

**Code No: M0422 /R07****R07****Set No. 1****IV B.Tech. I Semester Supplementary Examinations, February/March - 2011****RADAR SYSTEMS****(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 noise. [6+5+5]
2. a) Describe the effect of size of a simple spherical target on determination of radar cross section of the sphere.  
b) Write short notes on the integration of radar pulses. [8+8]
3. a) Discuss the limitations of simple CW radar with zero IF.  
b) Explain the factors responsible for spreading the CW signal energy over a finite band of frequencies. [8+8]
4. a) With the help of a suitable block diagram, explain the operation of a CW tracking illuminator application of a CW radar.  
b) Differentiate CW and FM CW radars. [10+6]
5. a) A simple MTI delay line canceller is an example of time domain filter. Why? Explain.  
b) Mention the limitations of MTI radar related to clutter parameters.  
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) Derive the impulse response characteristic for a matched filter.  
b) Explain the principle and process of correlation detection. [8+8]
8. a) Discuss about the mixers in the radar receivers.  
b) Compare series feeds and parallel feeds. [8+8]

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**R07**

**Set No. 2**

**IV B.Tech. I Semester Supplementary Examinations, February/March - 2011**

**RADAR SYSTEMS**

**(Electronics & Communication Engineering)**

**Time: 3 Hours**

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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) Explain in detail the choice of various parameters that are effecting the Radar range.  
b) What are the restrictions on the selection of pulse repetition frequency in Radaro peration? How they are adjusted for various range requirements? [8+8]
3. a) With a neat block, diagram explain how a CW Radar is used for the determination of the relative velocity of a target.  
b) Mention the applications of a CW Radar. [10+6]
4. a) With necessary mathematical expressions, describe range and Doppler measurement if the transmitted signal of a CW Radar is frequency modulated.  
b) Draw the block diagram of FM CW Radar and explain its operation with triangular modulation. [8+8]
5. a) Explain in detail the filter characteristics of the delay line canceller.  
b) Explain how the effect of blind speeds are reduced by operating at more than one PRF. [8+8]
6. a) Illustrate low angle tractions in detail.  
b) Briefly explain the four types of Radars that provide the tracks of the targets. [8+8]
7. a) Explain the characteristics of a cross correlation receiver with a block diagram.  
b) Write short notes on the efficiency of non matched filters. [8+8]
8. Write short notes on
  - a) types of feeds
  - b) Beam steering

**Code No: M0422 /R07****R07****Set No. 3****IV B.Tech. I Semester Supplementary Examinations, February/March - 2011****RADAR SYSTEMS****(Electronics & Communication Engineering)****Time: 3 Hours****Max Marks: 80**

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1. a) Discuss the parameters on which maximum detectable range of a radar system depends.  
 b) Compute the maximum detectable range of a radar system specified below.  
 Operating Wavelength = 3.2 cm; Peak pulse Transmitted Power = 500kw;  
 Minimum detectable power =  $10^{-13}$  w; Capture area of the antenna = 5 sqm;  
 Radar cross sectional area of the target = 20 sqm. [8+8]
2. a) Explain the significance of probability of false alarm and probability of miss.  
 b) Explain the relation between unambiguous range estimation and multiple time around echoes. [8+8]
3. a) With a block diagram explain the principle of operation of CW Doppler radar with non zero IF Receiver  
 b) Discuss the war and peace applications of CW Radar. [8+8]
4. a) Describe the effect of sinusoidal modulating signal in the place of rectangular pulses on the performance of a signal.  
 b) Write short notes on FM CW altimeter. [8+8]
5. a) Draw the block diagram of non coherent MTI radar and explain the functions of each block in detail.  
 b) Write the advantages of non- coherent MTI Radar. [10+6]
6. a) Explain about Pulse Doppler Radar. [8+8]  
 b) Give the reasons for poor tracking at low angle.
7. a) Derive the transfer function for matched filter.  
 b) Write short notes on
  - i) Coherent Detector.
  - ii) likely hood ratio receiver. [8+8]
8. Write short notes on
  - a) Radar Displays
  - b) Noise Figure and Noise Temperature [8+8]

**Code No: M0422 /R07****R07****Set No. 4****IV B.Tech. I Semester Supplementary Examinations, February/March - 2011****RADAR SYSTEMS****(Electronics & Communication Engineering)****Time: 3 Hours****Max Marks: 80**

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1. a) Derive the range equation and discuss about its limitations.  
b) What is the significance of radar ambiguity function. Explain. [8+8]
2. a) Obtain the basic radar equation in terms of minimum detectable power gains of transmitting and Receiving antennas.  
b) Describe the different noise components present in Radar System. [8+8]
3. a) Explain with necessary block schematic and analysis how Doppler direction is identified with CW radar.  
b) Differentiate CW radar and Pulsed radar. [8+8]
4. a) Explain the method of measurement of distance by using multiple frequencies CW radar in missile guidance systems.  
b) Write short notes on measurement errors. [10+6]
5. a) Explain the operation of filter which is used to achieve responses suitable for MTI.  
b) Discuss the necessity of delay line canceller and explain with an example. [8+8]
6. a) How is radar target acquired in typical radar?  
b) What factors determine the range and angular accuracies in radar? [8+8]
7. a) Explain the principle and characteristics of a matched filter and hence derive the expression for its frequency response function.  
b) Compare matched and non matched filters. [10+6]
8. Write short notes on
  - a) Phased array antennas
  - b) Duplexers. [8+8]