

NOVEMBER/DECEMBER 2019

**MCH23 — PHYSICAL CHEMISTRY – II**



Time : Three hours

Maximum : 75 marks

**SECTION A — (5 × 6 = 30 marks)**

Answer ALL questions.

1. (a) Describe the flash photolysis method for studying kinetics of fast reactions?

Or

- (b) What are consecutive reaction? Discuss the kinetics of consecutive reactions.

2. (a) Explain the determination of activity coefficient by electrochemical method.

Or

- (b) What is meant by mean ionic activity and mean ionic activity coefficient? Explain.

3. (a) Discuss the effect of ionic association on conductance.

Or

- (b) Discuss the Guoy–Chapman theory of electricity double layer.

4. (a) Explain the reducible and irreducible representation.

Or

- (b) Assign the point group for the following molecules.

- (i)  $\text{CHCl}_3$
- (ii)  $\text{CHCl=CHCl}$
- (iii) Naphthalene
- (iv)  $[\text{PtCl}_4]^{2-}$
- (v)  $\text{CH}_4$
- (vi)  $\text{H}_2\text{O}$

5. (a) Explain the great orthogonality theorem and its consequences.

Or

- (b) Discuss the symmetry selection rules of Infra-red and Raman spectra.

SECTION B — ( $3 \times 15 = 45$  marks)

Answer any THREE questions.

6. Using the Rice-Herzfeld mechanism for the reaction  $\text{H}_2 + \text{Br}_2 \rightarrow 2\text{HBr}$ , given above and employing steady state approximation of  $[\text{H}]$  and  $[\text{Br}]$ , derive the rate law expressive for the formation of  $\text{HBr}$ .
7. Derive Debye-huckel limiting law. Explain the qualitative and quantitative verification and also limitation of Debye huckel limiting law.

8. (a) Explain the electro kinetic phenomena. (5)  
(b) Discuss the Helmholtz-perrin theory of electrical double layer. (10)

9. (a) Explain the direct product representation. (5)  
(b) What is group multiplication table? construct the group multiplication table for  $\text{C}_{2v}$  Point group. (10)

10. (a) Construct the character table for  $\text{C}_{3v}$  point group. (5)  
(b) Obtain the hybrid orbitals for the sigma bonds in  $\text{CH}_4$ . (10)

