



NOVEMBER/DECEMBER 2018

MCH23 — PHYSICAL CHEMISTRY — II

Time : Three hours

Maximum : 75 marks

SECTION A — (5 × 6 = 30 marks)

Answer ALL questions.

1. (a) What are consecutive reactions? Discuss the kinetics of consecutive Reactions.

Or

- (b) Describe the flash photolysis method for studying the kinetics of fast Reactions.

2. (a) Explain the term mean ionic activity and mean ionic activity coefficients. Discuss in detail the Debye-Huckel theory of mean ionic activity coefficients.

Or

- (b) Discuss the activity coefficient of strong electrolytes.

3. (a) Discuss the Stern model of electrical double layer.

Or

- (b) Explain the electrode-electrolyte interface.

4. (a) What are symmetry elements and symmetry operations? List the symmetry elements for H_2S and PCl_3 .

Or

- (b) Define the following terms:
- (i) Group multiplication table
 - (ii) Sub-group
 - (iii) Order of the group.
5. (a) Discuss the Great Orthogonality theorem and its consequences.

Or

- (b) Obtain the symmetry normal modes of vibration for NH_3 molecule.

SECTION B — (3 × 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 or $[\text{H}]$ and $[\text{Br}]$, derive the rate law expression for the formation of HBr .
7. Derive Debye-Huckel limiting law equation. Explain the quantitative and qualitative verification of DHO.

8. Write a note on

- (a) Lippmann equation
- (b) Fick's law of diffusion
- (c) Membrane potential.

9. (a) Discuss the Direct Product representation.
(b) Explain the properties of irreducible representations.
10. (a) Discuss the construction of character table for D_{2d} point group.
(b) Obtain the hybrid orbital's for BF_3 .

