Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

ME - SEMESTER– II (Old course)• REMEDIAL EXAMINATION – SUMMER 2015

Subject Code: 1724101 **Date:12/05/2015**

Subject Name: RF and Microwave Circuits

Time: 02:30 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.**
4. **Use smith chart if required**

Q.1 **(a)** For a rectangular waveguide derive the expression of Field components for TE mode. **07**

(b) Use the Smith chart to find the following quantities for the transmission line circuit having $Z_L = 60 + j50$ Ý and Z_0=50 Ý. The length of transmission line is 0.4ɔ. **07**

(a) The SWR on the line.
(b) The reflection coefficient at the load.
(c) The load admittance.
(d) The input impedance of the line.
(e) The distance from the load to the first voltage minimum.
f) The distance from the load to the first voltage maximum.

Q.2 **(a)** Write short note on quarter wave transformer with reference to microwave engineering. **07**

(b) State the limitations of transmission line theory **07**

OR

(b) For a load impedance Z_l = 60-j80 Ý, design single stub (short circuit) shunt tuning network to match this load to 50Ý line. Assume that load is matched at 2GHz, and load consists of resistor and capacitor in series. Use smith chart to solve this problem. **07**

Q.3 **(a)** Describe microstrip line. What are its applications? Explain any three types of microstrip lines in brief. **07**

(b) Describe scattering matrix for Magic tee and explain its applications. **07**

OR

Q.3 **(a)** List out characteristics requirement from conducting and substrate material used to design MMIC and discuss advantages of MMIC based circuits over discrete circuits. **07**

(b) What are dominant modes in circular waveguide? How Besselôs Function plays an important role in deciding dominant mode in circular waveguide? Justify this with suitable expression for TE and TM modes of circular waveguide. **07**

Q.4 **(a)** What are microwave filters? Explain image parameters method and Insertion loss method of filter design. **07**

(b) Write short note on partially loaded waveguide. **07**

OR

Q.4 **(a)** Describe low pass constant-k filter sections in T and ´ forms. What are its advantages? Which modifications are done using m-derived low pass and high pass filter T-section? **07**

(b) Derive the telegrapher equations for two wire transmission line. What are the importances of $\frac{\lambda}{4}$ transmission line? **07**

Q.5	**(a)**	List out various types of mixer circuits and explain one of them in detail	**07**
	(b)	What do you mean by microwave oscillator? Explain working of microwave oscillator.	**07**

OR

Q.5	**(a)**	State the applications of signal flow graph and derive expressions for $\tilde{u}_{in}$ and $\tilde{u}_{out}$ of two port network with general source and load impedance using signal flow graph theory.	**07**
	(b)	Explain properties of Ferrite materials. Also explain any one Ferrite device with its construction.	**07**

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