**Syllabus**

# Customized Course (online) on

**Concept of Basic Radar Concept for CAAB personnel**

## CHAPTER 1: Introduction to RADAR

* Introduction to RADAR
* Radar Frequencies
* Frequency Selection criterion
* Normal radar functions

## CHAPTER 2: CLASSIFICATION OF RADARS

* Classification of Radars
* Applications of Radar in Civil Aviation
* Radars Used for Air Traffic Control Services
* General Applications of Radar other than aviation
* Limitations of a Radar

## CHAPTER 3: GENERAL TERMS USED IN RADAR

* Radar Clutter
* Sea Clutter
* Noise
* Noise Factor (F)
* Noise Figure (NF)
* Radar Range calculation
* Radar Cross Section (RCS)
* Pulse characteristics
* Radar Mile
* Maximum Unambiguous Range
* Range resolution
* Azimuth resolution
* Radar Accuracy
* Rate of scan

## CHAPTER 4: BASIC PULSE RADAR SYSTEM CHAPTER 5: RADAR ANTENNA

* + Function of Antenna
	+ Antenna beam
	+ Omnidirectional Antenna
	+ Directivity of an antenna
	+ Antenna Gain
	+ Antenna Pattern
	+ Beam Width
	+ Cone of silence
	+ Types of Antennas
	+ Antenna with Cosecant Squared Radiation Pattern
	+ Polarization
	+ Antenna drive system
	+ Azimuth encoding
	+ Beam Switch

## CHAPTER 6: RADAR RANGE EQUATION CHAPTER 7: RADAR TRANSMITTER

* + - Basic characteristics of a transmitter
		- General block diagram of a radar
		- RADAR Transmitter Types
		- Choices of microwave amplifying devices
		- Frequency diversity and Frequency agility

## CHAPTER 8: RECEIVER PROTECTORS & MICROWAVE DEVICES

* + - Receiver Protectors
			* Duplexer
			* Diplexer
			* RF Limiters
			* T/R Tube
			* Pre-TR Tube
			* Sensitivity Time Control (STC)
* Why Wave guides are used in PSR but not in MSSR
* Directional Couplers

## CHAPTER 9: RADAR RECEIVER

* General Description
	+ Minimum Detectable Signal (MDS)
	+ Low Noise Amplifier (LNA)
	+ RF Amplifier
	+ Automatic Gain Control (AGC)
	+ Mixer
	+ Intermediate Frequency (IF)
	+ IF Amplifier
	+ Instantaneous Automatic Gain Control (IAGC)
	+ Logarithmic Amplifier
* Dynamic Range of an Rx
* Pulse Compression
	+ Need of Pulse Compression
	+ Pulse Compressor
	+ Advantages & Disadvantages of Pulse Compression
	+ Methods of Pulse Compression
	+ Modulations involved in Pulse compression
* Matched Filter
	+ Properties of a Matched Filter
	+ Application of Matched Filter in Radar

## CHAPTER 10: RADAR SIGNAL PROCESSING

* INTRODUCTION TO DOPPLER AND MTI RADAR
	+ General
	+ MTI Radar and Pulse Doppler Radar
	+ Doppler Frequency Shift
	+ Simple CW Doppler Radar
	+ MTI Radar Block Diagram Description
	+ Pulse Radar that Extracts the Doppler Frequency-Shifted
	+ Echo Signal
	+ Sweep-to-Sweep Subtraction and the Delay-Line Canceler
* DELAY-LINE CANCELERS
	+ Frequency Response of the Single Delay-Line Canceller
	+ Blind Speeds
	+ Block Diagram
	+ Blind Phases, I and Q Channels
* Block Diagram of an Adaptive MTD Processer
* Threshold
* Probability of Detection (PD)
* False targets
* False Alarm
	+ Constant False Alarm Rate (CFAR)
	+ Cell Averaging CFAR or CA CFAR
	+ Clutter Map
	+ Difference between CW Radar and MTI Radar
	+ Difference between MTI and MTD Radars

## CHAPTER-11: TARGET PROCESSING-Plots and Tracks

* + - Track Initiation
		- Track Smoothing
		- Plot Combiner

## Annexure

**RADAR GLOSSARY REFERENCES**