

2. The energy corrections for the states $n=2$, with $l=1$, are affected by electric field are

- (a) $3a_0 e E, \infty$
- (b) $-3a_0 e E, -3a_0 e E$
- (c) Both are $3a_0 e E$ only
- (d) $3a_0 e E, -3a_0 e E$

3. If ω_{sm} is the angular frequency of transition from m^{th} state to s^{th} state, perturbation changes at rapid rate during T and $T + \lambda$ (very small interval of time, then for the validity of sudden approximation,

- (a) $\omega_{sm} \lambda \gg 1$
- (b) $\omega_{sm} \lambda \ll 1$
- (c) $\omega_{sm} \lambda = 0$
- (d) $\omega_{sm} = 0$

4. x - component of the orbital angular momentum is \hat{L}_x . It is given by

- (a) $\frac{\hbar}{2} \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix}$
- (b) $\frac{\hbar}{2} \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$
- (c) $\frac{\hbar}{2} \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix}$
- (d) $\frac{\hbar}{2} \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix}$

5. Dirac's expression for E is

- (a) $\pm c (\alpha_x p_x + \alpha_y p_y + \alpha_z p_z + \beta mc)$
- (b) $\pm c (\alpha_x p_y + \alpha_y p_x + \beta mc)$
- (c) $\pm c (\alpha_x p_x + \alpha_y p_y + \alpha_z p_z)$
- (d) $\pm c (\alpha_x p_x^2 + \alpha_y p_y^2 + \alpha_z p_z^2 + \beta mc)$

Answer in 1 or 2 sentences:

6. The interaction picture operator A_{int} is got from the operator in the Schrodinger picture A_{sh} by a transformation. What is it?

7. What is the validity condition for WKB to be good?

8. Find the selection rules for dipole approximation.