

Name _____

Physics 111 Quiz #5, October 21, 2024

Please show all work, thoughts and/or reasoning to receive partial credit. The quiz is worth 10 points total, and all parts may not be of equal weight.

I affirm that I have carried out my academic endeavors with full academic honesty.

1. A $100mW$ beam of red laser light with wavelength $\lambda_{red} = 632nm$ is incident on a $1\mu m$ thick sheet of aluminum foil that has been cut into a square of sides of length $L = 10cm$. The aluminum foil is suspended from a support and hangs vertically at rest and the laser beam strikes the aluminum foil perpendicular to its surface. The laser beam makes a circular spot of radius $r = 1mm$ on the aluminum foil's surface. If the density of aluminum is $\rho = 2700 \frac{kg}{m^3}$, what is the mass of the aluminum foil?
2. If the red laser light is completely reflected from the surface of the aluminum foil, with what magnitude of acceleration does the aluminum foil recoil?

3. What is the intensity of the red laser light on the aluminum foil?
4. What are the maximum values of the electric and magnetic fields in the red laser light?
5. Suppose that the red laser light is a source of polarized light, and that the direction of polarization was not known. Suppose that the laser light is incident on a polarizer with the transmission axis of the polarizer horizontal. If the intensity of the light that emerges from the polarizer was found to be reduced by 60% from the incident intensity, at what angle was the laser light originally incident on the polarizer? Express your answer as measured counterclockwise from the horizontal.