**13EC4102-RADAR ENGINEERING**

**(ECE)**

**Lectures/Week:4Hrs. Sessional Marks:40**

**Univ. Exam. Duration:3Hrs Univ Exam.Marks:60**

**UNIT-I**

**The Nature of Radar**: The simple form of the Radar equation, Radar block diagram and operation, Radar frequencies and Applications of Radar.

Minimum Detectable signal, Receiver noise, Probability Density Functions, Signal to Noise Ratio, Integration of Radar pulses, Radar Cross Section of Targets, Cross section fluctuations, Pulse Repetition Frequency and Range Ambiguities.

**UNIT-II**

**Radar Components**: Klystron Power Amplifier, Travelling Wave Tube, Magnetron Oscillator, Cross Field Amplifier, Modulators, Mixers: Conversion Loss, Noise Figure, Balanced mixer, Image recovery mixer, Duplexers: Branch type, Balanced type and Solid State Duplexers, limiters, Displays: CRT Display, A,B,C,D Scopes, PPI and RHI.

**UNIT-III**

**Radar Antennas:** Antenna Parameters, Radiation Pattern and Aperture distribution. Parabolic Reflector Antenna, Phased arrays, Beam steering, Advantages and Limitations of Phased arrays, Phased array Architectures, Constrained Feed, Space Feed, Passive and Active Aperture Arrays, Digital Beam Forming.

**UNIT-IV**

**Radar Systems**: Doppler Effect, Simple CW Radar, FM-CW Radar, MTI Radar: Delay line Cancellers, Blind speeds, Range Gated Doppler Filters, Limitations and types of MTI radars. Tracking Radar: Sequential Lobing, Conical Scanning and Monopulse Tracking, Tracking in Range.

**UNIT-V**

**Radar Clutter:** Introduction to Radar Clutter, Surface Clutter and Radar equation, Sea Clutter, Land Clutter, Detection of Targets in Sea and Land Clutter and Angel Echoes.

**TEXT BOOKS:**

1. Introduction to Radar Systems-Merrill. I. Skolnik, TMH, 2ndEdition,2007.
2. Radar:Principles,Technology and Applications-Byron Edde, Pearson Education, 2004.

**REFERENCE BOOKS:**

1. Introduction to Radar Systems-Merrill. I. Skolnik, TMH,3 rdEdition, 2001.
2. Microwave and Radar Engineering- M.Kulakarni, Umesh Publications, 4th Edition, 2012.