Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VI EXAMINATION – SUMMER 2025

Subject Code: 3161003 Date:20-05-2025

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 (1) Antenna, (2) Directivity, (3) Polarization	**03**
	(b)	(1) Draw the Radiation Pattern and give necessary indications. (2) Write an equation which shows the relation between directivity and gain.	**04**
	(c)	List down different types of antennas and explain any 2 with necessary figures.	**07**
Q.2	**(a)**	List down antenna radiating regions. What are near field and far field regions?	**03**
	(b)	An antenna has a field pattern $E(\theta) = \cos^2\theta, 0 \leq \theta \leq 90°$. Find HPBW and FNBW.	**04**
	(c)	Derive the expression of Friss Transmission formula. Explain radio communication link between transmitting antenna and receiving antenna.	**07**
		OR	
	(c)	Derive the expression of E_θ and $H_\emptyset$ of a small current element.	**07**
Q.3	**(a)**	Explain the principle of pattern multiplication with necessary example	**03**
	(b)	Derive an expression of 2 – isotropic point sources of same amplitude and same phase, placed equi – distance from center axis. Also draw its radiation pattern having distance between two elements as λ/2.	**04**
	(c)	Write a short note on Binomial array.	**07**
		OR	
Q.3	**(a)**	Explain helical geometry	**03**
	(b)	What is the function of horn antenna? List down various horn antennas. Give the optimum horn dimensions.	**04**
	(c)	Explain about loop antenna. . Explain the working principle of small loop antenna with necessary equations	**07**
Q.4	**(a)**	With suitable diagram discuss the construction features of Yagi-Uda antenna.	**03**
	(b)	State Babinet's principle. Explain slot antenna.	**04**
	(c)	What do you mean by frequency independent antennas? Draw log periodic wire antenna and explain the functioning and design concepts in detail.	**07**
		OR	
Q.4	**(a)**	What is lens antenna? Enlist its advantages and disadvantages.	**03**
	(b)	Explain in brief radiation mechanism for microstrip patch antenna. Enlist its advantages, disadvantages and applications of microstrip patch antenna.	**04**
	(c)	Write a short note on smart antenna.	**07**
Q.5	**(a)**	Define Virtual Height, Maximum Usable Frequency and critical frequency	**03**
	(b)	Explain the structure of ionosphere.	**04**
	(c)	Explain the Gain measurement methods	**07**

OR

Q.5	**(a)**	Explain Skip distance	**03**
	(b)	Enlist and draw with suitable indications of different modes of propagation.	**04**
	(c)	Write a short note on (1) Feed methods of Parabolic reflectors and (2) Feed methods of Microstrip Patch Antennas.	**07**

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