GUJARAT TECHNOLOGICAL UNIVERSITY
BE- SEMESTER–VI (NEW) EXAMINATION – WINTER 2024

Subject Code:3161003   **Date:20-11-2024**
Subject Name:Antennas and Propagation
Time:02:30 PM TO 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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	State and prove reciprocity theorem to antennas.	**03**
	(b)	Compare antenna with transmission line with necessary figure and equations.	**04**

	(c)	Define the following terms with necessary figures and equations if any.
		  i) Antenna efficiency
		  ii) Maximum Usable Frequency
		  iii) Beam area
		  iv) Resolution
		  v) Circular Polarization
			07

Q.2	**(a)**	Explain the term "Antenna" in different ways.	**03**
	(b)	Is it possible to design lossless antenna? Justify your answer.	**04**
	(c)	Derive the expression for the far field pattern of an array of 2 – isotropic point sources i) Equal amplitude and phase ii) Equal amplitude and opposite phase.	**07**

OR

	(c)	Derive an expression for electric and magnetic components of a short dipole antenna if the spherical system is defined in r, θ and ϕ.	**07**
Q.3	**(a)**	What do you mean by retarded effect? Explain it with help of necessary figure and equations.	**03**
	(b)	Sketch the helical geometry with its associated dimensions showing relationship between circumference, spacing, turn length and pitch angle of helix.	**04**
	(c)	Explain the operation of Microstrip patch antenna with neat diagram.	**07**

OR

Q.3	**(a)**	When can an antenna be termed as Frequency independent?	**03**
	(b)	Explain Schelkunoff theorems and its usefulness.	**04**
	(c)	Explain the experimental setup for the measurement of radiation pattern of antenna under test.	**07**

Q.4	**(a)**	Derive Friis transmission formula to determine loss between the two antennas located in free space.	**03**
	(b)	Discuss significance of complementary antenna with the help of babinet's principal.	**04**
	(c)	Explain - Pattern Multiplication and show that it can be used to find the resultant pattern of a linear array	**07**

OR

Q.4	**(a)**	Explain the features of Yagi Uda antenna.	**03**
	(b)	Explain the working of Artificial dielectric Lens antenna.	**04**
	(c)	Give the geometry and discuss the performance of a Log periodic antenna. Derive the associated design equations	**07**

Q.5	**(a)**	Explain in brief about antenna for mobile communication.	**03**
	(b)	Define the following terms. (Draw necessary figures) (i) Super refraction (ii) Virtual height	**04**
	(c)	Enlist and explain the Different modes of Radio wave propagation.	**07**

OR

Q.5	**(a)**	Discuss the antenna field zone with neat and clean figure.	**03**
	(b)	Compare the far field equations of small loop with short dipole.	**04**
	(c)	Discuss the principle of working of Parabolic reflectors. Explain the various feed techniques, their relative merits and demerits	**07**

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