M.Sc. 2nd Semester Physics CBCS Scheme

w.e.f. 2018-19 Examination, July-2022

QUANTUM MACHANICS-II

Paper-18PHY22C2

Time allowed: 3 hours Maximum marks: 80

Note: Alteast five questions in all, selecting at least one *question from each unit*

Question No. 1 is compulsory

1. (a) Discuss the advantage of variational method over other perturbation methods.

(b) What do you mean by magnetite dipole transitions ?

(c) State and prove Optical theorem.

(d) What are identical particles ?

Unit-I

2. Calculate the ground state energy of Helium atom using Variational method.

3. Write short notes on the following:

(a) Adiabatic approximation

(b) Fermi Golden rule.

Unit-II

4. Obtain selection rules of electric and magnetic dipole transitions induced by electromagnetic radiations.

5. Explain transition probabilities when an atom is exposed to monochromatic electromagnetic wave and derive relation between Einstein's coefficients. (16)

Unit-III

6. Derive an expression for the total scattering cross-section of the particles by spherically symmetric potential

7. Develop Green's function for a free particle and describe total wave function in the first Born approximation (16)

Unit-IV

8. Describe the collision of identical particles and calculate differential cross section for the scattering of two identical fermions of spins half. (16)

9. Discuss the singlet and triplet states pertaining to Helium atom. Discuss the ground state and first excited state.