Set No. 1

IV B.Tech II Semester Regular Examinations, Apr/May 2007
RADAR ENGINEERING
(Electronics & Communication Engineering)

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Draw the diagram of a Basic Radar system and explain the operation of each block in detail.
   (b) Discuss the range of radar frequencies in electromagnetic spectrum.   [10+6]

2. (a) Define and explain Transmitter power in Radar equation and express the Radar equation in terms of the energy contained in the transmitted waveform.
   (b) Discuss the factors of PRF and range ambiguities.   [10+6]

3. (a) What is Doppler effect? What are some of the ways in which it manifests it self? What are its Radar applications?
   (b) With a transmit(CW) frequency of 5GHz, calculate the Doppler frequency seen by a stationary Radar when the target radial velocity is 100 km/h(62.5 mph)?   [10+6]

4. (a) Draw and explain frequency-response characteristics of an MTI using range gates and filters.
   (b) What is the difference between MTI radar using range gates and an MTI with a single-delay-line canceler.   [8+8]

5. Explain the following limitations of MTI radar.
   (a) Equipment instabilities.
   (b) Scanning modulation.
   (c) Internal fluctuation of clutter.   [5+5+6]

6. (a) Compare the tracking techniques.
   (b) Explain in detail about limitations to tracking accuracy.   [10+6]

7. (a) Write notes on various antenna parameters and their significance as applicable to radars.
   (b) Explain and distinguish between the branch-type and balanced duplexers.

   [8+8]

8. (a) Explain the principle and process of correlation detection.
   (b) Explain and distinguish between different ECCM options.   [8+8]

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Set No. 2

IV B.Tech II Semester Regular Examinations, Apr/May 2007
RADAR ENGINEERING
(Electronics & Communication Engineering)

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Describe a pulsed Radar system. Discuss how the direction and range of an object is determined using this system.

   (b) Discuss about the frequencies used for radar.   [10+6]

2. Describe in detail the various system losses that affect the characteristics of the Radar.   [16]

3. (a) Explain the operation of Non-zero intermediate frequency receiver with neat block diagram. Compare it with zero IF receiver and bring out its advantages.

   (b) Bring out the factors that tend to spread the CW signal energy over a finite frequency band and explain the spreading reasons clearly.   [10+6]

4. (a) Draw and explain frequency-response characteristics of an MTI using range gates and filters.

   (b) What is the difference between MTI radar using range gates and an MTI with a single-delay-line canceler.   [8+8]

5. (a) Mention the limitations of MTI radar related to clutter parameters.

   (b) Mention the limitations of improvement factor imposed by pulse-to-pulse instability.

   (c) Write short notes on inter clutter visibility.   [6+5+5]

6. (a) Compare the tracking techniques.

   (b) Explain in detail about limitations to tracking accuracy.   [10+6]

7. (a) Explain the different types of feeds and their radiation characteristics, suitable to radar dish antennas.

   (b) List out the merits and demerits of phased array antennas.   [8+8]

8. (a) Describe and distinguish between the different types of ECM directed against a radar.

   (b) Discuss the relations between the matched filter characteristics and correlation function.   [8+8]

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Set No. 3

IV B.Tech II Semester Regular Examinations, Apr/May 2007
RADAR ENGINEERING
(Electronics & Communication Engineering)

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Derive the Radar range equation.

   (b) With a block diagram explain the operation of pulse radar.   [6+10]

2. Describe in detail the various system losses that affect the characteristics of the
   Radar.   [16]

3. (a) Explain how the limitations of simple CW Radar are overcome in multiple
       frequency CW Radar.

   (b) Determine the range and Doppler velocity of the target if the target is mov-
       ing away from a FM-CW Radar.The beat frequency observed for triangular
       modulation as fb (up) = 50kHz.and fb (down) = 20kHz. The modulating
       frequency is 2MHz and Doppler shift is 2kHz.   [8+8]

4. (a) Description of Range gate Doppler filters.

   (b) Differentiate blind phases from blind speeds.

   (c) Discuss the application of electrostatic storage tubes in MTI radar. [6+5+5]

5. Distinguish the principle of operation of a simple pulse radar from a simple CW
   radar. Explain the difference with neat schematic block diagrams.   [16]

6. (a) Explain the block diagram of amplitude comparison monopulse radar for single
       angular coordinate and explain its operation.

   (b) Explain the scanning patterns employed with pencil beam antenna.   [10+6]

7. (a) Write notes on various antenna parameters and their significance as applicable
       to radars.

   (b) Explain and distinguish between the branch-type and balanced duplexers.

                                                                           [8+8]

8. Explain the principle and characteristics of a matched filter. Hence derive the
   expression for its frequency response function.   [16]

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Code No: RR420402

Set No. 4

IV B.Tech II Semester Regular Examinations, Apr/May 2007
RADAR ENGINEERING
(Electronics & Communication Engineering)

Time: 3 hours   Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Derive the basic Radar equation.

   (b) What are the problems and limitations in the prediction of radar range.

   (c) Discuss about detection of signals in noice.   [6+5+5]

2. (a) Obtain the basic Radar equation in terms of minimum detectable power, gains
       of transmitting and receiving antennas etc.,

   (b) Describe briefly some of the factors governing the relationship between the
       radars cross section of a target and its true cross section.   [8+8]

3. (a) Explain how do you distinguish between CW Radar and Pulsed Radar.

   (b) Determine the operating frequency if the target is moving with acceleration
       as same as acceleration of gravity and the received signal bandwidth is 50Hz.

                                                                          [8+8]

4. (a) Draw and explain frequency-response characteristics of an MTI using range
       gates and filters.

   (b) What is the difference between MTI radar using range gates and an MTI with
       a single-delay-line canceler.   [8+8]

5. (a) Mention the limitations of MTI radar related to clutter parameters.

   (b) Mention the limitations of improvement factor imposed by pulse-to-pulse in-
       stability.

   (c) Write short notes on inter clutter visibility.   [6+5+5]

6. (a) What are the advantages of monopulse radar over conical scan radar.

   (b) Explain the block diagram of amplitude comparison monopulse for extracting
       error signals in both elevation and azimuth.   [6+10]

7. (a) Explain the different types of feeds and their radiation characteristics, suitable
       to radar dish antennas.

   (b) List out the merits and demerits of phased array antennas.   [8+8]

8. Write notes and explain about:

   (a) Passive ECM

   (b) Matched and non-matched filters

(c) North filter.

(d) Antijamming techniques. [4×4]

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