

AMIETE - ET (NEW SCHEME)

Time: 3 Hours

DECEMBER 2011

Max. Marks: 100

NOTE: There are 9 Questions in all.

- Please write your Roll No. at the space provided on each page immediately after receiving the Question Paper.
- 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: (2×10)

a. If the peak transmitted power in a radar system is increased by a factor of 16, the Maximum range increases by a factor of

- (A) 2 (B) 4
(C) 8 (D) 16

b. The unit of duty cycle is

- (A) sec (B) Hertz
(C) nil (D) Meter

c. The biggest disadvantage of CW Doppler radar is that

- (A) It does not give target velocity (B) It does not give target range
(C) It does not give target position (D) None of them

d. A solution to blind speed is

- (A) To vary PRF (B) To use monopulse
(C) To use MTI (D) To change Doppler frequency

e. After a target has acquired, the best scanning system for tracking is

- (A) Helical (B) Conical
(C) Spiral (D) Nodding

f. Clutter on PPI due to rain can be reduced by use of

- (A) Enhanced switch (B) Radar ON/OFF switch.
(C) Delay switch (D) A/C rain control

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- g. Sea clutter returns occur
- (A) due to reflections from rain clouds
 (B) At short Ranges
 (C) due to land reflections
 (D) None of the above
- h. The signal arriving from transmitter to the display unit is the
- (A) Trigger (B) Echoes
 (C) Heading marker (D) Bearing information
- i. In a RADAR , IF amplifier is tuned to the _____ the local oscillator and echo frequency.
- (A) Sum of (B) Difference between
 (C) Both (A) and (B) (D) None of the above
- j. VOR stands for
- (A) VHF omni range (B) Visually operated RADAR
 (C) Voltage output of regulator (D) None of the above.

**Answer any FIVE Questions out of EIGHT Questions.
 Each question carries 16 marks.**

- Q.2** a. Discuss the Frequency bands used for radar system. (8)
- b. Draw and Explain block diagram of simple pulse radar system. Explain different applications of radar. (8)
- Q.3** a. Explain the maximum unambiguous range, minimum detectable signal, and other factors affecting the maximum radar range (8)
- b. Use the radar range equation to determine the required transmit power for the TRACS radar given $P_{rmin} = 10^{-13}$ Watts, $G=2000$, $\lambda=0.23m$, $PRF=524$, and $\sigma=2.0m^2$ (8)
- Q.4** a. Explain function of COHO & STALO in MTI radar (8)
- b. Describe the method of staggering pulse repetition frequency to reduce the effect of blind speeds in an MTI system (8)
- Q.5** a. What do you mean by clutter? Discuss the types of clutter and Explain detection of target in sea clutter (8)
- b. Explain effect of weather on radar. (8)

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- Q.6** a. Briefly explain the various types of detectors used in RADAR receivers. (8)
- b. Define matched filter and give its frequency response function. (8)
- Q.7** a. Write short note on Advantages, limitations and applications of antenna arrays in radar systems (8)
- b. A parabolic reflector has radiation characteristics whose half power beamwidth is 6° . Find out its null-to-null beamwidth and power gain. (8)
- Q.8** a. Substantiate the requirement of duplexers in efficient radar systems. Describe the operation of branch and balanced type duplexers with necessary diagrams (8)
- b. Define and explain conversion loss of a mixer and noise temperature ratio. (8)
- Q.9** a. Explain in detail about LORAN navigation system. (8)
- b. With the help of a block diagram, explain the working of Amplitude comparison monopulse tracking radar. (8)