IILM UNIVERSITY

Tutorial No. : 02 (Module 2: Introduction to Quantum Physics)			
Subject	**Physics**	**Subject Code**	**UBS1002**

1. Calculate de-Broglie wavelength associated with a proton moving with a velocity equal to $1/20^{th}$ of the velocity of light. Given mass of the proton $= 1.67 \times 10^{-27}$ kg
2. Determine the velocity and kinetic energy of a neutron having de-Broglie wavelength 1Å. Given mass of neutron $= 1.67 \times 10^{-27}$ kg and Planck's constant $h = 6.63 \times 10^{-34}$ J – sec
3. Calculate the de-Broglie wavelength of an α- particle accelerated through a potential difference of 200 volt.
4. Calculate the kinetic energy of an electron if its de-Broglie wavelength equals the wavelength of sodium light. Given the wavelength of sodium light $\lambda = 5893$Å
5. Find energy of an electron moving in one dimension in an infinitely high potential box of width 1 Å.
6. An electron is bound in one dimensional potential box which has width 2.5×10^{-10}m. Assuming the height of the box to be infinite, calculate the lowest two permitted energy values of the electron.
7. Calculate the energy difference between the ground state and the first excited state for an electron in a 1D rigid box of length 10^{-10} m.
8. An X-ray of energy 100 keV strikes a target, they are scattered at an angle 30°. Find the wavelength of the incident photon.
9. Calculate Compton shift if X-rays of wavelength 1Å are scattered from a carbon block. The scattered radiation is viewed at 90° to the incident beam.
10. An X-ray photon is found to have its wavelength doubled on being scattered through 90°. Find the wavelength and energy of the incident photon.