University of Portland
School of Engineering

EE 402-Microwave & Optical Transmission-3 cr. hrs.
Fall 2001

Midterm Exam # 1

(Monday, October 15, 2001)
(Open Book Exam)
(Total Time: 55 mins.)

Name:_____

Signature:_____

(1) (25 mins., Total: 45 points) **A wireless communication signal.** The time-domain magnetic field expression of a wireless communication signal traveling in air is given by

$$\overline{\mathrm{H}} = \hat{x}0.2\sin(w t - 12p\, y - p/3) + \hat{z}0.2\cos(w t - 12p\, y + 2p/3) \quad m\mathrm{A\text{-}m^{-1}}$$

(a) (10 points) Find the frequency (in GHz) and the wavelength (in cm).

(b) (10 points) Write the complete expression for the corresponding electric field.

(c) (10 points) Find the total time-average power carried by this wave.

(d) (15 points) Find the polarization of this wave. (If circular or elliptical, indicate the sense of rotation as well.)

(2) (25 mins., 35 points) **Unknown medium.** The **red** Inan[2] book, page 766, Problem 8-14.

(3) (Take-home problem, 47 hours, 5 mins.(!), 20 points) The **red** Inan[2] book, page 635, Problem 7-38.