Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI (NEW) EXAMINATION – SUMMER 2022

Subject Code:3161003 Date:01/06/2022

Subject Name:Antennas and 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			MARKS
Q.1	**(a)**	Define the following terms: (i) Beam solid angle (ii) Directivity (iii)Antenna Aperture	**03**
	(b)	Derive the expression of Friss transmission formula	**04**
	(c)	Explain in the detail about Binomial array and pattern multiplication	**07**
Q.2	**(a)**	Explain the effect of ground on ungrounded antenna.	**03**
	(b)	Discuss Dolph–Tchebysheff distribution for linear arrays.	**04**
	(c)	Explain Non-metallic Dielectric lens and artificial dielectric lens antennas in detail.	**07**
		OR	
	(c)	Explain in detail about frequency scanning arrays.	**07**
Q.3	**(a)**	Calculate the percentage power reflected, if Antenna inputimpedance is (30+j40)Ω and characteristic impedance of transmission line is 50Ω.	**03**
	(b)	Explain the features of Yagi Uda antenna.	**04**
	(c)	State Babinet's principle and illustrate its application to slot antennas and complementary antennas.	**07**
		OR	
Q.3	**(a)**	Calculate the diameter of parabolic dish antenna, for given value of gain G = 40 dBand operating frequency 11 GHz.	**03**
	(b)	Explain the working principle of small loop antenna.	**04**
	(c)	Describe the properties of Endfire array.	**07**
Q.4	**(a)**	The maximum radiation intensity of a 90% efficiency antenna is 200mW/ unit solid angle. Find the directivity and gain (dimensionless andin dB) when theInput power is 125.66 mW.	**03**
	(b)	Along with necessary figure explain the principle of Folded dipole	**04**
	(c)	Explain Cassegrain feed with required figure.	**07**
		OR	
Q.4	**(a)**	Calculate the directivity of an antenna with circular aperture ofdiameter 3 meter at frequency 5 GHZ.	**03**
	(b)	Explain about log periodic antenna with necessary figures.	**04**
	(c)	Explain practical design consideration for the helical antenna.	**07**
Q.5	**(a)**	Describe various types of basic horns with figure.	**03**
	(b)	Explain the Different modes of Radio wave propagation.	**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

Q.5	**(a)**	Explain multihop propagation briefly.	**03**
	(b)	With figure describe the ionization layers.	**04**
	(c)	With necessary figure and derivations explain N element array of equal amplitude and spacing. Write the equation for array Factor.	**07**

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