Seat No.: _____ **Enrolment No._____**

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) - EXAMINATION – SUMMER 2017

Subject Code: 2161003 **Date: 01/05/2017**

Subject Name: Antenna & Wave Propagation

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.**

			MARKS
Q.1		**Short Questions**	**14**
	1	Define HPBW.	
	2	Define beam area.	
	3	Explain directivity.	
	4	Beam area=$2\pi/3$,Directivity=?	
	5	Define Zoned lens	
	6	Define axial ratio.	
	7	Define aperture efficiency.	
	8	$P_{\text{sine squared pattern}} = (8/3\pi)U_m$, D=?	
	9	Define impedance of space.	
	10	For circular loop $C=\lambda$ find R_r=? D=?	
	11	Horn with $a_{E\lambda}=10, a_{H\lambda}=13.7$,find HPBW in E & H plane.	
	12	Define basic radiation equation.	
	13	Enlist layers of wave propagation.	
	14	Define skip distance.	
Q.2	**(a)**	Explain cassegrain feed of parabolic reflector.	**03**
	(b)	Derive the expression for the far field pattern of an array of 2-isotropic point sources with equal amplitude and phase of feed currents.	**04**
	(c)	Obtain the ratio of E_θ and H_Φ field components of a current element at a distance point in free space with necessary derivations using Maxwell's equation.	**07**
		OR	
	(c)	Prove that radiation resistance of a quadrature wave monopole antenna is 36.5 Ω.	**07**
Q.3	**(a)**	Justify, the field from an uniform linear array of n isotropic point sources will be maximum in any direction Φ for which $\psi=0$ where ψ is the total phase difference of fields from adjacent sources.	**03**
	(b)	Discuss Dolph–Tchebysheff distribution for linear arrays.	**04**
	(c)	Derive the far field components of a small circular loop with radius 'a' and with a uniform phase current.	**07**
		OR	
Q.3	**(a)**	Enumerate the steps for the design pyramidal horn.	**03**
	(b)	Using reciprocity theorem to antennas show that effective lengths of transmitting and receiving antennas are the same.	**04**
	(c)	For uniform linear array of 'n' isotropic sources, obtain the expression for relative electric field at a far point. find nulls and maximas of an array pattern formed by four isotropic antenna fed in phase and spaced $\lambda/2$ apart.	**07**
Q.4	**(a)**	Discuss the antenna field zone.	**03**

	(b)	Radiation intensity of the antenna is $U=U_m\cos^n\Theta$. Prove that the directivity for a source with unidirectional radiation can be expresses with $D(\Theta)=2(n+1)$.	**04**
	(c)	Explain the following: (i) Gain measurements methods (ii) Phase measurements methods.	**07**

OR

Q.4	**(a)**	Explain the features of Yagi Uda antenna.	**03**
	(b)	Explain practical design consideration for the helical antenna.	**04**
	(c)	What is slot antenna and where is it used? State Babinet's principle and illustrate its application to slot antennas and complementary antennas.	**07**
Q.5	**(a)**	Explain reflector- lens antenna.	**03**
	(b)	Explain log periodic antenna	**04**
	(c)	Explain Non metallic Dielectric Lens Antenna.	**07**

OR

Q.5	**(a)**	Explain Microstrip antenna.	**03**
	(b)	Explain Ultra wide band antenna.	**04**
	(c)	Describe the structure of ionosphere and the characteristics of ionospheric layers. Prove that maximum usable frequency $f_c==f_0$ sec i where f_0 is the critical frequency and 'i' is the angel of incidence of EM wave at the ionosphere.	**07**

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