Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– I • EXAMINATION – WINTER 2014

Subject Code:2710504 **Date:12/01/2015**

Subject Name: RF AND MICROWAVES

Time:2:30 to 5:30 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)** What is ñABCDò Matrix? Prove that ABCD matrix of cascade connection of two networks is equal to product of two ñABCDò Matrices in individual two ports. **07**

(b) Explain the importance of Monolithic Microwave Integrated Circuits (MMIC) Discuss the fabrication techniques of MMIC subsystems. **07**

Q.2 **(a)** Derive the following **07**

1) Y-parameters in terms of Z-parameters

2) Z-parameters in terms of ABCD parameters

(b) A two-port network is known to have the following scattering matrix **07**

$$[S] = \begin{bmatrix} 0.15\angle 0^\circ & 0.85\angle -45^\circ \\ 0.85\angle 45^\circ & 0.2\angle 0^\circ \end{bmatrix}$$

Determine if the network is reciprocal, and lossless. If port two is terminated with a matched load, what is the return loss seen at port 1? If port 2 is terminated with a short circuit, what is the return loss seen at port 1

OR

(b) Find the S parameters of the 3 dB attenuator circuit shown in below Figure A. **07**

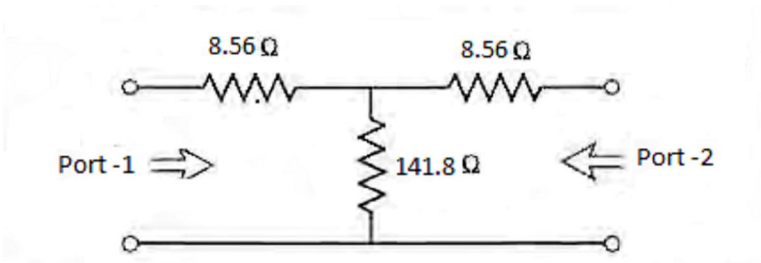

Figure A :A matched 3 dB attenuator with a 50 ęcharacteristic impedance

Q.3 **(a)** Write short notes on Ferrite Phase shifter **07**

(b) Describe the working of directional coupler with the help of two hole directional coupler derive the expression for its scattering matrix **07**

OR

Q.3 **(a)** Explain stability criteria and Stability circle of two port amplifier circuit in terms of S parameter of Transistor **07**

(b) Discuss the Importance of T and ´ matching network **07**

Q.4 **(a)** Discuss the principle of operation and characteristics of tunnel diode. Draw the equivalent circuit and give its applications **07**

(b) Explain the construction and operation of Varactor diode . Draw the **07**

equivalent circuit and also explain one of its application

OR

Q.4	**(a)**	Explain the principle of operation of parametric amplifier .Why it is suitable for low noise amplifier	**07**
	(b)	Explain the theory of operation of GUNN diode . How it provides negative resistance and what are its applications	**07**
Q.5	**(a)**	What are limitations of conventional tubes at microwave , How Klystron amplifier over come this limitation . explain its construction working	**07**
	(b)	Explain the working and construction of Magnetron How it differs from O-Type Microwave tubes and what are its applications	**07**

OR

Q.5	**(a)**	What is the importance of measurement of phase shift. Q, and VSWR at microwaves Explain how these parameters are measured	**07**
	(b)	Explain the amplification process in Travelling Wave Tube Amplifiers , what its advantages over Klystron.	**07**

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