Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

B. E. - SEMESTER – VII • EXAMINATION – WINTER 2012

Subject code: 173201 **Date: 26/12/2012**

Subject Name: Microwave and Satellite Communication

Time: 10.30 am - 01.00 pm **Total Marks: 70**

Instructions:

1. **Attempt any five questions.**
2. **Make suitable assumptions wherever necessary.**
3. **Figures to the right indicate full marks.**

Q.1	**(a)**	Explain three laws of Kepler's for planetary motion.	**07**
	(b)	(i)List out various applications and advantages of microwaves. (ii)Explain one of the applications of Magic Tee.	**07**
Q.2	**(a)**	Calculate the propagation constants and phase velocities for the TE_{10} , TE_{01}, TE_{11} modes for a rectangular waveguide with dimensions 7.214 cm x 3.404 cm operating at 5 GHz.	**07**
	(b)	Explain working of Two cavity klystron amplifier and list out application of Two cavity klystron amplifier.	**07**
		OR	
	(b)	Prove that it is impossible to construct perfectly matched lossless, reciprocal three port junction.	**07**
Q.3	**(a)**	Explain the operation of H-plane Tee junction. Derive the scattering matrix for H-plane Tee.	**07**
	(b)	Show that for TE_{10} mode a frequency of 6 GHz will pass through the guide of dimensions a = 1.5 cm, b = 1 cm if a dielectric with $\in_r = 4$ is inserted into the waveguide.	**07**
		OR	
Q.3	**(a)**	What is the PIN diode? Describe the construction of a PIN diode and also its characteristic.	**07**
	(b)	List out application of following devices. (1) IMPATT (2) TRAPATT (3) BARRITT	**07**
Q.4	**(a)**	Explain Doppler effect with respect to RADAR.	**07**
	(b)	Explain different scanning techniques for RADAR.	**07**
		OR	
Q.4	**(a)**	Explain pulse RADAR systems with necessary block diagram.	**07**
	(b)	Calculate the maximum range of a radar system which operates at 3 cm with a peak pulse power of 600 kW if its antenna is 5 m^2,minimum detectable signal is 10^{-13} W and the radar cross sectional area of the target is 20 m^2.	**07**
Q.5	**(a)**	Explain basic transmission theory with necessary equation.	**07**
	(b)	The earth rotates once per sidereal day of 23h 56 min 4.09s. Calculate the radius of GEO satellite in Km.	**07**
		OR	
Q.5	**(a)**	Explain need of Telemetry, Tracking, command and monitoring system in satellite communication.	**07**
	(b)	Derive wave equation for a TE wave and obtain all the field components in a rectangular waveguide.	**07**

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