SEM-IV UG1 Physics Honours

Modern Physics (Emergence of Quantum Theory)

There are 10 questions and each carries 2 marks. Full Marks" 10x2=20

Threshold wavelength of a photon that is capable of generating photoelectric effect in metal, is

- The minimum value
- The maximum value
- The average value
- The root mean square valuer

The energy required to dislodge a bound electron from sodium is 2.3 eV. The threshold wavelength of the light for the photoelectric effect to occur is

- $5380\mu m$
- $5380nm$
- $2690\mu m$
- $5380\,\overset{0}{A}$

In the phenomenon of photoelectric effect, the ejected electrons are

- Most of the times relativistic
- Most of the times non-relativistic
- Always relativistic
- Most of the times stationary

The maximum value of the change in wavelength of the scattered light in the Compton Scattering is

- $0.024\,\overset{0}{A}$
- $0.048\,\overset{0}{A}$
- $0.0\,\overset{0}{A}$
- $0.072\,\overset{0}{A}$

Compton scattering with tightly bound electrons leads to

- Maximum wavelength shift
- Minimum wavelength shift
- Wavelength shift equal to the Compton wavelength of electron
- Practically no wavelength shift at all

Compton scattering viewed at an angle yields two lines- one at the wavelength of the incident radiation (original line), and the other at higher wavelength

- Original line is due to the scattering from bound electrons while the other line is due to the scattering from free or loosely bound electrons
- Original line is due to the scattering from free and loosely bound electrons while the other line is due to the scattering from bound electrons
- Original line is due to the Mie scattering while the other line is due to scattering from free or loosely bound electrons
- Original line is due to the Mie scattering while the other line is due to scattering from bound electrons

An electron and a proton have same de-Broglie wavelength. Which one has the higher energy?

- Electron
- Proton
- Both have the sane energy
- Data insufficient

A particle is moving with a speed $c/\sqrt{2}$. Find the phase velocity of its de Broglie wave

- c
- $c/\sqrt{2}$
- $\sqrt{2}c$
- $c/2$

Using Heisenberg's uncertainty principle one can estimates the minimum energy of a harmonic oscillator is

- $\hbar\omega/2$
- $2\hbar\omega$
- $\hbar\omega$
- $\hbar\omega/4$

The uncertainty in the velocity of a particle is equal to its velocity. If $\Delta p_x \Delta x = \hbar$, the uncertainty in its location is

- λ
- 2λ
- $\lambda/2$
- None of these.