PHYS 2210 Spring 2024   A   Name_____

Quiz Class 5 – Photons, Complex numbers, Probability density

1) (4 pts) Photons of wavelength 310 nm are incident on a material with a workfunction of 2.5 eV. What would be the stopping potential (in volts) for electrons with the maximum possible kinetic energy?

2) (4 pts) A beam of light of wavelength 413 nm and total power of 10 mW is incident on a surface What is the rate at which photons strike the surface?

3) (4 pts) The probability amplitude for a photon to arrive at a detector is $\frac{1}{2-i}$. What is the probability that the photon arrives at the detector?

4) (4 pts) a) What are the real and imaginary parts of the complex number $\frac{1}{1-i}$?

Multiple choice (2 pts each)

_____5) An electron and a proton have the same kinetic energy. Which has the shortest wavelength?

      A) The electron.   B) The proton.

      C) They have the same wavelength.   D) More information is needed.

_____6) The frequency of light from source A is half that of source B. The ratio E_A/E_B of photon energies is:

      A) 2   B) ½   C) 4   D) ¼   E) 1

_____7) The wavefunction for a particle must go to zero at $+\infty$ and $-\infty$ because:

      A) the particle's charge must be conserved.

      B) the wavefunction must be continuous.

      C) the wavefunction must be normalizable.

      D) otherwise it cannot have a functional form that satisfies Schrodinger's equation.

_____8) Which of the following probability amplitudes maximizes your grade on this quiz?

      A) i.   B) $\frac{i}{\sqrt{2}}$ C) 0.75