Quantum Mechanics 2022

SC1.203

Quiz-I

26/08/2022

Time 40 Mins

1) In the particle-in-a-box problem, a generic wave function $\Psi(x,t)$ at $t=0$ can be expressed as a linear combination of the steady states with coefficients c_i. What does one mean by the statement: **the probability of getting E_n is given by $|c_n|^2$**? Explain. Can you express $\Psi(x,t)$ in terms of c_n's? In terms of $\Psi(x,0)$? [3+1+1=5]

2) Is the operator for p^2 hermitian? Show by explicit integral. [5]

3) Evaluate $[\hat{x}, \hat{p}^2]$. [5]

4) Obtain the ground state wave function for a harmonic oscillator. [5]

5) For a free particle, $v_{\text{quantum}} = v_{\text{classical}}/2$. Explain. [5]