

3. Area under the curve between $\frac{\sin^2\left(\frac{W_{ml}}{2}\right)}{W_{ml}^2}$ and $\frac{W_{ml}}{2}$ is proportional to

- (a) t^2
- (b) t
- (c) $1/t$
- (d) $1/t^2$

4. $[\hat{L}_x, \hat{L}_y]$ is given by

- (a) $\hbar L_z$
- (b) $\frac{i}{\hbar} L_z$
- (c) $-i\hbar L_z$
- (d) $i\hbar \hat{L}_z$

5. The continuity equation is given by

- (a) $\frac{\partial p}{\partial t} + \text{Div } S = 0$
- (b) $\frac{\partial^2 p}{\partial t^2} + \text{Div } S = 0$
- (c) $\frac{\partial p}{\partial t} + \text{Grad } S = 0$
- (d) $\frac{\partial S}{\partial t} + \text{Div } p = 0$

Fill up the blanks :

6. A state function can be expressed by a _____ in an infinite dimensional space by imagining an axis for each function ψ_i .

7. The first order time independent perturbed energy for the non-degenerate case is _____.

8. The four possible combinations of 'l' and 'm' for $n = 2$ in the case of hydrogen atom are _____.

9. $[\hat{J}_x, \hat{J}_y]$ is _____.

10. Dirac matrix ' α ' in terms of Pauli's spin matrix ' σ ' is given by _____.

Match the following :

11. Bra and ket vectors

(a) $\frac{-\hbar^2}{2m} (\nabla_1^2 + \nabla_2^2) - \frac{ze^2}{r_1} - \frac{ze^2}{r_2} + \frac{e^2}{r_{12}}$

12. Hamiltonian for helium atom by perturbation method

(b) Quantisation of energy

13. Time dependent perturbation method

(c) $\langle j_1 m_1 j_2 m_2 | j_1 j_2 j_m \rangle$

14. C.G. Coefficients

(d) $\left(\nabla^2 - \frac{1}{c^2} \frac{\partial^2}{\partial t^2} \right) \psi = \frac{m_0^2 c^2}{\hbar^2} \psi$

15. K.G. equation

(e) Dirac.