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 = 250KW, PRF = 1500PPS, pulse width = 0.8μs, Power gain of antenna = 2500, $S_{min} = 10^{-14}$W, $A_e = 10m^2$, $\sigma = 2m^2$. 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)**

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