Seat No.: _____ Enrolment No.

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (OLD) EXAMINATION – SUMMER 2019

Subject Code: 171001 **Date: 21/05/2019**

Subject Name:Microwave Engineering

Time: 02:30 PM TO 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)**	Discuss advantages of microwave frequencies over lower frequencies; also explain some areas of microwave application.	**07**
	(b)	Define the following terms i) TEM wave, ii) TE wave, iii) TM wave, iv) HE wave, v) Characteristic Impedance, vi) Reflection coefficient, vii) Input impedance.	**07**
Q.2	**(a)**	Explain the working principle of 'Magic Tee' in detail with S-matrix and neat diagram.	**07**
	(b)	Determine the cut-off wavelength for the dominant mode in a rectangular waveguide of breadth 10 cm. For a 2.5 GHz signal propagated in this waveguide in the dominant mode; Calculate the guide wavelength, the group and the phase velocities.	**07**
		OR	
	(b)	A two cavity Klystron amplifier has the following parameters. Beam voltage: Vo = 900 V, Beam current: Io = 30mA, Frequency: f= 8 GHz, Gap spacing in either cavity: d= 1 mm, Spacing between centers of cavities: L= 4 cm, Effective shunt impedance: Rsh = 40kΩ. Determine, i) The electron velocity, ii) The d.c. electron transit time, iii) The input voltage for maximum output voltage, iv) The voltage gain in decibels.	**07**
Q.3	**(a)**	Explain functioning of four ports circulator with neat schematic diagram.	**07**
	(b)	Describe working principle of Helix Travelling Wave Tube with neat diagram.	**07**
		OR	
Q.3	**(a)**	Explain operational principle, V-I characteristics, construction, advantages and disadvantages of IMPATT diode with neat diagram.	**07**
	(b)	Describe all the characteristics of Smith chart.	**07**
Q.4	**(a)**	Write a short note on Varactor diodes.	**07**
	(b)	Derive three expressions for maximum radar range, Rmax.	**07**
		OR	
Q.4	**(a)**	Draw and explain block diagram of 'Pulsed Radar System'.	**07**
	(b)	Prove that reflection coefficient(ρ) is dependent on characteristic impedance (Z_O) and load impedance (Z_L),also specify how their different values affects ρ.	**07**
Q.5	**(a)**	Explain function of cylindrical magnetron with neat diagram.	**07**
	(b)	Describe MTI Radar functions with neat block diagram.	**07**
		OR	
Q.5	**(a)**	Explain various radar display methods with neat diagram.	**07**
	(b)	Derive an expression for characteristics impedance and quality factor of microwave strip lines.	**07**

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