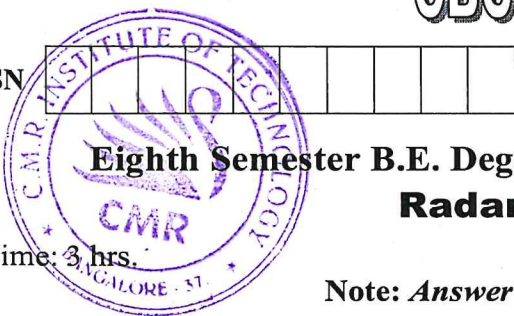


CBCS SCHEME

USN



17EC833

Eighth Semester B.E. Degree Examination, July/August 2021

Radar Engineering

Time: 3 hrs.

Max. Marks:100

Note: Answer any FIVE full questions.

- 1 a. Explain basic principle of radar with suitable diagrams. (10 Marks)
b. Explain maximum unambiguous range of a radar with equation and graph. (10 Marks)
- 2 a. A 10GHz radar has the following characteristics $P_t = 250\text{KW}$, $\text{PRF} = 1500\text{PPS}$, pulse width = $0.8\mu\text{s}$, Power gain of antenna = 2500, $S_{\min} = 10^{-14}\text{W}$, $A_e = 10\text{m}^2$, $\sigma = 2\text{m}^2$. Find : i) Runamb ii) Maximum possible range iii) Duty cycle iv) Average power. (10 Marks)
b. Briefly describe the major areas of radar applications. (10 Marks)
- 3 a. Derive the modified radar equation interms of signal to noise ratio. (10 Marks)
b. Explain the radar cross section of sphere and cone sphere targets. (10 Marks)
- 4 a. Discuss with equation and graphs the probability of false alarm and the probability of detection using a envelope detector. (10 Marks)
b. Discuss briefly the following types of system losses in radar
i) Microwave plumbing losses
ii) Antenna losses
iii) Signal processing losses. (10 Marks)
- 5 a. Explain the working of digital Moving Target Indicator (MTI) doppler signal processor with neat diagram. (10 Marks)
b. List the limitations of single delay line cancellers and derive its associated equations. (10 Marks)
- 6 a. With neat block diagram, explain the original Moving Target Detector (MTD) signal processor. (10 Marks)
b. Derive the equations for clutter attenuation and MTI improvement factor. (10 Marks)
- 7 a. Define monopulse tracker. Using block diagram explain amplitude comparison monopulse tracking radar for a single angular coordinate. (10 Marks)
b. With neat block diagram, explain conical scan tracking radar. (10 Marks)
- 8 a. What are the different types of tracking radar systems? Explain with diagrams, how angle tracking is done. (10 Marks)
b. Discuss on tracking in range of a tracking radar with suitable waveforms and equations. (10 Marks)
- 9 a. List the different functions served by radar antenna. (10 Marks)
b. Explain different types of radar display system. (10 Marks)
- 10 a. List the advantages and limitations of electronically steered phase array antenna. (10 Marks)
b. What is the role of duplexer's in radar system? Illustrate the transmit condition and receive condition in case of balanced duplexer. (10 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

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