

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VIII (NEW) EXAMINATION – WINTER 2023

Subject Code:2181103

Date:06-12-2023

Subject Name:Radar & Navigational Aids

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) Define RADAR and list its applications.	03
	(b) Derive the fundamental form of Radar range equation.	04
	(c) Define Navigation. List the four methods of navigation and describe any one in detail.	07
Q.2	(a) Define the following parameters: (i) Doppler frequency (ii) Pulse repetition frequency (iii) Clutter	03
	(b) Compare Basic Pulse RADAR and CW RADAR System.	04
	(c) Explain the principle and operation of FM-CW Radar.	07
	OR	
	(c) Explain the block diagram of MTI radar with a neat sketch in detail.	07
Q.3	(a) Explain minimum detectable signal and also define False alarm.	03
	(b) Explain the need of staggered pulse repetition frequencies in case of MTI Doppler Filters to reduce the effect of blind speed.	04
	(c) Explain Non coherent MTI radar with all necessary details.	07
	OR	
Q.3	(a) Distinguish between COHO and STALO.	03
	(b) Describe briefly DELAY LINES and CANCELLERS for MTI RADAR.	04
	(c) Why loop antennas are used in direction finding? Derive an expression for induced output voltage of loop antenna having N turns.	07
Q.4	(a) Distinguish between scanning and tracking. Explain any one method of tracking in brief.	03
	(b) Explain four Course Radio Range. How is the course bending achieved in the system?	04
	(c) Explain the working of the LORAN-A system.	07
	OR	
Q.4	(a) What is the chief advantage of automatic detection and tracking? What are its limitations?	03
	(b) Why is the Loran system called a hyperbolic system of navigation?	04
	(c) What is V.O.R? Explain its principle with necessary waveforms and operation of the VOR ground equipment.	07
Q.5	(a) Define Duplexer. List different types of antennas used in radars.	03
	(b) What is DME? Draw the block diagram of the AIR borne DME interrogator and list its modes of operation.	04

(c) Explain the principle of GPS receiver. 07

OR

Q.5 (a) Name Navigation Satellites of different countries and discuss in brief about Indian Navigational Satellites. 03

(b) Explain the components of the Doppler navigation system. 04

(c) What is the need for ILS at the airport? Explain the localizer and glide slope systems of ILS with radiation pattern of antennas in each case. 07
