(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 131855 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. VIII) THEORY EXAMINATION 2013-14

INTRODUCTION TO RADAR SYSTEMS

Time : 3 Hours *Total Marks : 100*

Note :– (1) Attempt all questions.

(2) All questions carry equal marks.

1. Attempt any **four** of the following : **(5×4=20)**

(a) What are the basic functions of Radar ? In indicating the position of target, what is the difference between Azimuth and Elevation ?

(b) A typical waveform of radar is shown below in fig 1. Some parameters of radar are shown in fig. Consider t = 1 μs Calculate :

(i) Average Power

(ii) Duty Cycle

(iii) Maximum Range of Radar.

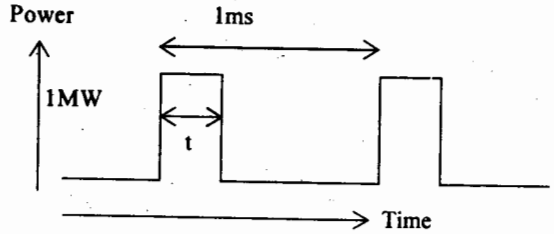

Fig 1.

(c) A Radars is operating at 10 GHz with the pack power of 500 kW, the power gain of antenna is 5000 and minimum power of the receiver is 10^{-14}. Calculate the maximum range of radar if the effective area of antenna is 10 m^2 and radar cross-section is 4 m^2.

(d) Explain the significance of Radar cross section fluctuation. Also describe pulse repetition frequency.

(e) What do you understand by Ducting ? Describe the minimum detectable signal with its expression.

(f) Explain Receiver Noise and Signal to Noise ratio in Radar systems.

2. Attempt any **two** of the following : **(10×2=20)**

(a) Compare Pulse Doppler Radar and MTI radar with block diagram. Also explain the significance of Butterfly effect on A-scope.

(b) Describe the following for MTI Radar :

(i) Blind Speed

(ii) Staggered PRF

(c) Describe the working of Delay Line Cancellers and explain the acoustic delay line.

3. Attempt any **two** of the following : **(10×2=20)**

(a) Explain the Block diagram of Amplitude Comparison in Mono pulse in one angle co-ordinate.

(b) Explain the Block diagram of Conical Scan Tracking Radar.

(c) How does radar Servo Tracking system work ? Explain sequential lobbing.

4. Attempt any **two** of the following : **(10×2=20)**

(a) Draw Constant False Alarm Rate (CFAR) Radar receiver. Explain its working.

(b) Define the term Target Recognition. Explain the block diagram of Automatic Target Detection and Recognition (ATR) system.

(c) Describe the working of Binary Integration for Non-Fluctuating target.

5. Attempt any **two** of the following : **(10×2=20)**

(a) Describe the following :

(i) Sea Clutter

(ii) Land Clutter

(b) Which is more advantageous between Digital or Analog pulse compression. Explain. How can one find the true range and True Doppler frequency shift of a target when using Linear-FM pulse compression waveforms ?