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

PAPER ID : 2896 Roll No. | | | | | | | | | | |

B.Tech.

(SEM. VIII) EVEN THEORY EXAMINATION 2012-13

INTRODUCTION TO RADAR SYSTEMS

Time : 3 Hours *Total Marks : 100*

Note :– Attempt **all** questions. All questions carry equal marks.

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

   (a) With the help of schematic block diagram, explain radar transreceiver system.

   (b) An L-band radar operating at 1.25 GHz uses a peak pulse power of 3 MW and must have a range of 100 nautical miles for objects whose radar cross-section is $1.0m^2$. If the minimum receivable power of the receiver is 2×10^{-13} Watt, what is the smallest diameter the antenna reflector could have, assuming it to be a full paraboloid with K = 0.65 ?

   (c) What is a duplexer ? Explain the operation of a radar duplexer with the help of a circuit diagram. What is the main limitation of the duplexer ? Explain.

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

   (a) Draw the block diagram and explain the operation of a CW radar using zero intermediate frequency in the receiver. How have the drawbacks of the radar been overcome ?

(b) Explain what is meant by the term blind speed in MTI radar. Under what conditions could this be an embarrassment ? What is a method of overcoming the problems of blind speed in radar ? Calculate the lowest two blind speeds of this radar, operating at 5 GHz with a pulse repetition frequency of 800 pps.

(c) Explain the use of delay line cancellers. Describe various types of delay-lines used in MTI radar. Explain with frequency response of the delay line cancellers.

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

(a) Describe with the aid of a sketch, the conical scanning method of tracking an acquired target. How is this an improvement over lobe switching ?

(b) Explain the basic difference between search radar and tracking radar. Compare different types of trackers systems.

(c) What do you understand by acquisition of target and explain the various method of antenna scanning ?

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

(a) What are the different types of detection used in radar ? Explain zero crossing detector with diagram.

(b) Discuss the need of Constant False Alarm Rate Receiver (CFAR). Explain working of the cell averaging CFAR with block diagram.

(c) Define threshold detection in radar signals. What do you mean by coherent detector ? Discuss the coherent integration of non-fluctuating target.

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

(a) What do you understand by measurements of radar parameters ? Enlist the various characteristics of the target that are to be extracted from the radar signals.

(b) Explain the following terms :

(i) Range measurement

(ii) Range accuracy

(iii) Range ambiguity

(iv) Range gate.

(c) What do you mean by radar clutter ? Explain various types of radar clutters. How they affect the performance of the radar ? Explain.