text{ V}$  and  $+0.34 \text{ V}$  respectively. (4)

Or

(b) (i) Explain the principle of electrochemical corrosion with suitable example. (8)

(ii) Describe the impressed current and sacrificial anode methods of corrosion control. (8)

15. (a) (i) Discuss the types of polymerization with suitable examples. (10)  
(ii) Distinguish Thermoplastics and thermosetting plastics. (6)

Or

- (b) (i) Explain the mechanism of free radical polymerization. (9)  
(ii) Describe injection moulding of plastics with a neat diagram. (7)
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