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 - 2023
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. Explain how centre of mass frame is transformed to Laboratory frame.
2. Explain the theory of sudden approximation.
3. Derive klein-Gordon equation and explain its significance.
4. Define probability density and magnetic moment of the electron.
5. Define transition probabilities and discuss Adiabatic approximation.
6. Derive the selection rules for dipole radiation from the semi-classical treatment of an atom with em radiation.
7. Derive an expression for magnetic moment of the electron due to its spin.
8. Discuss quantization of Schroedinger field.

Section C

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

9. Explain partial wave analysis of scattering of low energy particles and derive an expression for the scattering cross-section.
10. Obtain the plane wave solutions of KG equation and explain the significance of negative energy states.
11. Obtain the covariant form of Dirac's equation and establish the invariance of the relativistic Dirac equation.
12. Compare the Klein-Gordon field with Dirac field.

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

13. Apply time dependent perturbation theory to constant perturbation and derive expression for transition probability per unit time.

******