JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year II Semester Examinations, May - 2017

RADAR SYSTEMS

(Electronics and Communication Engineering)

13AG1A04A6 9

Time: 3 hours Max. Marks: 75

Note: This question paper contains two parts A and B.
Part A is compulsory which carries 25 marks. Answer all questions in Part A. Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART - A

(25 Marks)

1.a) Describe various radar applications. [2]
b) Calculate the range of a target, if the time taken by the signal to travel and return is 100 micro seconds? [3]
c) Calculate the Doppler frequency of an aircraft moving with a speed of 550 Knots and when the CW radar is working with λ=8cms. [2]
d) Write about Doppler principle. [3]
e) What are the differences between Pulse radar and Pulse Doppler radar? [2]
f) Write about MTI radar parameters. [3]
g) Discuss the sequential lobing tracking antenna mechanism. [2]
h) Briefly explain the tracking radar and search radar system. [3]
i) Give the comparison between the efficiency of matched and non matched filters. [2]
j) Discuss in brief measuring of noise figure. [3]

PART - B

(50 Marks)

2.a) What is minimum detectable signal? Calculate minimum receivable signal in a radar receiver that has an IF bandwidth of 1.5 MHz and a 9-dB noise figure.
b) Discuss in brief the radar range equation and modified radar range equation. [5+5]

OR

3.a) Discuss the radar cross section of the targets : Sphere, Flat Plate, Triangular trihedral.
b) Write about radar system losses. [5+5]

4. Draw a block diagram of the FMCW radar and explain its operation. [10]

OR

5. Discuss the following a) Non-Zero IF receiver b) Isolation between the transmitter and receiver. [10]

6.a) Explain MTI radar with a block diagram.
b) Define the terms : Clutter attenuation, Sub-clutter visibility. [5+5]

OR

7.a) Discuss the principle of operation of Pulse Doppler Radar.
b) Explain bind speed and the methods for reducing the effects of blind speed. [5+5]

8. Explain with the help of a block diagram amplitude comparison monopulse radars for extracting error signals in both elevation and azimuth. [10]

OR

9.a) Define tracking in range and explain the split gate tracker method.
b) Explain the working of a monopulse radar with the help of a block diagram. [5+5]

10.a) What is meant by correlation? Explain cross correlation with the help of neat block diagram.
b) A radar receiver is connected to a 30 ohm resistance antenna that has an equivalent noise resistance of 25 ohm. Calculate the noise figure of the receiver and the equivalent noise temperature of the receiver. [5+5]

OR

11.a) Write about radiation pattern of phased array antennas with suitable equations.
b) Write about: i) beam steering ii) beamwidth of phased array antennas. [5+5]