Seat No.: _____ Enrolment No._____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE – SEMESTER – VIII.EXAMINATION – WINTER 2016

Subject Code: 181103 Date: 22/10/2016

Subject Name: Radar & Navigational Aids (Department Elective - II)

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		**Answer the following:**	**14**
	a	Draw and briefly explain the block diagram of basic CW RADAR System.	**3**
	b	Write and explain the three radar range equations.	**4**
	c	Compare Basic Pulse RADAR and CW RADAR System.	**4**
	d	What are the main types of navigation aids?	**3**
Q-2	**a**	What is radar cross section? Discuss the relation between effective aperture and aperture efficiency of radar antenna.	**7**
	b	A RADAR operating at 10 GHz with peak power of 500KW, the power gain of antenna of 5000 and minimum power of receiver is 10^{-14} Calculate the maximum range of RADAR if effective area of antenna is 10 m2 and RADAR cross section is 4 m^2.	**7**
		OR	
	b	The MTI RADAR is used by a traffic control police to measure the speed of vehicles. If the Doppler frequency shift measured from the moving vehicle is 1.5 KHz. Calculate the speed of vehicle, if RADAR is operating at 1 GHz with PRF of 1000Hz.	**7**
Q-3	**a**	What is a multiple-time-around echoes and how it is related to radar's PRF? Considering three targets at different distances, explain a method of distinguishing MTA echoes from unambiguous echoes, using A scope.	**7**
	b	Define receiver noise. Explain radar range equation in terms of receiver noise figure, bandwidth and other related parameters. For radar receiver having NF of 4dB with IF bandwidth of 3MHz, find minimum detectable power.	**7**
		OR	
Q-3	**a**	Define blind speed and calculate two lowest blind speeds for MTI radar operating at 15GHz with PRF of 1KHz.	**5**

	b	Calculate the maximum unambiguous range and range resolution of a pulse RADAR having pulse width is 5 ms at a PRF of 1000 Hz.	**5**
	c	What is Doppler Effect? List advantages of pulse Doppler radar over CW radar.	**4**
Q-4	**a**	Distinguish between COHO and STALO.	**3**
	b	Describe briefly DELAY LINES and CANCELLERS for MTI RADAR.	**5**
	c	Write a short note on Sea clutter.	**6**

OR

Q-4	**a**	Briefly discuss the features of TACAN.	**4**
	b	Explain automatic direction finder through a block diagram	**5**
	c	Explain Global Positioning system.	**5**
Q-5	**a**	What is DME? Explain the operation of DME inside the aircraft.	**7**
	b	Write short note on Instrument landing system.	**7**

OR

Q-5	**a**	Why loop antennas are used in direction finding? Derive an expression for induced output voltage of loop antenna having N turns.	**7**
	b	Briefly describe the DECCA receiver with neat sketch.	**7**

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