

2nd Semester

RADAR SYSTEM ENGINEERING

Module – I

(10 hours)

The radar equation in terms of the key radar parameters and target-radar cross section. False alarm, minimum detectable signal, Receiver noise and the SNR. Probabilities of detection and False alarm, integration of radar pulses, radar cross section of targets; complex targets, transmitted power, prf, antenna parameters, beam shape, cosecant-squared antenna pattern.

Module – II

(8hours)

Basic ideas on system losses MTI and pulse doppler radar, delay line canceller, doppler effect on blind speeds in MTI, staggered prf. doppler filter banks, digital MTI processing, Limitations to MTI performance MTI from a moving platform (AMTI), pulse doppler radar, FM-CW radar for range and velocity determination, SLAR & SAR.

Tracking with radar, monopulse tracking, amplitude comparison monopulse, phase comparison monopulse, conical scan and sequential lobing, Glint (example from a simple target model) tracking in range.

Module – III

(10 hours)

Target acquisition, servo system tracking in doppler, track with scan (limited sector scan), Automatic tracking with surveillance Radars. Functions of the radar antenna, antenna radiation pattern, effective aperture and aperture illumination, side lobe radiation, reflector antennas, grain antenna, Electronically steered phased-array antennas, Beam steering and array-feed networks, change of beam width with steering angle, phase shifters, diode phase shifters, ferrite phase shifters

Module – IV

(8 hours)

Frequency-scan arrays, bandwidth limitation, transmission lines for frequency scan. Radiators and architectures for phased arrays, effect of errors on radiation patterns, errors in arrays, adaptive antennas array. General ideas on radar transmitters (RF power sources) and super heterodyne radar receiver, radar displays, scan converter, duplexer and receiver protectors.

Text book:

1. Introduction to Radar system (3rd Edition); Merrill L. Skolnik Tata McGraw Hill publishing Ltd.

2nd Semester

Reference books

1. Ridenour, L. N. Radar System Engineering, MIT radiation laboratory series, Vol. I & II, New York: Mc Graw Hill 1047.
2. Krous, J. D. Antennas, 2nd Edition. Mc Graw Hill, 1988
3. Nathanson, F. E. Radar Design Principle, 2nd Edition, Mc Graw Hill, 1991 (N.Y.)
4. Barton, D. K. Modern Radar System Analysis, Norwood, MA: Ar.Tech House, 1988
5. Hansen, R. C. Phased Array Antennas N.Y. John Willey, 1998 (Chap. 5)

TENTATIVE
Likely to be Modified