C. ABDUL HAKEEM COLLEGE (AUTONOMOUS),
MELVISHARAM - 632 509.
SEMESTER EXAMINATIONS, NOVEMBER - 2018

M.Sc., CHEMISTRY **SEMESTER III**

P14MCH303 – PHYSICAL CHEMISTRY - III

Time: Three Hours Maximum: 75 Marks

SECTION - A (5 X 6 = 30 Marks)

Answer **ALL** Questions.

1. a) What is Compton effect? How is Compton wavelength related to the incident wave Length?

(Or)

b) What are the postulates of quantum mechanics?

2. a) Calculate the spacing between energy levels for

(i) an electron (mass $=10^{-30}$ kg) in a one dimensional box of 1.0 A^{o} length, and

(ii) a ball bearing (mass = 1 g) in a box of 10 cm length. Comment on the energy gaps in the two cases.

(Or)

b) Derive an expression for the energy of a particle present in a one dimensional box.

3. a) State and explain the Born-Oppenheimer approximation.

(Or)

b) Elaborate the concept of LCAO-MO approach to multi-electronic systems.

4. a) State and explain Franck – Condon principle.

(Or)

b) Discuss the kinetics of unimolecular photophysical processes.

5. a) Explain the term membrane potential.

(Or)

b) Write a short note on electro kinetic phenomena.

SECTION - B (3 X 15 = 45 Marks)

Answer **ANY THREE** Questions.

6. a) What is Hermitian operator? Explain the properties of a Hermitian operator.

b) What do you understand by wave particle duality?

7. Derive the energy for hydrogen and helium atom using perturbation method.
8. Apply the Huckel's molecular orbital theory for ethylene and butadiene molecules and mention its outcomes.
9. Discuss in detail about the Stern-Volmer analysis and its importance.
10. Derive Lippmann equation. Discuss the influence of ions on electrokinetic phenomena.

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