Reg. No. : | | | | | | | | | | | |

G 1132

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2009.

Fourth Semester

Chemical Engineering

CH 242 — PHYSICAL CHEMISTRY

(Common to B.Tech. Leather Technology and B.Tech. Textile Technology)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are reference electrodes? Give one example.

2. Equivalent conductance of an electrolyte increases on dilution. Explain.

3. What is an opposing reaction? Give one example.

4. What is meant by congruent melting?

5. What is meant by heterogeneous catalysis? Give one example.

6. Define the terms adsorption isotherm, adsorption isobar.

7. What is meant by the term 'isoelectric point' of a lyophilic sol?

8. Distinguish between sol and emulsion.

9. State Stark-Einstein's law of photochemical equivalence.

10. Explain the term 'Fluorescence'.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Define Kohlrausch's law and discuss its applications. (8)

(ii) Derive Nernst equation of electrode potential. (8)

Or

(b) (i) Define electromotive force. How is it measured by potentiometric method? (8)

(ii) Describe the construction and working of hydrogen electrode. (6)

(iii) What is electrochemical series? (2)

12. (a) (i) Describe Hittorf's method of determining the transport number of silver ions in silver nitrate solution. (8)

(ii) Derive Michaelis-Menten equation. (8)

Or

(b) (i) Derive an expression for the kinetics of parallel reaction. (8)

(ii) Write short notes on 'activation energy' of a reaction. (4)

(iii) A first order reaction has rate constant equal to 1.25×10^{-4} sec^{-1} at 298 K and 8.5×10^{-4} sec^{-1} at 318 K. Calculate the activation energy of the reaction. (4)

13. (a) (i) Define phase rule. Explain the terms phase, component and degree of freedom. (8)

(ii) Write notes on :

(1) Eutectic point

(2) Cooling curves. (8)

Or

(b) (i) Draw and explain the important features of phase diagram of water system. (8)

(ii) What are lyophobic and lyophilic sols? Explain the following properties of sols (1) Tyndall effect (2) Brownian movement. (8)

14. (a) (i) Distinguish between physical and chemical adsorption. (6)

(ii) Derive and explain the BET equation for multilayer adsorption. Explain how the surface area of an adsorbent be determined with the help of this equation. (10)

Or

(b) (i) Discuss the important characteristics of catalysts. (8)

(ii) Discuss in detail the industrial applications of catalysis. (8)

15. (a) (i) With the help of a diagram, explain the phenomenon of electro-osmosis. (8)

(ii) Explain the terms Syneresis, Thixotropy, Gold number, and Schulze-Hardy law. (8)

Or

(b) (i) Define quantum yield. How is it determined experimentally? (8)

(ii) Derive the kinetic expression for the photochemical reaction between hydrogen and bromine. (8)
