Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII (NEW) EXAMINATION – SUMMER 2022

Subject Code:3171110 Date:14/06/2022

Subject Name:Radar and 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)**	Discuss the basic principle behind operation of RADAR. Also provide the classification of RADAR.	**03**
	(b)	Define following terms: Second Time Around Echo, Sweep, Missed Detection, False Alarm	**04**
	(c)	Derive the equation for maximum range (R_{max}) of RADAR in terms of noise figure of receiver, bandwidth and other parameters. List the parameters which affect the performance of RADAR and its maximum range.	**07**
Q.2	**(a)**	Discuss major advantages and drawbacks of RADAR with relevant examples.	**03**
	(b)	Define Clutters. Why do they limit the performance of RADAR? Enlist the methods by which we can eliminate those Clutters.	**04**
	(c)	What is a Doppler effect? Derive the equation for radial velocity of a moving target. Also discuss the difference between Continuous Wave RADAR and Pulsed RADAR.	**07**
		OR	
	(c)	What are unmodulated and modulated Continuous Wave RADARs? Which are better and why? Explain Frequency Modulated Continuous Wave RADAR with necessary block diagram and waveforms.	**07**
Q.3	**(a)**	Briefly describe the concept of sequential lobbing approach.	**03**
	(b)	What is meant by PRF? What is the prime merit if PRF is varied? What is Staggered PRF and why is it important?	**04**
	(c)	What is basically a Moving Target Indicator RADAR? With a block diagram, explain in detail. Why are STALO and COHO needed in MTI RADAR?	**07**
		OR	
Q.3	**(a)**	What do you mean by Mono Pulse tracking system? Where is it applicable?	**03**
	(b)	Define Blind Speed. How can it limit the performance of RADAR? How can we reduce the effect of Blind Speed?	**04**
	(c)	What is the main limitation of MTI RADAR? Discuss the difference between MTI and MTD RADAR. Draw the diagram and explain MTD RADAR with its applications.	**07**

Q.4	**(a)**	Define Navigation and list out different methods of it. Explain in brief Pilotage Navigation.	**03**
	(b)	Discuss Pulse Modulator mechanism for RADAR transmitter in brief with some examples and applications.	**04**
	(c)	What is phased array to perform electronic scanning? With the help of necessary block diagram, explain it in detail.	**07**
		OR	
Q.4	**(a)**	What is Goniometer? What are its benefits?	**03**
	(b)	Explain briefly different antennas used in RADAR transmissions and receptions.	**04**
	(c)	Draw the block diagram and discuss the operation of electronic scanning system with relevant examples.	**07**
Q.5	**(a)**	What is VHF Omni-directional Receiving equipment?	**03**
	(b)	Discuss in detail LORAN C hyperbolic navigation system with importance of master and slave pulses.	**04**
	(c)	Write a short note on NAVIC and GAGAN receivers.	**07**
		OR	
Q.5	**(a)**	Discuss DECCA navigation system in short.	**03**
	(b)	What is the major role of Localizers and Glide Slope in Instrument Landing System? Discuss in brief.	**04**
	(c)	What is GPS and A-GPS system? With necessary diagrams explain them with some practical applications.	**07**