University of Hyderabad

School of Physics

Jul 2010 - Dec 2010 | Time : 30 Mins
M.Sc. III-Semester | Quantum Mechanics-II | MM : 20

SessionIX::Group Activity

Note: The members of each group to discuss the paper for 15 minutes and then each student must write the answer separately.

⊘ Describe each of the following in a word, a phrase or a sentence.

⊘ **Sample Question:** $|j_1 - j_2| \leq j \leq j_1 + j_2$

Sample Answer: Rule for addition of angular momenta j_1, j_2

[1] $(Xf, g) = (f, X^\dagger g)$

[2] $X = \sum \lambda_n |n\rangle\langle n|$

[3] $\sum_n |n\rangle\langle n| = I$

[4] $(f, Xf) > 0 \qquad \forall f$

[5] $\langle\psi_m|\psi_n\rangle = \delta_{mn}$

[6] $\|\psi\|^2 = \sum_n |(u_n, \psi)|^2$

[7] $[q_\alpha, p_\beta] = i\hbar\delta_{\alpha\beta}$

[8] $\mathcal{P} = |\psi\rangle\langle\psi|$

[9] $\langle\psi|X|\psi\rangle > 0$

[10] $|\psi\rangle = \sum_n \langle u_n|\psi\rangle\, |u_n\rangle$

[11] $P_n = \dfrac{|\langle\psi|\psi_n\rangle|^2}{\langle\psi|\psi\rangle\,\langle\psi_n|\psi_n\rangle}$

[12] $E_n = (n + 1/2)\hbar\omega$

[13] $\|f\|\,\|g\| \geqslant |(f, g)|$

[14] $\langle X\rangle_\psi = \dfrac{\langle\psi|X|\psi\rangle}{\langle\psi|\psi\rangle}$

[15] $\sum_n \psi_n(x)\psi_n(y) = \delta(x - y)$

[16] $i\hbar\dfrac{d\Psi}{dt} = \hat{H}\Psi$

[17] $\int u_n(x)u_m(x) = \delta_{mn}$

[18] $H = -\dfrac{\hbar^2}{2m}\dfrac{d^2}{dx^2} + \dfrac{1}{2}m\omega^2x^2$

[19] $[J_i, J_j] = i\hbar\varepsilon_{ijk}J_k$

[20] $(Xf, Xg) = (f, g), \qquad \forall f, g$

[21] $\Delta A\Delta B \geq \hbar\left|\dfrac{\langle C\rangle}{2}\right|$

[22] $(Xf, g) = (f, Xg), \qquad \forall f, g$

[23] $\psi = \sum_n (u_n, \psi)\psi$

[24] $P_n = |\langle u_n|\psi\rangle|^2$

[25] $\lim_{x\to\infty} \psi_E(x) = C\exp(ikx)$

[26] $\lambda = \ell(\ell + 1)\hbar^2, -\ell \leqslant \mu \leqslant \ell$

[27] $(\Delta X)^2 = \langle X^2\rangle - \langle X\rangle^2$