

99-460

1996

IEEE Carleton

CARLETON UNIVERSITY
RADAR
FINAL EXAM QUESTIONS

- 14/20 1.a) A 60cm wavelength radar has a peak transmitter power of 2MW, a pulse width of 2.5u.sec and a pulse repetition frequency of 400Hz. The antenna rotates at 5 rpm, has a gain of 34 dB and a horizontal beam width of 1.2 deg. Assume that the receiver noise figure is 2.5 dB and system losses total of 5 dB. For a target of average cross section of 1 sq. m and a Swerling case 1 fluctuation characteristics, estimate the maximum range for a detection probability of 0.8 and a false alarm probability of 10^{-6} . *418 km*
- 6/20 b) What threshold setting expressed in volts at the input terminal of the receiver would be required for the performance specified? Assume that the input impedance of the receiver is 50 ohms. *1.94 μ v*
2. A MTI radar employs a 1.3 Ghz, 600W average power transmitter which produces 2 u sec. pulses at 800 Hz PRF. The radar utilizes a 1.5 deg antenna azimuth beamwidth with a rotation rate of 12 rpm. MTI operation is achieved with a triple delay canceller.
- 8/20 a. What is the maximum improvement factor achievable due to rain clutter? *53.73 dB*
- 8/20 b. What is the maximum improvement factor achievable due to antenna scanning modulation? *61.21 dB*
- 4/20 c. Is the radar's improvement factor scan modulation limited or rain clutter limited? *rain clutter.*