Module 3

INTRODUCTORY QUANTUM MECHANICS

(As per Revised Curriculum SVU R-2023)

1. de' Broglie equations	$\lambda = \frac{h}{p} = \frac{h}{mv}$ $\lambda = \frac{h}{2mK}$ $\lambda = \frac{h}{2mqV}$
2. Uncertainty products	$\Delta x \Delta p_x \geq \frac{h}{4\pi}$ (Also, $\Delta i \Delta p_j = 0$ for $i \neq j$) $\Delta E \Delta t \geq \frac{h}{4\pi}$ $\Delta \theta \Delta L \geq \frac{h}{4\pi}$
3. Relativistic equation for kinetic energy	$K = \sqrt{p^2c^2 + m_0^2c^4} - m_0c^2$ For $v \ll c, K \rightarrow \frac{p^2}{2m_0}$
4. Energy of particle confined to one-dimensional infinite quantum well	$E_n = \frac{n^2\pi^2\hbar^2}{2mL^2} = \frac{n^2h^2}{8mL^2}$; $n = 1, 2, 3, \ldots$
5. Momentum of particle confined to one-dimensional infinite quantum well	$p = \pm\hbar k = \pm\frac{nh}{2L}$
6. Phase velocity/wave velocity	$v_{phase} = \frac{\omega}{k}$
7. Group velocity	$V_{group} = \frac{d\omega}{dk} = v_{particle}$

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