

## FACULTY OF SCIENCE

M. Sc. I – Semester Examination, December 2013

Subject: Chemistry

Paper – III : Physical Chemistry

Time: 3 Hours

Max. Marks: 80

**Note :** Answer all questions from Part–A and Part–B. Each question carries 8 marks in Part–A and 12 marks in Part – B.

**PART – A** (4 x 8 = 32 Marks)  
(Short Answer Type)

- 1.(a) Define chemical potential of Ideal gases and mention its significance.
- (b) Derive any two Maxwell relations.
- 2.(a) Give an account of potentiometric titrations.
- (b) Explain Liquid-Liquid Junction potential.
- 3.(a) What is commutative property of operators? What is its significance in quantum mechanics?
- (b) Explain the various classical theories of black-body radiation.
- 4.(a) Explain the collision theory of Reaction-Rates.
- (b) Give an account of correlations for Nucleophilic reactions.

**PART – B** (4 x 12 = 48 Marks)  
(Essay Answer Type)

- 5.(a) Derive Clausius-Clapeyron equation.
  - (b) Derive the van't Hoff's equation.
- OR**
- (c) Write a notes on the following:
    - (i) Pressure dependence of "G"
    - (ii) Physical significance of "A" and "G"
  - (d) Explain the standard entropies and entropy changes of chemical reactions.
- 6.(a) Derive an equation for concentration cell with transference.
  - (b) Explain the half-wave potential and its significance.
- OR**
- (c) Give an account of cyclic-voltametric study of insecticide parathion.
  - (d) Explain the principle of amperometric titrations.
- 7.(a) Derive the Time independent schrodinger equation from classical mechanics.
  - (b) Explain the black body radiation and Planck's concept of quantization.
- OR**
- (c) Write notes on the following:
    - (i) Operators  $\nabla$  and  $\nabla^2$
    - (ii) Normalized and orthogonal functions
  - (d) Discuss any three postulates of quantum mechanics.
- 8.(a) Write about Swain-Scott equation and Edward equation.
  - (b) Explain the deviations from Hammett correlations.
- OR**
- (c) Discuss Lindemann's theory of unimolecular reactions.
  - (d) Explain the role of steric factor in kinetic theory of collisions.

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