

Answer in 1 or 2 sentences :

16. Give example for basis in Hilbert's space.
17. How does first order perturbed wave function in time independent case is approximated?
18. Give one example application for the theory of time dependent perturbation.
19. What is result of $[L_z, x]$? $+i\hbar y$
20. Give two examples for spin 'o' particle.

SECTION B — 5 × 6 = 30 marks)

Answer ALL the questions choosing either (a) or (b).

21. (a) Give the comparison between Heisenberg and Dirac (Interaction) picture.

Or

- (b) Obtain energy eigen values for one dimensional harmonic oscillator.

22. (a) Give the theory of WKB approximation.

Or

- (b) Obtain ground state energy of Helium atom by perturbation technique.

23. (a) Give the theory of adiabatic approximation and calculate transition probability.

Or

- (b) Discuss time dependent perturbation theory to potential scattering.

24. (a) Prove $J_z (J_z \psi_{jm}) = (m \pm 1) \hbar J_z \psi_{jm}$.

Or

- (b) Obtain matrices for J^2, J_x, J_y and J_z .

25. (a) Outline the properties of γ -matrices.

Or

- (b) Discuss the commutation relations of Dirac's matrices.