Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER- VII EXAMINATION-SUMMER 2023

Subject Code: 3171110 Date: 21/06/2023

Subject Name: Radar and Navigational Aids

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 Pulse Width, Average Power and Pulse Repetition Time.	03
	(b)	Draw and explain a simple block diagram of Radar	04
	(c)	Derive the basic Radar range equations as governed by minimum receivable echo power Smin. Also write the equation that shows the relation between Smin and Noise Figure (F), with necessary indications.	07
Q.2	(a)	Define blind speed. How blind speed can be avoided?	03
	(b)	Explain Doppler Effect.	04
	(c)	Using a block diagram, describe how CW Radar works. Give its applications, limits and benefits of CW Radar.	07
		OR	
	(c)	Which disadvantage of CW Radar is solved by FMCW radar? Explain it using FMCW radar block diagram.	07
Q.3	(a)	CW radar operating at 5 cm wavelength and target radial velocity is 200 knots, calculate the Doppler frequency of the radar. (1 knot = 0.508 m/s).	03
	(b)	Differentiate between MTI and Pulse Doppler Radar.	04
	(c)	Draw a block diagram and explain the operations of an MTI Radar. What are delay lines in such Radar?	07
		OR	
Q.3	(a)	Explain Radar servo tracking system with the help of simple block diagram	03
	(b)	How is conical scanning an improvement over lobe switching? Explain.	04
	(c)	Draw the ketch of klystron amplifier and explain its working.	07
Q.4	(a)	What is duplexer? How does it work?	03
	(b)	List different types of Radar displays. Explain A scope Radar display.	04
	(c)	Using a block diagram, describe how Mono pulse Radar works.	07
		OR	
Q.4	(a)	What do you understand by Phased array antenna? Write its advantages.	03
	(b)	Write a short note on Parabolic Reflector Antenna.	04
	(c)	Describe GPS system in brief.	07
Q.5	(a)	Define Radio Direction Finder. Define Antenna effect and polarization error in loop antenna.	03
	(b)	Explain the working of loop antenna as a direction finder.	04
	(c)	Describe LORAN - C as hyperbolic Navigation system.	07
		OR	
Q.5	(a)	Write a brief note on LF/MF Radio Range.	03
	(b)	What is VOR? Describe the purpose of VOR in navigation.	04
	(c)	Write a short note on Instrument Landing System (ILS).	07

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