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Code No: 128EA

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B. Tech IV Year II Semester Examinations, July - 2023

RADAR SYSTEMS

(Electronics and Communication Engineering)

Time: 3 Hours **Max. Marks: 75**

Note: i) Question paper consists of Part A, Part B.

ii) Part A is compulsory, which carries 25 marks. In Part A, Answer all questions.

iii) In Part B, Answer any one question from each unit. Each question carries 10 marks and may have a, b as sub questions.

PART – A

(25 Marks)

1.a)	Discuss about Radar frequencies.	[2]
b)	Define the term radar range resolution and write the equation.	[3]
c)	Write the merits and demerits of continuous wave radar.	[2]
d)	Define Doppler Effect. Explain how it is used in CW radar.	[3]
e)	Discuss the filter characteristics of delay line canceller.	[2]
f)	Give the principle operation of pulse Doppler radar.	[3]
g)	List out different trackers and define the operation of a tracker.	[2]
h)	Discuss the concept of conical scan.	[3]
i)	What is a matched filter Receiver?	[2]
j)	Give the merits and limitations of phased array antennas.	[3]

PART – B

(50 Marks)

2.a) Derive fundamental radar range equation governed by minimum receivable echo power s_{min}.

b) The average false alarm time is a more significant parameter than the false alarm probability. Give the reasons. [5+5]

OR

3.a) Describe the effect of (in terms of wavelength of operation) size of a simple spherical target on determination of radar cross section of the sphere.

b) With the help of expressions, explain radar transmitter power. [5+5]

4.a) Draw and explain CW radar with nonzero IF receiver.

b) Discuss the results of multiple frequency usage for operating FM-CW radar while mentioning the limitations of multiple frequency usage in CW radars. [5+5]

OR

5.a) Write short notes on the Unwanted signals and the measurement errors in FM altimeter.

b) With suitable waveforms, discuss frequency time relationships in FM-CW radar. [5+5]

6.a) Compare and contrast the situations with a power amplifier and a power oscillator in the transmitter of an MTI system.

b) Explain bind speed and the methods for reducing the effects of blind speed. [5+5]

OR

7.a) Describe the method of staggering pulse repetition frequency to reduce the effect of blind speeds in an MTI system.

b) Differentiate single -delay-line canceller and double-delay-line canceller. [5+5]

8.a) Describe sequential lobing type of error signal generation to track a target automatically.

b) Explain in detail about limitations to tracking accuracy. [5+5]

OR

9.a) Describe different Radar tracking techniques.

b) Draw and explain the wave front phase relationships in phase comparison monopulse radar. [5+5]

10.a) Draw and explain balanced type duplexer.

b) Describe briefly various visual displays to view radar echo signals in radar systems.[5+5]

OR

11.a) Explain the basic concept of phased array antennas.

b) Explain the necessity of a matched filter in a radar receiver to improve its signal-to-noise ratio. [5+5]

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