G 221

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2003.

Fourth Semester

Chemical Engineering

(Common to Textile Technology and Leather Technology)

CH 242 — PHYSICAL CHEMISTRY

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What is an electrochemical cell?

2. Write the mathematical expression for Nernst's equation for $Zn(s)|Zn^{2+}(aq)\|Cu^{2+}(aq)|Cu(s)$?

3. What is a zero order reaction?

4. Write down the Arrhenius equation.

5. What is condensed phase rule?

6. What is the eutectic composition of lead–silver system?

7. Why should a solid catalyst work best as a fine powder?

8. Define emulsion.

9. What is gel?

10. State Grotthus–Draper Law.

PART B — (5 × 16 = 80 marks)

11. (i) Discuss the mechanism of any one of the photochemical reaction in detail. (8)

(ii) Write short notes on :

(1) Photoelectric cell. (4)

(2) Chemical actinometer. (4)

12. (a) (i) Define transport number. How will you determine the transport number? (8)

(ii) Describe the construction of Calomel electrode. (8)

Or

(b) (i) Derive Nernst's equation. How is it useful? (8)

(ii) How is specific conductivity of a strong electrolyte measured? (8)

13. (a) (i) What are parallel reactions? Discuss its mechanism in detail. (8)

(ii) Discuss the mechanism of enzyme catalysis in detail. (8)

Or

(b) (i) Draw a two component system phase diagram neatly and explain. (8)

(ii) What is Gibb's phase rule? Describe the terms involved in it. (8)

14. (a) (i) Derive Gibb's adsorption isotherm for adsorption from solution phase. (8)

(ii) State and explain B.E.T. equation for multilayer adsorption. How is it verified? (8)

Or

(b) (i) Derive the rate equations for a general acid catalysed reaction. (8)

(ii) Distinguish

(1) Physical and Chemical adsorption. (4)

(2) Homogeneous and Hetrogeneous catalysis. (4)

15. (a) (i) Discuss any four methods of preparation of colloidal solutions. (8)

(ii) Write notes on :

(1) Electrophoresis. (4)

(2) Electro–osmosis. (4)

Or

(b) (i) Discuss any four properties of colloidal systems. (8)

(ii) What are the applications of colloids? (8)
