

Code: EC7T5C

**IV B.Tech - I Semester – Regular/Supplementary Examinations  
October - 2019**

**RADAR SYSTEMS  
(ELECTRONICS & COMMUNICATION ENGINEERING)**

Duration: 3 hours

Max. Marks: 70

**PART – A**

Answer *all* the questions. All questions carry equal marks

11 x 2 = 22 M

1.

- a) Define Unambiguous range in a radar system.
- b) List the applications of CW Radar.
- c) Relate Doppler frequency shift with radial velocity of a moving target.
- d) What is a Matched filter?
- e) Distinguish MTI & Pulse Doppler Radar.
- f) What are the peak power and duty cycle of radar whose average transmitter power is 200W, pulse width of  $1\mu\text{s}$  and a pulse repetition frequency of 1000Hz?
- g) What is the principle of CW Radar?
- h) What is the principle of MTI Radar?
- i) Define Beam, rotation and Target axis in conical scanning.
- j) Explain what is a matched filter with a Non White Noise and give the expression for its frequency response.
- k) Define Noise figure.

## PART – B

Answer any **THREE** questions. All questions carry equal marks.

3 x 16 = 48 M

2. a) What are the differences between pre integration and post integration of radar pulses at the Radar receiver? 8 M
- b) A low power, short range radar is solid-state throughout, including a low-noise RF amplifier which gives it an overall noise figure of 4.77dB. If the antenna diameter is 1m, the IF bandwidth is 500 kHz, the operating frequency is 8 GHz and the radar set is supposed to be capable of detecting targets of  $5\text{m}^2$  cross sectional area at a maximum distance of 12 km, what must be the peak transmitted pulse power? 8 M
3. a) With the help of a suitable block diagram, Explain the operation of CW radar with Non-Zero IF in the receiver. 8 M
- b) Explain how isolation between Transmitter and Receiver is obtained in CW radar. 8 M
4. a) Define blind speed. An MTI radar operates at 5 GHz with a PRF of 100PPS. Find the three lowest blind speeds of this Radar. Explain the importance of Staggered PRF. 8 M
- b) Explain about Delay line cancellers. 8 M

5. a) With a neat diagram explain the operation of amplitude comparison of Mono pulse tracking Radar. 8 M
- b) 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. 8 M
6. a) Derive and explain frequency Response characteristics of Matched filter. 8 M
- b) Explain Branch type duplexer in Radar receivers. 8 M