Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII(OLD) • EXAMINATION – WINTER 2016

Subject Code: 171001 Date: 29/11/2016

Subject Name: Microwave Engineering

Time: 10:30 AM to 01:00 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)**	Define: Blind speed, Group velocity, Wavelength, Microwave, Mode, Characteristic Impedance, Transmission coefficient	**07**
	(b)	Define Standing wave and derive equation of the voltage standing wave. Find equations for the minimum and maximum amplitude and distance between any two successive maxima or minima.	**07**
Q.2	**(a)**	Draw equivalent circuit of transmission line and derive basic equations for voltage and current on transmission line. Define skin depth of transmission line.	**07**
	(b)	Explain Magic Tee with it's S-Matrix.	**07**
		OR	
	(b)	Explain in detail E-plane Tee. Prove that the Tee junction cannot be matched to all the three arms simultaneously using S-Matrix.	**07**
Q.3	**(a)**	Explain structure and working of TRAPATT diode with necessary waveforms and derivations.	**07**
	(b)	Explain working of Circulators and isolators with neat sketch.	**07**
		OR	
Q.3	**(a)**	Describe the construction and working of a reflex klystron. Explain how velocity and current modulation takes place using the Applegate diagram.	**07**
	(b)	Explain construction, characteristic and application of Gunn diode.	**07**
Q.4	**(a)**	Explain the amplification process for a helix type travelling wave tube. What are its different applications?	**07**
	(b)	A transmission line has Characteristic Impedance Zo= 75 + j0.01ohm and it is terminated in load impedance Zl= 70 + j50 ohm. Find Reflection coefficient, Transmission coefficient.	**07**
		OR	
Q.4	**(a)**	A 5.2cm length of lossless 100 ohm line is terminated in a load Z_l= 30+j50 ohm, calculate magnitude of reflection coefficient, phase of reflection coefficient, and SWR using smith chart. Also find the Impedance at input from Load. The signal frequency is 750 MHz and $\lambda = \lambda_0$.	**07**
	(b)	Sketch circular and rectangular waveguide and compare their dominant mode, advantages and disadvantages.	**07**
Q.5	**(a)**	Define receiver noise. Explain radar range equation in terms of receiver noise figure, bandwidth and other related parameters.	**07**
	(b)	What do you mean by Doppler effect? Explain operation of MTI radar.	**07**
		OR	
Q.5	**(a)**	What is microstrip line? Derive equation of characteristic impedance and quality factor of microstrip line.	**07**
	(b)	Discuss the advantages of microwave frequencies compare with low-frequency waves and list out the various applications of microwaves.	**07**

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