19APE0404

Time : 3 Hours　　　　　　　　　　　　　　　　　Max. Marks : 70

PART — A

(Compulsory Question)　　　　　　　**(10 × 2 = 20 Marks)**

Answer the following.

1. (a) Define the Probability of detection.

   (b) Describe the functions performed by the Radar.

   (c) Write the applications of CW Radar.

   (d) Define the Doppler effect. $V_a = \frac{2V_d}{\lambda}$

   (e) What is the first blind speed of an l-band Radar operating at 1.25 GHZ, when the PRF has a maximum unambiguous range of 380 km? 1.50

   (f) What are the limitations of MTI Radar?

   (g) What are the drawbacks in sequential-lobing tracking?

   (h) Define the elevation angle with respect to Radar.

   (i) Define noise temperature and describe the relation between noise figure and noise temperature.

   (j) Define the efficiency of a Matched filter.

Turn Over

PART — B

Answer ONE full Question from each Unit.   (5 × 10 = 50 Marks)

All questions carry equal marks.

UNIT – I

2. (a) With the help of a neat block diagram, explain the principle of operation of Radar.   (5)

(b) What are the various Radar system losses? Explain in detail.   (5)

Or

3. A Pulse Radar transmits a peak power of 1 MW. It has a PRT equal to 1000 microsec. and the transmitted pulse width is 1 micro sec. Calculate   (10)
    (a) Maximum unambiguous range
    (b) Average Power
    (c) Duty Cycle
    (d) Energy transmitted.

UNIT – II

4. (a) How the Doppler shift and Radar range can be measured with FM-CW Radar? Explain.   (5)

(b) Explain the operation of the multiple frequency CW Radar.   (5)

Or

5. (a) Explain the principle of operation of Frequency Modulated Continuous Wave Radar with a neat block diagram.   (5)

(b) Calculate the Doppler frequency seen by a Stationary Continuous Wave Radar with a transmit frequency of 5 GHz when the target radial velocity is 100 km/h.   (5)

$fd = 5.556$

UNIT – III

6. (a) What is the importance of staggered pulse repetition frequencies in the design of an MTI Radar? Explain.   (5)

(b) Explain the function of a single delay line canceller and derive an expression for the frequency response function.   (5)

Or

7. (a) Explain the operation of an MTI Radar with power oscillator transmitter. (5)

(b) Explain the frequency response characteristics of a MTI Radar using Range gated Doppler filters.   (5)

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UNIT – IV

8. (a) Draw the block diagram and explain the operation of a Conical scan tracking Radar. (5)

   (b) What is automatic detection and tracking? Explain its limitations. (5)

Or

9. (a) Explain amplitude comparison Monopulse tracking radar with the help of a neat block diagram. (5)

   (b) Write a brief note on acquisition and scanning patterns. (5)

UNIT – V

10. (a) Derive the expression for the frequency response of a Matched filter receiver with non white noise input. (5)

    (b) Derive an expression for the effective Noise figure of two cascaded networks. (5)

Or

11. (a) Draw and explain the structures of balanced duplexer during transmission and reception modes. (5)

    (b) Briefly explain the concept of beam steering of Phased array antennas. (5)

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