Apeejay Stya University, Sohna, Gurgaon

Course Code: ETEC-207

Subject: Concept of Microwave & Radar Engineering

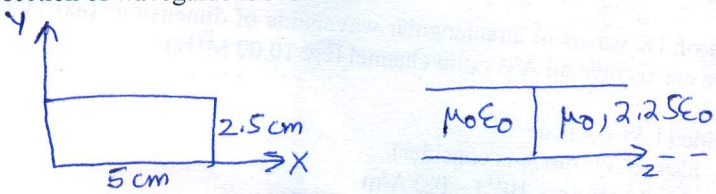
Assignment No.3 **Last Date of Submission:-8/4/13**

Q1. A TE_{11} mode of 10GHz is propagated in an air filled rectangular waveguide. The magnetic field in the z- direction is given by

$$H_z = H_o \cos(\pi x/\sqrt{6}) \cos(\pi y/\sqrt{6}) \text{ A/m}$$

If β = 1.0475 rad/cm, x&y are in cm & a=b=$\sqrt{6}$ cm. Determine (i) f_c (ii) phase velocity v_p (iii) λg & magnetic field intensity in y+ direction.

Q2.The cross section of waveguide is shown below.

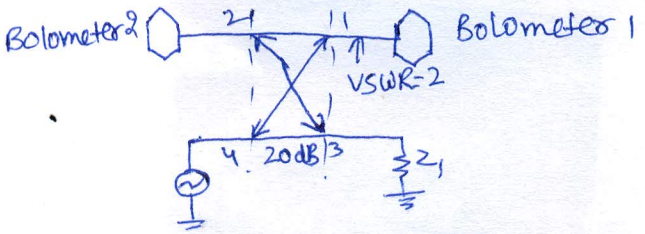


It has dielectric discontinuity as shown in above figure. If the guide operates at 8 GHz in dominant mode. Find SWR.

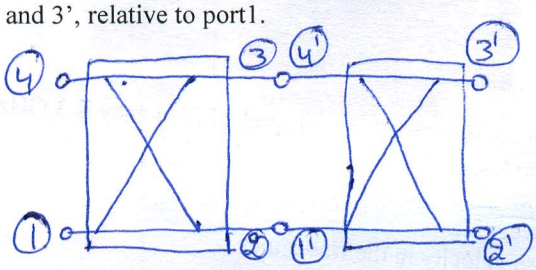
Q3. Explain Faraday rotation & derive the value of φ.

Q4. What is magic Tee?

Q5. A symmetric DC has infinite directivity & forward attenuation of 20dB. If B_1 introduces a VSWR of 2.0 on arm1 & reads 9mW & B_2 reads 3mW. Then, find power dissipated at arm 3 & VSWR.



Q6. Two identical 90° couplers with C = 8.34 dB are connected as shown below. Find the resulting phase & amplitudes at ports 2' and 3', relative to port1.



Q7. A directional coupler has the scattering matrix given below. Find the directivity, coupling, isolation & return loss at the input port when the other ports are terminated in matched loads.

$$[S] = \begin{bmatrix} 0.05\angle 30 & 0.96\angle 0 & 0.1\angle 90 & 0.05\angle 90 \\ 0.96\angle 0 & 0.05\angle 30 & 0.05\angle 90 & 0.1\angle 90 \\ 0.1\angle 90 & 0.05\angle 90 & 0.04\angle 30 & 0.96\angle 0 \\ 0.05\angle 90 & 0.1\angle 90 & 0.96\angle 0 & 0.05\angle 30 \end{bmatrix}$$