

## Problem 1;

In free space ( $z \leq 0$ ), a plane wave is with:  $\mathbf{H} = 10 \cos(10^8 t - \beta z) \mathbf{a}_x$  mA/m, is incident normally on a lossless medium ( $\epsilon = 2\epsilon_0$ ,  $\mu = 8\mu_0$ ) in region  $z \geq 0$ . Determine the following:

1. Reflected wave  $\mathbf{H}_r$ ,  $\mathbf{E}_r$
2. Transmitted wave  $\mathbf{H}_t$ ,  $\mathbf{E}_t$

## Problem 2:

A uniform plane wave in air is given by:  $\mathbf{E} = 40 \cos(\omega t - \beta z) \mathbf{a}_x + 30 \sin(\omega t - \beta z) \mathbf{a}_y$  V/m

Determine the following:

1.  $\mathbf{H}$
2. If the wave is incident on a perfect conducting surface plate normal to the  $z$ -axis at  $z = 0$ , find the reflected  $\mathbf{E}_r$  and  $\mathbf{H}_r$
3. What are total  $\mathbf{E}$  and  $\mathbf{H}$  fields for ( $z \leq 0$ )
4. Calculate the time-average Poynting vectors for ( $z \leq 0$ ) and  $z \geq 0$ .

## Text Book::

Read chapter 5: sections 5.1 – 5.5

Chapter 5:

Problems 2, 6, 7, 10

Understand examples (5.1 – 5.5)