

GUJARAT TECHNOLOGICAL UNIVERSITY**M. E. - SEMESTER – II • EXAMINATION – WINTER • 2014****Subject code: 1710411****Date: 10-12-2014****Subject Name: RF and Microwave Engineering****Time: 02:30 pm - 05:00 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) Using impedance or admittance parameter of microwave network, derive the condition for (1) reciprocal network and (2) lossless network. **07**
- (b) With reference to the microwave network analysis, discuss the equivalent voltage and equivalent current. Also discuss the impedances. **07**

- Q.2** (a) Compare circular waveguide and rectangular waveguide. **07**
- (b) Discuss following terms: **07**
- (1) dominant mode (3) wave impedance
- (2) evanescent mode (4) overmoded

OR

- (b) Explain the lossy transmission line and derive distortion less transmission line that satisfy the relation **07**

$$\frac{R}{L} = \frac{G}{C}$$

- Q.3** (a) Derive the expression for short circuited $\lambda/4$ transmission line resonator. **07**
- (b) Write a short note on bethe hole coupler. **07**

OR

- Q.3** (a) Explain non-reciprocal phase shifter with necessary sketches and hysteresis curve. **07**
- (b) Write a short note on circulator. **07**

- Q.4** (a) With neat sketches and necessary equations explain single ended mixer. **07**
- (b) Write a short note on Microwave Monolithic Integrated Circuits. **07**

OR

- Q.4** (a) Discuss gain and stability of general two port amplifier circuit in terms of s-parameter of transistor **07**
- (b) Write a short note on dielectric resonator oscillator **07**

- Q.5** (a) A certain two-port network is measured and the following scattering matrix is obtained: **07**

$$\begin{bmatrix} 0.1 \angle 0^\circ & 0.8 \angle 90^\circ \\ 0.8 \angle 90^\circ & 0.1 \angle 0^\circ \end{bmatrix}$$

From this data, determine whether the network is reciprocal or lossless. If a short circuit is placed on port 2 what will be the resulting return loss at port 1?

- (b) Write a short note on ABCD matrix for microwave network analysis. **07**

OR

- Q.5** (a) Briefly explain constant-k filter sections. Also give image parameter of T and π networks. **07**
- (b) Derive the expressions for series and parallel resonator circuit. **07**
