

Code: **EC7T3**

**IV B.Tech - I Semester – Regular Examinations - November 2015**

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

Duration: 3 hours

Max. Marks: 70

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

- 1 a) Obtain the Radar equation and discuss the various parameters which improve the performance of the Radar. 9 M
- b) Explain about applications of radar. 5 M
- 2 a) Describe how threshold level for detection is decided in the presence of receiver noise for a specified probability of occurrence of false alarms. 7 M
- b) Describe the effect of (in terms of wavelength of operation) size of a simple spherical target on determination of radar cross section of the sphere. 7 M
- 3 a) With the help of a suitable block diagram, explain the operation of a CW radar with non-zero IF in the receiver. 7 M

- b) Describe methods to achieve isolation between transmitter and receiver of a CW Doppler radar if same antenna is to be used for transmission and reception. 7 M
- 4 a) Derive an expression for Range and Doppler measurement for an FMCW Radar. 8 M
- b) Determine the range and Doppler velocity for a FM-CW radar if the target is approaching the Radar. Given the beat frequency  $f_b(\text{up})=50\text{kHz}$  and  $f_b(\text{down})=30\text{ kHz}$  for the triangular modulation, the modulating frequency is 2MHz and Doppler frequency shift is 2kHz. 6 M
- 5 a) With a neat block diagram, explain the functioning of a MTI radar with power oscillator type of Transmitter. 7 M
- b) What is a delay line canceller? Illustrate the concept of blind speeds based on the frequency response of a single delay line canceller. 7 M
- 6 a) What are the special features of a Tracking radar? Explain the principle of working of a conical scan tracking radar. 7 M

- b) Explain the principle of sequential lobing technique and list out its advantages. 7 M
- 7 a) Explain the characteristics of a cross-correlation receiver with a block diagram. 7 M
- b) Explain the principle and characteristics of a matched filter. Hence derive the expression for its frequency response function. 7 M
- 8 a) What is a duplexer? Explain the principle of working of a branch type duplexer with neat schematics. 8 M
- b) Explain and distinguish between the different types of radar displays. 6 M