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.

(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.

(c) Give an account of cyclic-voltammetric 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.

(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.

(c) Discuss Lindemann's theory of unimolecular reactions.
(d) Explain the role of steric factor in kinetic theory of collisions.

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