

Total No. of Questions :6]

SEAT No. :

P83

OCT. -16/BE/Insem. - 138

[Total No. of Pages :2

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 $\epsilon_r = 9$ 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]

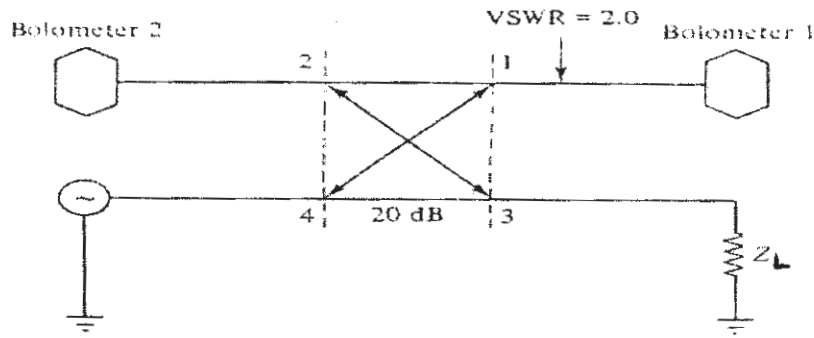


Fig.1: Power Measurement by directional coupler

- 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 75Ω and 60Ω connected to ports 1 and 2. [4]

