

Con. 6079-09.

B.E. (EXTC) Sem VII (R)

Radar Engineering

(3 Hours)

SP-6626

31/12/09

[ Total Marks : 100

10.30 to 1.30

N.B. (1) Question No.1 is compulsory.

(2) Attempt any four questions out of remaining six questions.

1. (a) Explain frequency agility and diversity techniques. 5  
 (b) Explain the factors which govern the pulse repetition frequency. 5  
 (c) Explain remote sensing radar in brief. 5  
 (d) Explain in brief the various system losses in the radar. 5
2. (a) What do you understand by the terms duty cycle and unambiguous range of a radar ? 10  
 What is the technique employed for resolving range ambiguity ?  
 (b) With the help of a block diagram explain the working of a high PRF pulse doppler radar. Also draw the received signal spectrum in the vicinity of the RF carrier frequency  $f_0$ , for a high PRF pulse doppler radar, indicating altitude return, main beam clutter, side to be clutter, target echo, receiver noise etc. 10
3. (a) What do you mean by RCS ? Explain the RCS of following :— 10  
 (i) Sphere (ii) Rod (iii) Complex target.  
 (b) Draw the functional block diagram of MTI radar system and explain its operation. 10  
 Define the terms blind speed and MTI improvement factor.
4. (a) State the factors which influence the bandwidth of a radar receiver. Write down the advantages of large bandwidth. 10  
 (b) What is the purpose of instrument landing system ? How azimuth and elevation guidelines are provided in this system ? Explain in brief with sketches. 10
5. (a) What are the advantages of using pulse compression techniques in radar system ? 10  
 Explain the principle of phase coded pulse compression technique with proper diagrams and the advantage gained.  
 (b) Explain the role of loop antennas in radio direction finders. What is the need for a sense finder antenna system ? Enumerate various methods employed for increasing loop voltage. 10
6. (a) With a suitable block diagram explain the working of a conical scan tracking radar. 10  
 Explain the various factors that need to be considered in determining the optimum squint angle.  
 (b) What are the basic differences between a search radar and a tracking radar ? 10  
 Discuss the various scanning techniques and tracking mechanisms.
7. Write short notes on the following :—
- (a) MFCW Radar 5  
 (b) Delay Line Canceler 5  
 (c) Any two types of Display used in Radar 5  
 (d) TACAN. 5