UNIVERSITY OF PETROLEUM & ENERGY STUDIES, DEHRADUN

Program	**B. Tech CS : (All Batches)**	**Semester**	**I**
Course	**ENGINEERING PHYSICS**	**Course Code**	**PHYS1023**
Session	**Sept - Dec, 2021**	**Topic**	**QUANTUM MECHANICS**

1 Derive a formula expressing the de-Broglie wavelength of an electron in terms of potential difference (V) in volts through which it is accelerated.

2 Prove that for a relativistic particle group velocity (v_g) is equal to the particle velocity (v).

3 Show that the direction of the recoiled electron in Compton's effect is given by

$$\tan\varphi = \frac{cot\frac{\theta}{2}}{1+\frac{hv}{m_0c^2}}$$

where θ is the scattering angle and φ represents the recoil angle of the electron.

4 Explain why pair production cannot happen in free space.

5 What is Heisenberg's Uncertainty principle? Apply Heisenberg's principle to show that an electron cannot be a part of the nucleus.