Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VIII (Old) EXAMINATION – WINTER 2019

Subject Code: 181103 Date: 27/11/2019

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.**

Q.1	**(a)**	What is Doppler effect? Briefly explain the working principle of pulse doppler radar with the help of block diagram.	**07**
	(b)	Derive the equation for maximum range of radar and discuss the factor affecting the radar range.	**07**
Q.2	**(a)**	What is the peak power of the radar whose average power is 200W, pulse width is 1μs and PRF of 1000Hz? Also calculate the range of this radar if it has to detect a target with a radar cross section of $2m^2$ when it operates at a frequency of 2.9 GHz with an antenna that is 5m wide,2.7m height, aperture efficiency of 0.6 and minimum detectable signal(MDS) is 10^{-12} W.	**07**
	(b)	How FMCW radar overcomes the shortcomings of Doppler CW radar? Explain the principle and operation of FM-CW radar in brief.	**07**
		OR	
	(b)	Draw and explain working of MTI Radar. What is the difference between MTI radar and MTI radar with power oscillator?	**07**
Q.3	**(a)**	What do you mean by tracking with radar? Explain block diagram of conical-scan tracking radar.	**07**
	(b)	Why loop antennas are used in direction finding? Derive an expression for induced output voltage of loop antenna having N turns.	**07**
		OR	
Q.3	**(a)**	What is Phase Array Antenna and explain how the steering mechanism works in linear phase array?	**07**
	(b)	Write a short note on synthetic aperture radar (SAR).	**07**
Q.4	**(a)**	Explain Airborne Doppler navigation.	**07**
	(b)	Explain Instrument landing system (ILS) .What is the drawbacks of ILS?	**07**
		OR	
Q.4	**(a)**	Describe the principle of VOR. Explain VOR Receiving equipment use for reference phase & bearing measurement.	**07**
	(b)	Explain the principle of working of LORAN A and explain how absolute delay is measured.	**07**
Q.5	**(a)**	Explain TACAN Beacon Equipment with its receiver bearing circuit.	**07**
	(b)	Explain various methods of navigation in detail.	**07**
		OR	
Q.5	**(a)**	Explain briefly DECCA Hyperbolic system.	**07**
	(b)	Write a short note on Global Positioning System.	**07**

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