

**GUJARAT TECHNOLOGICAL UNIVERSITY**  
**ME-SEMESTER-II EXAMINATION –WINTER 2012**

**Subject code: 1724101****Date: 29/12/2012****Subject Name: RF and Microwave Circuits****Time: 10:30 to 13:00****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 lossless  $100 \Omega$  transmission line is terminated by an impedance of  $200 + j200 \Omega$ . Find the location of the first  $V_{\max}$  and first  $V_{\min}$  if operating wavelength is 5 cm. Use Smith chart to solve this problem. **07**

**(b)** What are the different microwave filters? Explain any one of them in details. **07**

**Q.2 (a)** Explain different materials and their characteristics used for MMIC's fabrication. **07**

**(b)** What do you mean by impedance matching? Explain stub matching methods used in transmission line. **07**

**OR**

**(b)** Find ABCD parameters for T and  $\pi$  network. **07**

**Q.3 (a)** What are the criterias for microwave filter design? Explain microwave filter design by insertion loss method **07**

**(b)** What do you mean by transmission matrix? How it is related to impedance matrix? **07**

**OR**

**Q.3 (a)** With block diagram and signal flow graph explain Thru, Reflect and Line connection. **07**

**(b)** Derive the expression for field components present in direction of propagation for TE mode of rectangular waveguide. **07**

**Q.4 (a)** What is signal flow graph? Explain all the rules for decomposition of signal flow graph. **07**

**(b)** A load line of impedance  $Z_L = 250 - j450 \Omega$  at 5 GHz is connected to a  $100 \Omega$  line. Calculate the position and length of short circuited stub designed to match this load to the line, so that maximum power can be transferred to the load. Use Smith chart to solve this problem. **07**

**OR**

**Q.4 (a)** Explain the lumped-Element circuit model for a transmission line. **07**

**(b)** What do you mean by Ferrite materials? Draw and explain block diagram of ferrite based circulator. **07**

**Q.5 (a)** Explain the terms: Reflection coefficient, Insertion loss, Return Loss, SWR. **07**

**(b)** Why microstrip lines are used? Explain its various types. **07**

**OR**

**Q.5 (a)** Explain techniques to fabricate MMIC. **07**

**(b)** Describe Power divider and coupler used in microwave circuit. **07**

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