Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

PDDC - SEMESTER – V • EXAMINATION – WINTER 2012

Subject code: X 51101 Date: 11/01/2013

Subject Name: Antenna & Wave propagation

Time: 02.30 pm - 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)**	Define following terms: (i) HPBW (ii) Antenna radiation efficiency (iii) Radiation Density (iv) Beam solid angle (v) Directivity (vi) Far field (vii) Effective length of an antenna.	**07**
	(b)	Derive the expression for radiation resistance of Infinitesimal (Hertzian) dipole.	**07**
Q.2	**(a)**	Explain Yagi – Uda antenna with its features.	**07**
	(b)	Explain radio Communication link between transmitting and receiving antenna and derive Friis transmission formula.	**07**
		OR	
	(b)	State and prove reciprocity theorem for two antenna	**07**
Q.3	**(a)**	A source has a radiation Intensity pattern given by (i) $U = U_m \sin\theta$. (ii) $U = U_m \sin^2\theta$. Find out directivity for both pattern.	**07**
	(b)	Derive expression for radiation resistance of small loop antenna.	**07**
		OR	
Q.3	**(a)**	(a) Calculate the directivity of an antenna with $\theta_{HP} = 2°$, $\emptyset_{HP} = 1°$. (b) Find the gain of this antenna if efficiency K = 0.5.	**07**
	(b)	Explain two operating modes of helical antenna in detail.	**07**
Q.4	**(a)**	Explain various types of horn antenna in detail.	**07**
	(b)	Explain Binomial array with four element non uniform array in detail.	**07**
		OR	
Q.4	**(a)**	State Babinet's principle and illustrate its application to slot antennas and complementary antennas.	**07**
Q.4	**(b)**	Explain End fire and broadside array, considering linear array of two isotropic sources.	**07**
Q.5	**(a)**	Write brief note on Microstrip patch antenna with its advantages and limitations.	**07**
	(b)	Explain different modes of propagation with its practical significance	**07**
		OR	
Q.5	**(a)**	Define: (i) Virtual height (ii) MUF (iii) Skip distance (iv) Critical frequency (v) OWF (vi) multi hop propagation (vii) fading	**07**
	(b)	:plain Antenna gain measurement method	**07**

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