

Wollo University  
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Problem Set

Chapter 1 – Rectangular and Circular Waveguide

Name : \_\_\_\_\_ ID no. \_\_\_\_\_

1. The dimension of a guide are 2.5 cm X 1 cm , the frequency is 8.6 Ghz , Find the following
  - a. Possible modes
  - b. Cut off frequencies
  - c. Guide wavelength
2. A rectangular waveguide with dimension of 3x 2 cm operate in the  $TM_{11}$  at 10Ghz , Determine the Characteristics Wave impedance .
3. A rectangular Waveguide has a =4cm , b = 3cm as its cross sectional dimension , find all the modes which will propagate at 5000 Mhz .
4. A rectangular waveguide with a dimension of 3x2 cm operates in  $TM_{11}$  mode at 10Ghz. Determine the characteristics wave impedance.
5. A waveguide operating in  $TE_{10}$  mode had a dimension 2.26 cm X 1 cm . The measured guide wavelength is 4 cm .
  - a. Cut off Frequency
  - b. Frequency of operation
6. A 6 Ghz signal is to be propagated in the dominant mode in a rectangular waveguide . if its group velocity is to be 80% of the free space velocity of light , what must be the breadth of the waveguide .
7. An airfilled rectangular waveguide has a dimension of 0.9 x 0.4 cm and is supporting  $TE_{10}$  mode at a frequency of 9800 Mhz . Calculate the wave guide impedance .
8. A rectangular waveguide of inner dimension 2.5 cm x 1.2 cm is to propagate energy in  $TE_{10}$  mode. Calculate the cut off frequency , if the frequency of the signal is 1.2 times of this cut off frequency , compute the guide wavelength , phase velocity and Wave impedance .
9. A cylindrical waveguide has a inner radius of 300mm, find the cutoff frequency for the guide operating in  $TE_{11}$  mode , Calculate the guide wavelength and the impedance .
10. A  $TE_{11}$  mode is propagating through a circular waveguide .The radius of the Guide is 5cm and the guide is air filled.Determine the wavelength in the guide of an operating frequency 20 GHz
11. An air filled circular waveguide is to be operated at a frequency of 8 GHz and is to have a dimension such that  $f_c=0.7f$  for  $TE_{11}$  mode, Determine the guide wave in the length.