

M.Sc. (Previous) Applied Chemistry Examination, August/September 2008
 Directorate of Correspondence Course (Freshers)
 DEC. APP. CHEM. 1.04 : PHYSICAL CHEMISTRY

Time : 3 Hours

Max. Marks : 85

- Note :*
- 1) Answer any **TEN** questions from Part – A, **TWO** questions from Part – B and **THREE** questions from Part – C.
 - 2) Figures to the **right** indicate marks.
 - 3) Repeaters answer any **ONE** question from Part – B.

PART – A

(2×10=20)

1. The simple collision theory fails to explain reversible reactions. Why ?
2. What are the surface active agents ?
3. Explain the use of secondary solute in the preparation of a liquid scintillator.
4. Write the Debye-Huckel-Onsager conductance equation and explain the terms involved.
5. What is nuclear fission ? And explain its significance.
6. Define activity and activity coefficient.
7. What is ionic atmosphere ?
8. Distinguish between over voltage and decomposition voltage.
9. What are primary and secondary batteries ?
10. Explain the use of cathodic depolarizers in batteries.
11. Distinguish between self scattering and back scattering.
12. What are the advantages of fuel cells ?
13. Comment on entropies of ice and water.
14. Define chemical potential.
15. State Raoult's law.

P.T.O.

PART – B

(10×2=20)

16. a) Explain the Lindemann's theory of unimolecular reactions.
 b) Write a note on fuel cells. (5+5=10)
17. a) Give a brief account on artificial radio activity.
 b) Discuss the factors affecting the CMC of surfactants. (5+5=10)
18. a) Explain the criteria for spontaneity and equilibrium in a chemical process.
 b) Out line the principle of evaluation of fugacity of a gas. (5+5=10)

PART – C

(15×3=45)

19. a) Describe briefly the theories involved in the mechanism of hydrogen over voltage.
 b) Write a note on electrolytes.
 c) Explain the charging theory and practices of storage batteries. (5+5+5=15)
20. a) Explain nuclear fission reaction with suitable examples.
 b) Derive Van't Hoff's reaction isotherm and deduce the relation giving the temperature dependence of free energy.
 c) Explain the term ionic atmosphere. Deduce Clausius-Glaapeyron equation. (5+5+5=15)
21. a) Discuss the working principle of semiconductor radiation detectors.
 b) The energy of activation of a reaction is 15 k cal/mole. If the rate constant of this reaction is $6 \times 10^{-4} \text{ sec}^{-1}$ at 27°C , what would be the rate constant at 37°C ?
 c) State and explain the Nernst heat theorem. (5+5+5=15)
22. a) Discuss the determination of partial molar volume by the method of density measurements.
 b) With a neat diagram explain dry cell and mention its uses.
 c) Write an explanatory note on breeder reactor. (5+5+5=15)
23. a) Deduce Debye heat capacity equation.
 b) Explain the thermodynamics of real gases.
 c) Write the Debye-Huckel limiting law and explain the significance of each term in it. Discuss the modifications in the equation to account for the activity coefficients in a concentrated electrolyte. (5+5+5=15)