Seat No.: _____   Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2021

Subject Code:2171001   **Date:03/08/2021**
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)**	Write the applications of remote sensing.	**[3]**
	(b)	Explain the losses associated with microwave transmission.	**[4]**
	(c)	Derive transmission line equations and also derive solution of transmission line equation.	**[7]**
Q.2	**(a)**	Draw the different type of modes in waveguides.	**[3]**
	(b)	Explain the waveguide parameters (a) cut-off wavelength (b) guide length	**[4]**
	(c)	Explain the smith chart in detail.	**[7]**

<div align="center">OR</div>

	(c)	Explain the impedance matching technique using single stub and double stub.	**[7]**
Q.3	**(a)**	A 8KHz radar has the following characteristics. Peak transmitted power = 300KW, power gain of antenna 2000, minimum detectable peak signal power by receiver is 10^{-14} Watts; cross sectional area of the radar antenna is $15m^2$. If this radar were to be used to detect a target of $2m^2$ equivalent cross section and find maximum range possible.	**[3]**
	(b)	Explain the working of PIN diodes and its applications.	**[4]**
	(c)	Write shot note on TRAPATT diode.	**[7]**

<div align="center">OR</div>

Q.3	**(a)**	How to measure noise using spectrum analyzer?	**[3]**
	(b)	Find all possible modes that will propagate in a rectangular waveguide having cross-sectional dimensions of 4cm × 2 cm. The operating frequency is 5GHz.	**[4]**
	(c)	Write a short note on Two Cavity Klystron.	**[7]**
Q.4	**(a)**	Explain microwave imaging.	**[3]**
	(b)	Write a short note on Varactor diode.	**[4]**
	(c)	Draw the microstrip lines and parallel strip lines. Also derive their characteristic impedance equation.	**[7]**

<div align="center">OR</div>

Q.4	**(a)**	Define Q-factor of a cavity resonator.	**[3]**
	(b)	Explain the any two Gunn oscillation modes.	**[4]**
	(c)	Explain the construction and working of TWT.	**[7]**

Q.5	(a)	List the performance parameters of directional couplers.	[3]
	(b)	Explain the microwave power measurement.	[4]
	(c)	Explain MMIC fabrication techniques.	[7]

OR

Q.5	(a)	Write the applications of Gunn diode.	[3]
	(b)	A Gunn diode is working in transit time modes at 12GHz. The domain charges move at a speed of 10^7 cm/s. calculate: (i) Length of device and (ii) mode of operation at 10GHz and 14 GHz.	[4]
	(c)	Write short note on cylindrical magnetron.	[7]

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