

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 Ans.
- 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 μm
- 5380 nm
- 2690 μm
- 5380 $\overset{0}{A}$ Ans.

In the phenomenon of photoelectric effect, the ejected electrons are

- Most of the times relativistic
- Most of the times non-relativistic Ans.
- 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 $\overset{0}{A}$ Ans.
- 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 Ans..

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 Ans
- 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 Ans.
- Proton
- Both have the same energy
- Data insufficient

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

- c
- $\frac{c}{\sqrt{2}}$
- $\sqrt{2}c$ Ans
- $\frac{c}{2}$

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

- $\frac{\hbar\omega}{2}$

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

Ans.

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