Code: EC7T5C

IV B.Tech - I Semester – Regular Examinations – October - 2017

RADAR SYSTEMS
(ELECTRONICS & COMMUNICATION ENGINEERING)

Duration: 3 hours   Max. Marks: 70

PART – A

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

$$11 \times 2 = 22$$

1.
   a) What is the working principle of radar?
   b) How do Doppler radars measure target velocity?
   c) What are the uses of radars?
   d) How radar sets can use the intra pulse modulation and pulse compression?
   e) What are the limitations of non-coherent MTI Radar systems?
   f) Why a simple CW radar does not give range information?
   g) What are the advantages of Time domain Delay-line Canceller over Conventional Frequency Domain Filter.
   h) Define noise figure and give numerical equation.
   i) Differentiate between blind speeds and blind phases.
   j) What is a delay line canceller?
   k) Define radar cross section.

PART – B

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

$$3 \times 16 = 48 \text{ M}$$

2. a) What is RADAR? Derive the radar range equation in terms of minimum detectable signal.　　　　　　　　　8 M

   b) Radar mounted on an automobile to be used to determine the distance to a vehicle travelling directly in front of it. The radar operates at a frequency of 9375MHz with a pulse width of 10ns. The maximum range to be 500ft. Find PRF? If the antenna dimensions were 1ft by 1ft and the antenna efficiency were 0.6, what would be the antenna gain (dB)?

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3. a) With the help of suitable block diagram, explain the operation of a FM-CW altimeter.　　　　　　　　　8 M

   b) Determine the range and Doppler velocity for FMCW radar if the target is approaching the radar. Given the beat frequency $f_b(\text{up})$= 15KHz and $f_b(\text{down})$= 25KHz for the triangular modulation. The modulating frequency is 1MHz and 1KHz.　　　　　　　　　8 M

4. a) Discuss the factors limiting the performance of an MTI system.　　　　　　　　　8 M

b) An MTI radar operates at 5GHz with a pulse repetition frequency (PRF) of 800pps. Calculate the lowest three blind speed of this radar. 8 M

5. a) Explain how an object can be tracked with radar using Sequential lobing? 8 M

b) Draw the block diagram of amplitude comparison monopulse radar and explain. 8 M

6. a) What are the different types of displays used in radars? Explain. 8 M

b) Derive the impulse response characteristics of a matched filter. 8 M