



Student ID:

Name:

Instructions: Please write your answer on a file or piece of paper and return it to me by uploading it in the Assignment Moodle section (or in person if you don't have access to Moodle yet). I will look at all homework but will consider for evaluation only those returned **not later than Thursday April 8th**. I will then upload the solutions of the homework so you will have the chance to check the solution if something was not clear.

IMPORTANT: This homework is not mandatory so you will still be able to get your full score at the final test even if you can't do it or can't return it on time!

Questions:

1. A plane wave traveling along the z-axis in a dielectric medium with $\epsilon_r=2.55$ has an electric field given by $E_y = E_0 \cos(\omega t - kz)$. The frequency is 2.4 GHz and $E_0 = 30$ V/m. Find:
 - a. The amplitude and direction of the magnetic field;
 - b. The phase velocity;
 - c. The phase shift between the positions $z_1 = 0.5$ m and $z_2 = 1.7$ m.
2. Compare the polarization states of each of the following pairs of plane waves:
 - a. Wave 1: $\mathbf{E}_1 = \hat{x}2 \cos(\omega t - kz) + \hat{y}2 \sin(\omega t - kz)$
Wave 2: $\mathbf{E}_2 = \hat{x}2 \cos(\omega t + kz) + \hat{y}2 \sin(\omega t + kz)$
 - b. Wave 1: $\mathbf{E}_1 = \hat{x}2 \cos(\omega t - kz) - \hat{y}2 \sin(\omega t - kz)$
Wave 2: $\mathbf{E}_2 = \hat{x}2 \cos(\omega t + kz) - \hat{y}2 \sin(\omega t + kz)$
3. The critical angle for total internal reflection of a certain interface between two materials is exactly 45° . What is the Brewster angle for the same interface and same materials?