

N 1035

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2004.

Second Semester

Mechanical Engineering

CM 132 – CHEMISTRY — II

(Common to Civil Engineering, Instrumentation and Control Engineering, Mechatronics Engineering, Information Technology, Computer Science and Engineering, Electrical and Electronics Engineering, Electronics and Communication Engineering, Electronics and Instrumentation Engineering, Bio-Medical Engineering)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are nucleophiles and electrophiles? Give two examples for each.
2. Define the terms enthalpy and entropy.
3. What are the various multicomponent equilibria? Give one example for each type.
4. What are composites? What are their characteristics?
5. What is an irreversible cell? Explain giving an example.
6. Explain briefly the principle of glucose sensors.
7. A cooper equipment should not possess a small steel bolt. Give reasons.
8. What are the three states in which solid iron can exist? What are their lattice structures?
9. What are the constituents of German silver and nickel bronze? What are their uses?
10. Write any four applications of powder metallurgy.

PART B — (5 × 16 = 80 marks)

11. (i) Discuss the mechanism of S_N2 reaction and electrophilic substitution reaction. (8)
- (ii) Under what conditions electrochemical corrosion occur? Discuss the mechanism of electrochemical corrosion. (8)
12. (a) (i) Define the following terms : Heat of formation of a compound, heat of neutralization, integral heat of solution and differential heat of solution. (4)
- (ii) What is free energy change? What is its significance? ΔG for a reaction at 300K is -10 kcal. What is the entropy change for the reaction? What will be ΔG at 330 K? (4)
- (iii) What is Ellingham diagram? Draw the Ellingham diagram for the formation of oxides of mercury, chromium, aluminium and magnesium. Explain their significance. (8)

Or

- (b) (i) State phase rule. Define and explain the terms involved in the phase rule. (8)
- (ii) What are refractories? How are they classified? Give example for each type. Explain the terms refractoriness and thermal spalling. (8)
13. (a) (i) How are nylon-6, 6 and polycarbonate prepared? What are their properties and uses? (8)
- (ii) Explain the function of resin, plasticizers, stabilizers and accelerators used during compounding of plastics. Give atleast two examples for each. (8)

Or

- (b) (i) Write a brief account of polymer blends and polymer alloys. (8)
- (ii) Give the composition, preparation and uses of flint glass, pyrex glass, optical glass and quartz. (8)
14. (a) (i) What is meant by emf series? Explain any three applications of emf series. (8)
- (ii) Explain extraction of aluminium from bauxite by electrowinning process. (8)

Or

- (b) (i) Explain how electrochemical machining is carried out. What are the advantages of it over conventional methods? (8)
- (ii) Explain how corrosion is controlled by use of inhibitors and by sacrificial anode method. (8)

15. (a) (i) Explain the following extraction process : Calcination, roasting, smelting and aluminothermic reduction. (8)
- (ii) Explain the following process of heat treatment : Annealing, hardening, tempering and carburizing. (8)

Or

- (b) (i) Draw the phase diagram for a two component system that forms a continuous series of solid solutions without a maximum or a minimum and explain its salient features. (8)
- (ii) Write a note on compacting and sintering operations employed in powder metallurgy. (8)