Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER– VI (OLD) EXAMINATION – WINTER 2021

Subject Code:161003 Date:24/11/2021

Subject Name:Antenna and Wave Propogation

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.**

Q.1	**(a)**	Write the different definitions of antenna. State and prove reciprocity theorem to antennas.	**07**
	(b)	Define the following terms.(draw necessary figures and write equations if any) i) Antenna efficiency ii) Radiation pattern iii) Gain and Directivity iv) FNBW and HPBW	**07**
Q.2	**(a)**	Discuss i) Dolph–Tchebysheff distribution for linear arrays. ii) Binomial arrays.	**07**
	(b)	Derive an expressions for electric and magnetic components of a short dipole antenna if the spherical system is defined in r, θ and ϕ.	**07**
		OR	
	(b)	Derive an expression for radiation resistance of short dipole for far-field region. Prove that radiation resistance of half wave dipole antenna is 73 Ω.	**07**
Q.3	**(a)**	Explain - Pattern Multiplication and show that it can be used to find the resultant pattern of a linear array.	**07**
	(b)	Sketch the helical geometry with its associated dimensions showing relationship between circumference, spacing, turn length and pitch angle of helix. Also discuss different types of radiation modes	**07**
		OR	
Q.3	**(a)**	What is the importance of parabolic structure in antenna? Explain Casegrain feed method of parabolic reflector antenna.	**07**
	(b)	Explain and design 3-element yagi-uda antenna.	**07**
Q.4	**(a)**	In far field, for a small loop antenna derive field equations. Also derive radiated power resistance equation.	**07**
	(b)	Explain Babinet's Principle. Discuss it for complementary antenna.	**07**
		OR	
Q.4	**(a)**	Enlist the different types of lens antenna and explain in brief.	**07**
	(b)	Explain measurement of radiation pattern antenna under test.	**07**
Q.5	**(a)**	Explain the Different modes of Radio wave propagation.	**07**
	(b)	Define the following terms.(draw necessary figures) (i) Skip distance (ii) Super refraction iii) Virtual height	**07**

OR

Q.5	**(a)**	Give the geometry and discuss the performance of a Log periodic antenna. Derive the associated design equations.	**07**
	(b)	Explain different types of horn antennas.	**07**