

SHRIMATHI DEVKUNVAR NANALAL BHATT VAISHNAV COLLEGE FOR WOMEN
(AUTONOMOUS)

(Affiliated to the University of Madras and Re-accredited with 'A+' Grade by NAAC)

Chromepet, Chennai - 600 044.

M.Sc.Physics - END SEMESTER EXAMINATIONS - APRIL 2025

SEMESTER - II

22PPHCT2005 - Quantum Mechanics - II

Total Duration : 2 Hrs. 30 Mins.

Total Marks : 60

Section B

Answer any **SIX** questions ($6 \times 5 = 30$ Marks)

1. Show that the scattering cross-section is the square of the scattering amplitude.
2. Explain harmonic perturbation and obtain the expression for transition probability.
3. Describe the selection rule for dipole transition.
4. Obtain Klien Gordon relativistic equation and discuss its physical interpretation.
5. Derive the expression for magnetic moment of electron due to its spin, motion.
6. Obtain the Covariant form of Dirac equation.
7. Explain the quantization of Schrodinger equation.
8. Describe spin orbit interaction and obtain the expression for interaction energy.

Section C

I - Answer any **TWO** questions ($2 \times 10 = 20$ Marks)

9. Using semi classical treatment discuss the interaction of electromagnetic radiation with atom and hence derive the Einstein A and B coefficient for absorption and emission.
10. Derive the Plane wave solution of Klien Gordon equation.
11. Explain the spin of Dirac Particle and hence obtain the Pauli's spin matrices. Also give the Properties of Pauli's spin matrices.
12. Discuss in detail about the quantization of Electromagnetic field.

II - Compulsory question ($1 \times 10 = 10$ Marks)

13. Describe the procedure for partial wave analysis and derive the asymptotic solution of the wave function. Also derive the expression for scattering cross section using the same.
