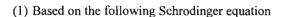
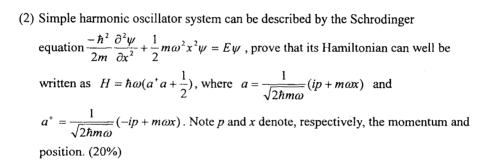
國立中央大學97學年度碩士班考試入學試題卷

所別:電機工程學系碩士班 固態組 科目:近代物理 共 1 頁 第 1 頁



$$i\hbar \frac{\partial \psi}{\partial t} = \frac{-\hbar^2}{2m} \frac{\partial^2 \psi}{\partial x^2} + V(x)\psi$$
, Prove that probability density $\rho = \int_{-\infty}^{\infty} |\psi(x,t)|^2 dx$ is a

time-independent constant if ψ satisfies the condition of square-integrable. (20%)



- (3) Find the eigenvalues and eigenvectors of the matrix $A = \begin{bmatrix} 0 & -i \\ i & 0 \end{bmatrix}$. Meanwhile, prove that these eigenvectors are orthogonal. (20%)
- (4) Density of states $D(\varepsilon)$ means the number of eigenstates in a small interval d ε around energy ε . According to such a definition. Describe $D(\varepsilon)$ as a function of ε for different semiconductor heterostructures: quantum wells, wires and dots. (20%)
- (5) Write out the Fermi-Dirac distribution function and the Boson-Einstein distribution function. (10%)
- (6) Briefly describe what the Bloch theorem is. (10 %)

