PHYSICS 325 HOUR EXAMINATION

Name______________________________

1. _________________________
2. _________________________
3. _________________________

Total _________________________

Work all three problems.

1. The intensity of a plane electromagnetic traveling wave, propagating in a vacuum toward the +y direction, is 100 W/cm². The wave has a wavelength of 500 nm, and it is linearly polarized in the z direction. (A) Write an expression for the electric field including the correct amplitude for the field.

(B) Write an expression for the magnetic field of the traveling wave.
2. (A) A light wave with an intensity of 2 W/cm² and traveling in air is incident on a air-water interface at with an angle of incidence of 45°. The index of refraction of water is 1.33. (A) What is the angle of reflection?

(B) What is the angle of refraction?

(C) The angle of incidence is to be change to correspond to the angle of polarization. What is the new angle of incidence?

(D) What is the polarization of the light if the reflected intensity is zero at the angle of polarization?

(E) If the angle of incidence is changed to 0° what is the intensity of the reflected wave?
3. (A) For a diverging lens with a focal length of 5 cm an object is located on axis and 10 cm to the left of the lens. Use the three locator rays and similar triangles to locate the image. Is the image real or virtual? Erect or inverted? What is the magnification?

(B) For a converging lens with a focal length of 5 cm an object is located on axis and 10 cm to the left of the lens. Use the three locator rays and similar triangles to locate the image. Is the image real or virtual? Erect or inverted? What is the magnification?