JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
B. Tech IV Year II Semester Examinations, May - 2016
RADAR SYSTEMS
(Common to ECE, ETM)

Time: 3 Hours   Max. Marks: 75

Answer any Five Questions
All Questions Carry Equal Marks
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1.a)   Draw the block diagram of the radar system and explain each block.
  b)   Explain the minimum detectable signal and receiver noise concept in basic radar system.
                                                                               [8+7]

2.a)   Explain radar cross-section of target.
  b)   Find the maximum range of radar whose transmitted power is 200 KW. Cross-sectional area of the target is 10 sq.m. The minimum power received is 1 mw. The power gain of the antenna used is 2000, and the operating frequency is 3 GHz.
  c)   Calculate the average transmitted power of radar when the peak power is 200 KW, pulse width is 2 micro seconds, and rest time is 2000 sec.   [7+4+4]

3.a)   Draw and explain the block diagram of simple pulse radar.
  b)   Explain CW radar. Write its advantages, disadvantages and applications.   [8+7]

4.a)   Explain the applications of Altimeter FMCW radar and write its advantages.
  b)   Determine the range and Doppler velocity for FMCW radar if the target is approaching the radar. Given the beat frequency f_b (up) =15 KHz and f_b (down) =25 KHz for the triangular modulation, the modulating frequency is 1 MHz and Δf is 1 KHz   [9+6]

5.a)   With necessary block diagram explain the principle and operation of pulse Doppler radar.
  b)   Explain delay line cancellers and discuss the limitations of single delay line cancellers.   [8+7]

6.a)   Explain the block diagram of Monopulse tracking radar.
  b)   What are the various methods of Acquisition before tracking a target with radars? Explain in detail.   [8+7]

7.a)   What is meant by correlation? Explain cross-correlation with the help of neat diagram.
  b)   Briefly explain about the efficiency of non-matched filters.   [8+7]

8.a)   Define and distinguish the following terms:
         i) Noise figure   ii) Noise temperature   iii) System noise temperature and receivers.
  b)   Explain the radiation pattern of phased array antenna with suitable equations.   [8+7]