

EENG 433

MICROWAVE APPLICATIONS

HW3

Date: 30/03/2016

Due: 06/04/2016

- 1) In air filled rectangular WG, the cutoff frequency of a TE_{10} mode is 5 GHz, whereas that of TE_{01} mode is 12 GHz. Calculate:
 - a) The dimension of the WG,
 - b) The cutoff frequency of the next three higher TE modes
 - c) The cutoff frequency for TE_{11} mode if the guide is filled with a lossless material having $\epsilon_r = 2.25$ and $\mu_r = 1$.
- 2) A rectangular waveguide with dimensions $a = 2.5\text{cm}$, $b = 1\text{cm}$ is to operate below 15.2GHz . How many TE and TM modes can be propagated in the WG if the guide has the medium parameters given by $\epsilon = 4\epsilon_0$, $\mu = \mu_0$.
 - a) Calculate the cutoff frequencies of the modes.
 - b) Calculate the phase constant, phase velocity and the wave impedance for the dominant mode (TE_{10}) operating at 15GHz .