Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII • EXAMINATION – WINTER • 2014

Subject Code: 171001 **Date: 25-11-2014**

Subject Name: Microwave Engineering

Time: 10:30 am - 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)**	Explain advantages of microwave and its applications. Draw neat diagram of Microwave system.	**07**
	(b)	Explain reflection coefficient of transmission line and standing wave. Derive expression for impedance and reflection coefficient at any point on the line.	**07**
Q.2	**(a)**	Sketch rectangular and circular waveguide. Compare their dominant mode. List advantages and disadvantages.	**07**
	(b)	A transmission line has a characteristic impedance of $50 + j\ 0.01\ \Omega$ and is terminated in a load impedance of $73 - j\ 42.5\ \Omega$. Calculate: (a) the reflection coefficient; (b) the standing-wave ratio.	**07**
		OR	
	(b)	An air-filled circular waveguide has a radius of 2 cm and is to carry energy at a frequency of 10 GHz. Find all the TE_{np} and TM_{np} modes for which energy transmission is possible.	**07**
Q.3	**(a)**	Explain in detail applications of Magic Tee.	**07**
	(b)	Explain with diagram waveguide band, corners and twist with their applications.	**07**
		OR	
Q.3	**(a)**	Sketch different directional couplers. Define coupling factor, directivity.	**07**
	(b)	Explain in brief Microwave Circulators and Faraday – rotation isolator.	**07**
Q.4	**(a)**	Explain Working of reflex klystron. Compare it with cavity klystron.	**07**
	(b)	Draw different slow-wave structures. Explain working of Traveling-wave tube.	**07**
		OR	
Q.4	**(a)**	List different types of Magnetron. Explain mechanism of oscillations of Magnetron Oscillator with diagram.	**07**
	(b)	Explain working principles of Tunnel Diodes with Energy-band Diagrams.	**07**
Q.5	**(a)**	What is Gunn effect? Explain working of GaAs diode.	**07**
	(b)	Define receiver noise. Explain radar range equation in terms of receiver noise figure, bandwidth and other related parameters.	**07**
		OR	
Q.5	**(a)**	Draw block diagram of pulse radar and explain each block. List different types of display used.	**07**
	(b)	What do you mean by Doppler effect? Explain operation of MTI radar.	**07**

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