



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 — ($3 \times 15 = 45$ 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 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 .

