2. Energy of He atom by variation method (taking z-atomic number; E_H – ground state energy of H-atom) is given by

(a) $-\left(z^2-\frac{5}{4}z\right)E_H$ (b) $-\left(2z^2-\frac{5}{4}z\right)E_H$

(c) $\left(z^2+\frac{5}{4}z\right)E_H$ (d) $-\left(2z^2E_H\right)$.

3. Transition probability/unit time, when transitions are extended to continuum is given by τ where τ is equal to,

(a) $2\pi\left|H^1_{ml}\right|^2\rho(E_m)$ (b) $i\hbar\left|H^1_{ml}\right|^2\rho(m)$

(c) $\left|H^1_{ml}\right|^2\rho(E_m)$ (d) $\frac{2\pi}{\hbar}\left|H^1_{ml}\right|^2\rho(m)$.

4. Eigen value of $\hat{J}^2$ is

(a) $\hbar^2l(l+1)$ (b) $\hbar^2s(s+1)$

(c) $\hbar^2j(j+1)$ (d) $\hbar^2j(j+1)^2$.

5. Trace of Dirac's matrices is

(a) +1 (b) zero

(c) –1 (d) anything (+1 or –1).

Fill in the blanks :

6. If 'C' is a complex number, and if $|R\rangle = C|A\rangle$ then $\langle R|$ is given by _____.

7. Best energy of Helium occurs using variation method when z' is _____ rather than z.

8. The conclusion of sudden approximation when Hamiltonian changes for a very short finite interval of time, the wave function _____.

9. Eigen value of J_z is _____.

10. The order of Dirac's matrices can be only _____.

Match the following :

11.	$\langle AIB\rangle$	(a)	$\frac{-i\hbar}{2m}(\psi^*\nabla\psi-\psi\nabla\psi^*)$
12.	Energy of I order time independent non-degenerate perturbation	(b)	Collision of gas molecules
13.	Application of adiabatic approximation	(c)	$\pm\hbar J_\pm$
14.	$[J_z, J_\pm]$	(d)	$\langle\psi^*_k\|H^1\|\psi^*_k\rangle$
15.	Current density in KG equation	(e)	$\langle\overline{BIA}\rangle$