

Code No. 9244 / O

FACULTY OF SCIENCE
M.Sc. II – Semester (Old) Examination, April / May 2014

Subject: Physics & Applied Electronics
Paper – III: Quantum Mechanics – II

Time: 3 Hours

Max.Marks: 64

Note: Answer all questions from Part - A and Part - B. Each question carries 3 marks in Part - A and 10 marks in Part - B.

PART – A (8 x 3 = 24 Marks)
[Short Answer Type]

- 1 Derive the relation between phase shift and potential
- 2 State and explain optical theorem.
- 3 What is constant perturbation? Explain.
- 4 Explain electric dipole approximation.
- 5 What is centre field approximation?
- 6 Explain the idea of Born-Oppenheimer method.
- 7 Write down Klein-Gordon equation and state the limitations of it.
- 8 Obtain Dirac equation in covariant form.

PART – B (4 x 10 = 40 Marks)
[Essay Answer Type]

- 9 (a) Derive an expression for scattering amplitude using Green's method.
(b) Apply Born approximations for an electron scattered by screen coulomb potential.
OR
(c) Using partial wave analysis method deduce the scattering amplitude in terms of phase shift.
- 10 (a) What is Fermi golden rule? Explain.
(b) Using the concept of harmonic perturbation obtain an expression for transition probability rate.
OR
(c) Discuss the interaction of electromagnetic radiation with an atom.
- 11 (a) Explain the molecular orbital theory in detail.
OR
(b) Describe valance band theory and deduce Eigen values of an hydrogen molecule.
- 12 (a) Write the Dirac equation and obtain its plane wave solutions.
OR
(b) Write down the Dirac equation for a particle in electromagnetic fields and deduce an expression for magnetic moment.
