Total No. of Questions :6]

SEAT No. :

P83

[Total No. of Pages :2

OCT. -16/BE/Insem. - 138
B.E. (E & TC)
MICROWAVE ENGINEERING
(2012 Pattern) (Semester - I)

Time : 1 Hour] *[Max. Marks :30*

Instructions to the candidates:

1) ***Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.***
2) ***Neat diagrams must be drawn wherever necessary.***
3) ***Figures to the right side indicate full marks.***
4) ***Use of calculator is allowed.***
5) ***Assume suitable data if necessary.***

Q1) a) A rectangular waveguide is filled by dielectric material of $\epsilon_\gamma = 9$ and has inside dimensions of 7 × 3.5 cm. It operates in the dominant TE_{10} mode. **[6]**

i) Determine the cut off frequency.

ii) Find the phase velocity in the guide at a frequency of 2 GHz.

iii) Find the guided wavelength at the same frequency.

b) Comment on : Similarities and comparison of coaxial cable and waveguide. **[4]**

OR

Q2) a) Explain rectangular cavity resonator. Find resonating frequency of the cubical cavity of dimension 2 cm. **[6]**

b) Explain the terms related to waveguide: **[4]**

i) Phase velocity

ii) Group velocity.

Q3) a) A symmetric directional coupler has an infinite directivity and a forward attenuation of 20 dB. This coupler is used to monitor the power delivered to a load Z_L as shown in figure below. Bolometer 1 introduces a VSWR of 2.0 on arm 1, bolometer 2 is matched to arm 2. If bolometer 1 reads 9 mW and bolometer 2 reads 3 mW.

P.T.O.

i) Find the amount of power dissipated in the load Z_L.

ii) Determine the VSWR on arm 3. **[6]**

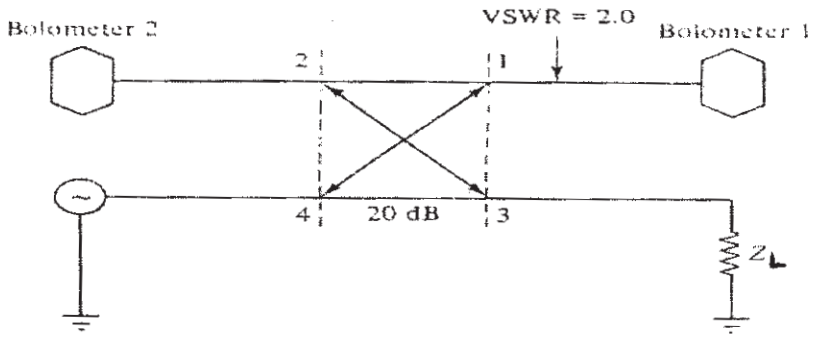

Fig.1: Power Measurement by directional coupler

b) With the help of diagram explain the Magic Tee used to measure the impedance. **[4]**

OR

Q4) a) Explain the various types of strip line in detail. **[6]**

b) Explain the working principle of nonreciprocal 3 port circulator. **[4]**

Q5) a) Prove that it is impossible to construct a perfectly matched, lossless, reciprocal three port junction. **[6]**

b) An isolator has an insertion loss of 0.5dB and an isolation of 30 dB. Determine the scattering matrix of the isolator if the isolated ports are perfectly matched to the junction. **[4]**

OR

Q6) a) Explain S matrix representation along with the properties for multiport network. **[6]**

b) In an H - plane Tee junction, 30 mW power is applied to port 3 that is perfectly matched to the junction. Calculate the power delivered to the load 75 Ω and 60 Ω connected to ports 1 and 2. **[4]**