Radar Engineering
EC704A
Contacts: 3L
Credits: 3

Module –I: Introduction to Radar   [6L]
Historical background, radar terminology, radar band designations, Radar block diagram, radar equation: detection of signals in noise and signal-to-noise ratio, Probabilities of detection & False alarm, integration of radar pulses, radar cross section, distributed targets, Transmitted power, pulse-repetition frequency, antenna parameters & system losses, introduction to radar clutter.

Module – II: Radar Types   [8L]
Pulse radars and CW radars,Advantages of coherent radar, Doppler radar and MTI: Doppler effect, delay-line cancellers, blind speeds, staggered PRFs, Digital filter bank, Moving Target Detector, limitations of MTI, tracking with radar, monopulse tracking, conical scan, limitation to tracking accuracy,

Module –III: Radar signals & clutter   [10L]
Basic radar measurement, theoretical accuracy of radar measurements, Range and velocity ambiguities, the ambiguity diagram, pulse compression-principles, the matched filter, chirp waveforms, Waveform design: nonlinear FM, phase codes, waveform generation and compression
Descriptions of land & sea clutter, statistical models for surface clutter, detection of targets in clutter.

Module –IV: Devices and Radar Systems   [8L
Radar transmitter: Solid-state RF power source, Magnetron, other RF power sources, Radar receiver: Super heterodyne receiver, receiver noise figure, duplexers & diplexers, Receiver protectors, Applications: Electronic Warfare: ESM, ECM, ECCM; super resolution, IFM, types of jammers, Stealth and counter-stealth: stealth techniques for aircraft and other target types, low frequency and UWB radar ,System design examples

Text Books :
1. Introduction to Radar Systems-3/E , M. I. Skolnik, Tata McGrawhill
2. Principles of Modern radar system , M. H. Carpentier, Artech House

Reference Books:
1. Fundamentals of radar signal processing, M. I. Richards, McGraw-Hill
2. Handbook of radar measurement , Barton, David & Ward, H. R, Artech House
3. Radar Technology , Brookner, Eli, Artech House
4. Radar Handbook , ed. M. I. Skolnik, Mc-Graw Hill, 1990
5. Skolnik, M. I, "Fifty years of Radar", Proc. IEEE, vol. 73 (Feb. 1985), pp. 182-197