

Xib.

BEC(EXTC) VII  
Radar Engg04/06/09  
11-2 P.M.  
VR-4812

(3 Hours)

[ Total Marks : 100 ]

- N.B. : (1) Question No. 1 is **compulsory**.  
 (2) Attempt any **four** questions out of remaining **six** questions.  
 (3) **Figures** to the right indicate **full marks**.

1. (a) Explain in brief the various system losses in the radar. 5  
 (b) Compare analog MTI system with digital MTI system. 5  
 (c) Explain doppler shift and its role in pulsed and CW RADAR. 5  
 (d) Explain frequency agility and diversity techniques. 5
2. (a) Derive the simplified version of radar range equation in terms of minimum detectable signal to noise ratio ( $S/N$ ) min. Also explain why ( $S/N$ ) min is a better measure of a radous detection performance than in minimum detectable signal ( $S_{min}$ ). 10  
 (b) What do you understand by the terms duty cycle and unambiguous range of a radar ? What is the technique employed for resolving range ambiguifier. 10
3. (a) Draw the block diagram of a pulsed RADAR and explain the significance of designing IF amplifier as a matched filter. List the properties of a matched filter for RADAR application. 10  
 (b) Explain the need for integration of RADAR pulses and define the following terms – 10
  - (i) Integration Efficiency (IE)
  - (ii) Integration Improvement Factor (IIF)
  - (iii) Integration Loss (IL).
4. (a) Describe the operation of a line type radar modulator. What are the advantages of that type of modulator ? What is its most significant drawback ? 10  
 (b) What are the basic differences between a search radar and a tracking radar ? 10 Discuss the various scanning techniques and tracking mechanisms.
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) State the factors which influence the bandwidth of radar receiver. Write down the advantages of large bandwidth. 10
6. (a) Explain how the problem of blind speed can be overcome by use of multiple PRF in HTIs radar. Explain how multiple staggered PRF's can be processed with a transversal (non recursive) filter. 10  
 (b) Explain the role of loop antennas in radio direction binders. What is the need for a sense binder antenna system. Enumerate various methods employed for increasing loop voltage. 10

7.

Write short note on the following :-

- (a) Instrument Landing System
- (b) RCS of a Complex Target
- (c) Conical Scan Tracking
- (d) MFCW Radar.

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