Code No: 07A7EC15 **R07** **Set No. 2**

IV B.Tech I Semester Examinations,November 2010
RADAR SYSTEMS
Electronics And Telematics

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw and explain block diagram of Conical-scan tracking radar.
   (b) Why does a tracking radar have poor accuracy at low elevation angles? Explain. [8+8]
2. (a) Draw the block diagram of non-coherent MTI Radar and explain the function of each block in detail.
   (b) Explain the Advantages and Disadvantages of non-coherent MTI Radar. [8+8]
3. Explain in detail about branch type and balanced type Duplexers. [16]
4. (a) Calculate the maximum range of a radar system which operates at 3 cm with a peak pulse power of 500 kW, if its minimum receivable power is 10^{-13} W, the capture area of its antenna is 5 m^2, and the radar cross-sectional area of the target is 20 m^2.
   (b) Define a integration efficiency of Radar pulses.
   (c) What is the false alarm number? How to calculate it? [6+4+6]
5. (a) What is the beat frequency? How it is used in FMCW radar?
   (b) Explain how the multipath signals produce error in FM altimeter? [8+8]
6. (a) What is matched filter? Why it is needed in pulse Radar?
   (b) How the interference from other radars are reduced in pulse radar?
   (c) Explain how the Radar is useful for ship safety? [6+4+6]
7. Derive the matched-filter frequency response function using the Schwartz inequality. [16]
8. (a) Explain how the sign of the Doppler frequency is found by splitting the received signal in CW radar?
   (b) Drive the expression for doppler frequency and plot it as a function of radar frequency and target radial velocity. Assume necessary parameters. [8+8]

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Code No: 07A7EC15 **R07** **Set No. 4**

IV B.Tech I Semester Examinations,November 2010
RADAR SYSTEMS
Electronics And Telematics

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Differentiate blind phases from blind speeds.
   (b) Discuss the various types of MTI delay lines used in MTI radar. [8+8]
2. What are basic differences between a search Radar and Tracking Radar? Discuss the various scanning techniques and Tracking mechanisms. [16]
3. (a) Explain the functioning and characteristics of PPI display and A-Scope.
   (b) Explain the terms Linear Array, Planar array, Broadside array and endfire array. [8+8]
4. (a) Determine the maximum distance from the radar to the target, based on this explain the operation of Radar.
   (b) With a block diagram, explain the principle of operation of a pulse-radar. Bring out the considerations required to determine the pulse width and PRF of a radar system. [8+8]
5. (a) Explain the operation of the two frequency CW Radar.
   (b) How to select the difference between two transmitted signals of CW radar? [8+8]
6. (a) Discuss about the factors that influence the prediction of Radar range.
   (b) Define noise bandwidth of a radar receiver. How does it differ from 3-dB band width? Obtain the expression for minimum detectable signal in terms of noise bandwidth, noise figure and other relevant parameters. [8+8]
7. Explain the principle and characteristics of a matched filter hence derive the expression for frequency response function. [16]
8. (a) What is the Doppler effect? What are some of the ways in which it manifests itself? What are its radar applications?
   (b) Find the relation between bandwidth and the acceleration of the target with respect to radar? [8+8]

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Code No: 07A7EC15 **R07** **Set No. 1**

IV B.Tech I Semester Examinations,November 2010
RADAR SYSTEMS
Electronics And Telematics

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is a Radar? How it is used in communications?
   (b) Derive the equation for maximum Radar range in terms of radar and target parameters? [8+8]
2. (a) Draw the block diagram of FMCW Radar using side band superhetrodyne receiver and explain the function of each block.
   (b) What types of errors are present when cycle counter is used to measure frequency of FMCW Radar. [10+6]
3. (a) Why Beat frequency amplifier is used in CW Radar? Explain its principle of working with frequency response characteristics.
   (b) Draw the block diagram of sideband super heterodyne CW Radar receiver and explain each block. [8+8]
4. (a) With the aid of neat sketch, describe the equipment and technique used in the mono pulse method of target tracking.
   (b) Discuss about the simultaneous-phase-comparison radar. [8+8]
5. (a) Discuss the properties of a matched filter.
   (b) Specify the matched filter by its impulse response. [8+8]
6. Explain in detail about Series arrangements for applying phase relationships in an array:
   (a) Fed from one end.
   (b) Center-fed. [16]
7. (a) Derive the formula for probability of a false alarm for Radar.
   (b) Determine the Radar cross-section of a sphere in the optical region and compare it with in Raylaigh region. [8+8]
8. (a) Explain Equipment instabilities Limitation to MTI Performance.
   (b) Draw the block diagram of digital MTI processor and explain that how the effects of blind phases are eliminated. [8+8]

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Code No: 07A7EC15 **R07** **Set No. 3**

IV B.Tech I Semester Examinations,November 2010
RADAR SYSTEMS
Electronics And Telematics

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the basic concept of phased array antennas.
   (b) Explain characteristics of different radar displays. [8+8]
2. (a) Describe the essential characteristics, functions and major applications of search Radar Systems.
   (b) Describe Acquisition with respect to Tracking radar. [8+8]
3. (a) Why Doppler amplifier is used in CW Radar? Explain its principle of working with frequency response characteristics.
   (b) Why isolation between transmitter and receiver of long range CW Radar is required? How is it obtained? [8+8]
4. Discuss the relation between the matched filter characteristics and correlation detection. [16]
5. (a) Explain how to choose the PRF at which Radar pulses may be transmitted?
   (b) Write the three forms of Radar range equation and to give the importance of each term in these equations. [8+8]
6. (a) Obtain the SNR at the output of IF amplifier of Radar Receiver for a specified probability of detection without exceeding a specified probability of false alarm.
   (b) Explain how system losses will affect on the Radar Range? [8+8]
7. (a) Why the step error and quantization errors which occur in cycle counter are used for frequency measurement in FMCW Radar?
   (b) Draw the block diagram of sinusoidally modulated FMCW radar and explain the function of each block. [8+8]
8. Explain the following limitations of MTI radar.
   (a) Equipment instabilities.
   (b) Scanning modulation.
   (c) Internal fluctuation of clutter. [16]

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