

Total No. of printed pages = 4

EC 1318E041

Roll No. of candidate

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2020

B.Tech. 8th Semester End-Term Examination

Electronics and Communications Engineering

RADAR ENGINEERING (ELECTIVE IV)

Full Marks – 50

Time – Two hours

The figures in the margin indicate full marks
for the questions.

Answer Question No. 1 (any *five*) and any *three* question
from the rest.

1. Answer the following (MCQ/ Fill in the blanks) :
(5 × 1 = 5)
- (i) What are the main reasons for the failure of the simple form of the radar equation?
 - (ii) What is called a missed detection?
 - (iii) What is clutter map?
 - (iv) State one method to reduce blind speed?
 - (v) What are the limitations of single delay line canceller?

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- (vi) What are the different types of Radar present? Name them.
 - (vii) What is blind speed?
 - (viii) Define Acquisition?
 - (ix) In a RADAR system the transmitter of the radar is more sensitive than the receiver. (True/False)
 - (x) List out the different types of displays used in radar communication?
2. (a) Describe the Doppler effect? Explain how the Doppler Effect is used to determine velocity of targets in Radar Systems? (2 + 3 = 5)
 - (b) Write some applications of Continuous Wave (CW) Radar? (5)
 - (c) What is Doppler frequency shift? Establish a relation between Doppler frequency shift and radial velocity of a moving target? (2 + 3 = 5)
 3. (a) Stationary objects are most easily detected by an FM systems. Explain? (4)
 - (b) Derive the simple Radar equation? (6)
 - (c) Pulse modulation method does NOT depend on relative frequency or target motion? Discuss. (5)
 4. (a) With the help of suitable diagram, explain the operation of radar. Explain each and every block in detail. (8)
 - (b) Explain in detail how blind speed is overcome in pulse Doppler radar? (7)

5. (a) Explain the working of Moving Target Indicator (MTI) Doppler with neat diagram? (8)
- (b) Illustrate with neat block diagram single delay line canceller. Also derive the expression for frequency response of single delay line canceller? (7)
6. (a) Mention the different tracking systems in radar communication? Explain any one of them? (2 + 5 = 7)
- (b) What is the basic principle of radar system? How does it determine distance to a target? (4)
- (c) Describe PRF and PPT with diagram? (2 + 2 = 4)
7. (a) Define scanning? Explain different types of scanning techniques? (2 + 6 = 8)
- (b) List all the possible losses in a radar system and discuss the possible causes of each of them. (3)
- (c) Find out the Doppler frequency shift caused by a space borne target approaching with a relative velocity of 100 m/s with respect to a CW Radar operating at a carrier frequency of 6.0 GHz. (Velocity of electromagnetic waves = 3×10^8) (4)
8. (a) What is the role of a duplexer in radar system? (3)
- (b) What are the properties of sea clutter and land clutter? (5)
- (c) Explain the limitations of automatic detection and tracking? (7)

9. Write short notes on (any *three*) : (3 × 5 = 15)

(a) Single Target Tracker

(b) Matched Fitter

(c) Noise Figure

(d) k- distribution

(e) Duplexer.
