

GUJARAT TECHNOLOGICAL UNIVERSITY
ME - SEMESTER- II(Old course) • EXAMINATION (Remedial) – WINTER- 2015

Subject Code: 1710411**Date: 16/12/2015****Subject Name: RF and Microwave Engineering****Time: 2:30 pm to 5:00 pm****Total Marks: 70****Instructions:**

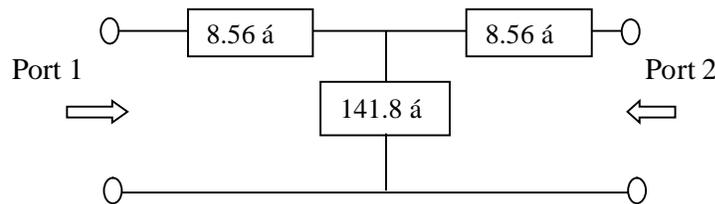
1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.

- Q.1 (a)** A load of $100 + j 150 \Omega$ is connected to a 75Ω lossless line. Find the following: Reflection coefficient, Standing wave ratio, The load admittance, Input impedance at 0.4λ from the load, Input impedance at the generator if the line is 0.6λ long. **07**
- (b)** Explain multiple reflection analysis of the quarter-wave transformer with required expression. **07**

- Q.2 (a)** Derive the general solutions for TE and TM waves. **07**
- (b)** A rectangular waveguide with dimensions $a = 2.5$ cm, $b = 1$ cm is to operate below 15.1 GHz. How many TE and TM modes can the waveguide transmit if the guide is filled with a medium characterized by $\epsilon_r = 4$, $\mu_r = 1$? Calculate the cutoff frequencies of the modes. **07**

OR

- (b)** Calculate the width and length of a microstrip line for a 50Ω characteristic impedance and a 90° phase shift at 2.5 GHz. The substrate thickness is $d = 0.127$ cm, with dielectric constant of 2.20. **07**
- Q.3 (a)** Find the S parameters of the 3 dB attenuator circuit shown below. **07**



- (b)** Explain the transmission (ABCD) matrix. Derive the ABCD parameters for a given the Z parameters of a two-port network. **07**

OR

- Q.3 (a)** Explain single and double stub matching in details **07**
- (b)** Derive the necessary equations of circular waveguide for TE mode **07**

- Q.4 (a)** Derive the equations of quality factor (Q) for short-circuited $\lambda/4$ transmission line and open-circuited $\lambda/2$ transmission line. **07**
- (b)** Explain quadrature hybrid directional coupler with even-odd analysis. **07**

OR

- Q.4 (a)** Explain a rectangular waveguide cavity with necessary equations of resonant frequency, and Q of the $TE_{10\ell}$ mode. **07**

- (b)** A lossless T-junction power divider has a source impedance of 50Ω . Find the output characteristics impedances so that the input power is divided in a 2:1 ratio. Compute the reflection coefficients seen looking into the output ports. **07**

- Q.5 (a)** Explain the Wilkinson power divider in details. **07**

(b) Explain filter design by image parameter method.

07

OR

Q.5 (a) Explain ferrite phase shifter in details.

07

(b) Explain filter design by insertion loss method.

07
