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Electronics and Communication Engineering Department

National Institute Of Technology, Trichirappalli_620015

Time: 3 Hours **EC 306 Microwave Components and Circuits** **Max.Marks:50**

NB: Write down the missing word/expression/value/Fig. wherever blank is to be filled.

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1. **a. Effective Dielectric constant is to be taken in the case of Microstrip line because of _____.**

   b.The cross section of an ANTIPODAL FINLINE is _____ It is useful for _____.

   c. NON TEM mode is supported by _____

   d.The scattering matrix of a matched isolator with 1 dB insertion loss and 30 dB Isolation is given by _____.

   e.The CPW mode is otherwise called as _____ mode.

   f. The S matrix of an ideal transmission line is _____ .

   g. In Microstrip when the EM wave propagates in y direction, the components _____ and _____ are NON ZERO.

   i. The difference in S matrix of a power divider and that of Wilkinson is _____ . (10 Marks)

2. **a. Show that there is no power coming out of the ISOLATED port of a waveguide directional coupler.**

   b.The Directivity of an Ideal directional coupler is _____.

   c. Two identical directional couplers are placed in a waveguide to sample the incident and reflected power. The meter shows the power level of the reverse coupler to be 10 dB down from the level of the forward coupler. The VSWR in the guide is _____ . (4 +2 +4) Marks

3. **Specifications for a low pass microstrip filter are as given below. Design and Draw the Layout for the third order filter with cut off frequency = 1 GHz, pass band ripple = 0.1 dB, source and load I impedance = 50 ohms , effective Є = 10.8,**

thickness = 1.27 mm. w/h for 20 ohms, 50 ohms and 100 ohms are 2, 1 and respectively.

$g_0 = g_4 = 1$, $g_1 - 1.0316 = g_3$ and $g_2 = 1.474$.

(10) Marks

4. a.From the first principle, obtain the design parameters of series and shunt branch of a 90^0 branch line coupler

b. Hence or otherwise find the Impedance values of series and shunt arm of a 1 stripline branch line coupler assuming the characteristic Impedance to be Z_0.

(7 +3) Marks

5. a. The value more than _____ is said to be HIGH VSWR. In such a measurement the distance between successive minima is found to be 1.5 cm.The distance between 3 dB minima points are 0.1 cm. The corresponding VSWR is _____.

b. In the Microwave Impedance measurement for the Load VSWR is 2 ,the dist between successive minima was 1.5 cm. The shift in minima was 0.75 cm towar source. Use the Smith Chart and find the load impedance.

c.In a Microwave frequency measurement, the successive minima distance is fou to be 2.43cm, the wider dimension of the waveguide is 2.286 cm. The frequency o operation is _____ GHz.

(4 +3 +3)Marks