3. For the adiabatic approximation, the condition that $|C_m(t)| \ll$ implies, $|C_m(t)^2| \rightarrow$ probability of finding the system at 'm' in a time 't' sec).

(a) $\frac{1}{\hbar\omega_{sm}^2}\frac{\partial H'_{sm}}{\partial t} \ll 1$

(b) $\frac{1}{\hbar}\frac{1}{\omega_{sm}^2}\frac{\partial H_{sm}}{\partial t} \gg t$

(c) $\frac{1}{\hbar\omega_{sm}^2}\frac{\partial H'_{sm}}{\partial t} > 1$

(d) $\frac{1}{\hbar}\frac{1}{\omega_{sm}^2}\frac{\partial H'_{sm}}{\partial t} = 1.$

4. $J_z(J_{\pm}\psi_{jm})$ value is

(a) $m\hbar J_{\pm}\psi_{jm}$

(b) $(m-1)\hbar J_{\pm}\psi_{jm}$

(c) $(m+1)\hbar\psi_{jm-1}$

(d) $(m\pm1)\hbar(J_{\pm}\psi_{jm})$.

The matrix for Z–component of Dirac matrix α_z is

(a) $\begin{pmatrix} 0 & 0 & 0 & -i \\ 0 & 0 & i & 0 \\ 0 & -i & 0 & 0 \\ i & 0 & 0 & 0 \end{pmatrix}$ (b) $\begin{pmatrix} 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{pmatrix}$

(c) $\begin{pmatrix} 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & -1 \\ 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \end{pmatrix}$ (d) $\begin{pmatrix} 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 0 \\ 0 & 1 & 0 & 0 \\ 1 & 0 & 0 & 0 \end{pmatrix}$

6. If $\hat{A}$ be a self adjoint operator, what is the value of $\langle\phi|\hat{A}|\psi\rangle$?

7. Write down the Hamiltonian for He atom.

8. What is the percentage value of subsidiary peaks of main curve for the transition probability curves drawn between $4\sin^2\left(\frac{\omega_{fi}t}{2}\right)\Big/\omega_{fi}^2$ versus ω_{fi}?

9. Write down the matrix for L_z.

10. What is the magnetic moment for Dirac electron?