Code No: 158CJ **R18**

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)	Explain how the Radar pulses are integrated?	[2]
b)	What is the difference between the RADAR range equation and the modified range equation?	[3]
c)	What are the characteristics of FM-CW RADAR?	[2]
d)	What are the functions of a non-zero IF receiver?	[3]
e)	Explain double cancellation in MT1 RADAR.	[2]
f)	What are the applications of MT1 RADAR?	[3]
g)	What are the scanning patterns in tracking RADARs?	[2]
h)	Define tracking range.	[3]
i)	What is the efficiency of a non-matched filter?	[2]
j)	What are the advantages of the RADAR receiver?	[3]

PART – B

(50 Marks)

2.a) Explain the basic principles of Radar and discuss about various parameters which improve the performance of the Radar.
b) Discuss about Radar frequencies and applications of RADAR. [5+5]

OR

3.a) What is the Maximum unambiguous Range? How is it related to pulse repetition rate?
b) Explain in detail various system losses involved in the Radar systems. [6+4]

4.a) What is the Doppler effect? What are some of the ways in which it manifests itself?
b) What is the relation between bandwidth and the acceleration of the target with respect to radar? [5+5]

OR

5.a) Explain how isolation between transmitter and receiver is obtained in CW radar?
b) Explain how the noise signals are limiting the performance of the FM-CW altimeter. [5+5]

6. Explain the following limitations of MT1 radar.
   a) Equipment instabilities
   b) Scanning modulation
   c) Internal fluctuation of clutter. [10]

OR

7.a) Explain the function of the time domain filter in a MT1 radar with an example.
   b) What is the role of Power Amplifier, Transmitter and Power Oscillator in MT1 RADAR? [6+4]

8.a) Compare the different tracking techniques.
   b) Explain in detail about limitations to tracking accuracy. [5+5]

OR

9.a) With a neat diagram explain the operation of a conical scan radar. Explain the various factors that need to be considered for optimum squint angle.
   b) Explain with the help of a neat block diagram Amplitude comparison Mono-pulse radar for extracting error signals in both Azimuth and Elevation. [5+5]

10.a) What is meant by correlation? Explain cross relation with the help of a neat block diagram.
   b) Establish the impulse response characteristic for a matched filter. [5+5]

OR

11.a) Explain how beam width of a phase array antenna will vary with steering angle?
   b) Explain the expression for frequency response of the matched filter with Non White noise. [5+5]

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