

Radar Principles and Applications (RP 4.2.2)

Radar Introduction and Overview:

Introduction to radar; Types of radar; Information available from a radar ; Effects of operating frequency on radar; Applications of radar. (2)

Radar Transmitter:

Types of radar transmitters; Gyrotrons; Modulators; Choice of RF power source; Solid state transmitters. (2)

Radar Receivers:

Radar receiver configurations; Bandwidth considerations; Receiver front end; Digital receivers. (2)

Radar Detection and Tracking:

Automatic detection; Practical detectors; Optimal detectors; Automatic tracking; Range and velocity tracking; False alarm. (2)

Effects of Propagation Factors:

Atmospheric attenuation and refraction of radar waves; Attenuation, back scatter and Doppler effects in rain, clouds and snow; Propagation modeling. (2)

Radar Cross Section (RCS):

RCS of complex targets; Control of RCS; RCS reduction; Body shaping; Radar absorbing materials; Enhancement of RCS by multiple scatterers; RCS prediction techniques; RCS measurement techniques; Radar echo suppression. (3)

Radar Antennas:

Radar reflector antennas; Reflector feed design considerations; Phased Array antennas; Beam formers; Beam steering; Mutual coupling; Phase shifters (3)

Types of Radar:

MTI radar; Adaptive MTI radar; Air-borne MTI radar; Pulse Doppler radar; Synthetic Aperture radar; Space based remote Sensing radar; Meteorological radar; HF over the Horizon radar; Ground Penetrating radar; Through the wall radar; Noise radar; Civil marine radar; Bistatic radar (8)

Clutter:

Clutter characteristics; Ground echo; Clutter suppression; Clutter at HF and mmwave frequency; environmental clutter; clutter models. (2)

Radar Measurements:

Radar reflectivity measurement techniques; Monostatic and Bistatic measurements techniques; Radar measurement accuracy. (2)

Radar Signal Processing:

Special techniques for signal processing; Choice of waveforms in different environmental conditions; optimum waveform for detection in clutter; Receiver channel processing; Transmitter channel processing.

(2)