

Name_____

Physics 111 Quiz #6, February 21, 2025

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 beam of laser light (with wavelength $\lambda = 410nm$) has a power output of $P = 12.6W$. The laser beam makes a circular spot with diameter $4mm$ when it is shone onto a surface. What is the intensity of the laser beam on the surface?

2. With what magnitude of force does the light exert on the surface if the light is completely reflected?

3. What are the maximum values for the electric and magnetic fields in the light?

- Suppose the laser light is shone onto a polarizer with the transmission axis of the polarizer vertical. The laser light emerges from the first polarizer and is incident on a second polarizer whose transmission axis is oriented at an angle θ to the first. The intensity of the laser light that emerges from the second polarizer is measured to be 12% of the incident intensity. At what angle was the second polarizer oriented if the laser light was initially unpolarized?
- Suppose that the laser light was incident on the left edge of a tank of water at an angle θ_{air} measured with respect to the normal to the water's surface. The beam of laser light is seen to strike the lower right edge of the tank a horizontal distance $x = 0.5m$ from where the beam enters the water on the left edge. If the tank is $D = 0.5m$ deep, at what angle θ_{air} was the light incident on the water from the air?