Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

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

Subject Code:2171001 Date:10/05/2019

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**.

			MARKS
Q.1	**(a)**	List the microwave frequency bands.	**3**
	(b)	How microwave signals and systems are different than other low frequency signals and systems?	**4**
	(c)	Explain the necessity of impedance matching and methods to perform impedance matching.	**7**
Q.2	**(a)**	A 75Ω transmission line that is half wavelength long is terminated in a load resistance of 300Ω. Determine its input impedance.	**3**
	(b)	Explain the waveguide parameters (a) cut-off wavelength (b) guide length	**4**
	(c)	Derive transmission line equations and also derive solution of transmission line equation.	**7**
		OR	
	(c)	Explain the construction and applications of smith chart.	**7**
Q.3	**(a)**	Draw the different type of modes in waveguides.	**3**
	(b)	Explain the waveguide parameters : group and phase velocities, characteristic wave impedance.	**4**
	(c)	Find all possible modes that will propagate in a rectangular waveguide having cross-sectional dimensions of 4cm × 2 cm. the operating frequency is 5GHz.	**7**
		OR	
Q.3	**(a)**	Compare transmission lines with waveguides.	**3**
	(b)	Write short note on scattering parameters.	**4**
	(c)	Draw diagram of E-plane Tee junction and derive s-parameter matrix for the same.	**7**
Q.4	**(a)**	Explain directional coupler parameters.	**3**
	(b)	Write a short note on Varactor diode.	**4**
	(c)	Write short note on tunnel diode.	**7**
		OR	
Q.4	**(a)**	Define Q-factor of a cavity resonator.	**3**
	(b)	Write short note on isolators.	**4**
	(c)	Define Klystron. Write short notes Two Cavity Klystron.	**7**

Q.5	**(a)**	A certain microstrip line has the following parameters: $\varepsilon_r = 5.23$, h = 7mm, t = 2.8mm, w = 10mm. Calculate the characteristic impedance z_0 of the line.	**3**
	(b)	Write the applications and advantages of microwave solid state devices.	**4**
	(c)	Explain Electromagnetic Interference and Microwave Imaging.	**7**
		OR	
Q.5	**(a)**	An n-type GaAs Gunn diode has electron density of $10^{18}cm^{-3}$, temperature of 300^0K, electron density at lower valley is $10^{10}cm^{-3}$ and electron density at upper valley is 10^8cm^{-3}. Determine the conductivity of the diode. Take μ_l = 8000 cm^2/V-sec and μ_u= 180 cm^2/V-sec.	**3**
	(b)	Explain the Gunn effect.	**4**
	(c)	Describe Microwave RADAR system.	**7**

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