AMIETE – ET (NEW SCHEME) - Code: AE78

Subject: RADAR AND NAVIGATIONAL AIDS

Time	: 3 Hours	NE 2011	Max. M	Iarks: 100		
 NOTE: There are 9 Questions in all. Question 1 is compulsory and carries 20 marks. Answer to Q.1 must be written in the space provided for it in the answer book supplied and nowhere else. The answer sheet for the Q.1 will be collected by the invigilator after 45 Minutes of the commencement of the examination. Out of the remaining EIGHT Questions answer any FIVE Questions. Each question carries 16 marks. Any required data not explicitly given, may be suitably assumed and stated. 						
Q.1	Choose the correct or the best alternative in the following: a. The average power of radar is equal to:			(2×10)		
	(A) $P_t \times PRF$	(B) $P_t \times d$	uty cycle			
	(C) $P_t \times PRP$	(D) P_t/dv	ty cycle			
	b. Radar range R is equal to:					
	(A) $C \times \Delta t$	(B) Δ t/2				
	(C) $P_t \times \Delta t/2$	(D) C $\times \Delta$	t/2			
	c. The nominal frequency range of C-band radar is:					
	(A) 4-8 GHz	(B) 1-2 Gl	Hz			
	(C) 8-12 GHz	(D) 2-4 G	Hz			
	d. The maximum unambiguous ra	adar range is:				
	(A) 2C×PRP	(B) PRF/				
	(C) C/2 PRF	(D) 2C/ Pl	RF			
	e. The radar system losses depen	d upon:				
	(A) Antenna losses	(B) Plumb	e e			
	(C) Signal processing losses	(D) All of	the above			
	f. The purpose of delay line is to	produce a delay	equal to:			
	(A) PRF	(B) PRP				
	(C) Blind speed	(D) None	of the above			

	g.	g. The blind speed in radar are eliminated by using:					
		(A) Delay line cancellers(B) Staggered PRF(C) Doppler shift(D) Single PRF					
	h.	Tracking in range is achieved by:					
		(A) Range gate stealer(C) Automatic tracking	(B) Split gates(D) Beam switching				
	i.	AFC system is employed to keep:					
		(A) Receiver in tune with transmitte(B) Frequency agility(C) Constant gain(D) Volume control	r				
	j.	The device used to protect receiver when the radar transmitter is transmitting:					
		(A) Modulator(C) Duplexer	(B) Mixer(D) Magnetron				
		Answer any FIVE Questions Each question ca					
Q.2	a.	Describe the operation of Pulse Rac	lar with help of block diagram.	(8)			
	b.	. Derive the simple form of the radar range equation.					
Q.3	a.	Briefly describe the behaviour of the radar cross section (4)					
	b.	Derive an expression for echo power in consecant-squared antenna for an air-surveillance radar. (4)					
	c.	Briefly explain various Radar Syste	m Losses	(8)			
Q.4	a.	Describe Doppler Frequency shift					
	b. A C W radar transmits frequency of 10 GHz and Doppler is 1000 Hz. Calculate the radial velocity of the target. (4)						
	c. Explain with the help of block diagram, the principal of operation of MTI radar. (8)						
	c.	Explain with the help of block diagram	ram, the principal of operation of MTI				

Q.5 Describe Matched Filter Receiver. List its important characteristics. **(8)** Enumerate the important parameters for the automatic detection of radar signal. **(8) Q.6** Briefly explain radar clutter, surface clutter, volume clutter. **(8)** b. Explain variation of surface clutter with grazing angle with the help of suitable diagram. **(8)** a. Explain Directive gain and Power gain in radar antenna. **Q.7 (8)** b. Enumerate the advantages of electronically steered phased array antenna. **(8)** Explain the role and design features of RF low noise amplifier. **Q.8 (6)** b. Define Noise Figure and express it mathematically? **(6)** Briefly explain Circulator as Duplexer. **(4)** Briefly explain different types of tracking radars? Q.9 **(8)** b. Briefly explain the principal of operation of three types of Radar/Radio Beacons. **(8)**