PET6D001 SOFTWARE DEFINED RADIO ARCHITECTURE SYSTEM AND FUNCTION

MODULE-1(10 HRS)
Introduction to SDR: The Need for Software Radios. What Is a Software Radio? Characteristics and Benefits of a Software Radio. Design Principles of a Software Radio.
Radio frequency implementation issues: The Purpose of the RF Front-End. Dynamic Range: The Principal Challenge of Receiver Design. RF Receiver Front-End Topologies. Enhanced Flexibility of the RF Chain with Software Radios. Importance of the Components to Overall Performance. Transmitter Architectures and Their Issues. Noise and Distortion in the RF Chain. ADC and DAC Distortion.

MODULE-2(10 HRS)
Multirate signal processing: Introduction. Sample Rate Conversion Principles. Polyshase Filters. Digital Filter Banks. Timing Recovery in Digital Receivers Using Multirate Digital Filters.
Digital generation of signals: Introduction. Comparison of Direct Digital Synthesis with Analog Signal Synthesis. Approaches to Direct Digital Synthesis. Analysis of Spurious Signals. Spurious Components due to Periodic Jitter. Band pass Signal Generation. Performance of Direct Digital Synthesis Systems. Hybrid DDS-PLL Systems. Applications of direct Digital Synthesis. Generation of Random Sequences. ROM Compression Techniques.

MODULE-3 (10HRS)
Analog to digital and digital to analog conversion: Parameters of ideal data converters; Parameters of practical data converters; Techniques to improve data converter performance; Common ADC and DAC architectures
Smart antennas: Vector channel modeling; Benefits of smart antennas; Structures for Beamforming Systems; Smart Antenna Algorithms. Diversity and Space-Time Adaptive Signal Processing; Algorithms for Transmit STAP; Hardware Implementation of Smart Antennas; Array Calibration.

MODULE-4 (6 HRS)
Digital hardware choices: Introduction; Key Hardware Elements; DSP Processors; Field Programmable Gate Arrays; Trade-Offs in Using DSPs, FPGAs, and ASICs; Power Management Issues; Using a Combination of DSPs, FPGAs, and ASICs.

ADDITONAL MODULE (TERMINAL EXAMINATION-INTERNAL) (04 HOURS)
Object-oriented representation of radios and network resources: Networks; Object-Oriented Programming; Object Brokers; Mobile Application Environments; Joint Tactical Radio System

TEXT BOOKS
1. Software Radio: A Modern Approach to Radio Engineering, Jeffrey H. Reed, Prentice Hall PTR; May 2002, ISBN: 0130811580

REFERENCE BOOKS
1. Software Radio Architecture: Object-Oriented Approaches to Wireless Systems Engineering by Joseph Mitola Wiley-Interscience; 1st edition 2000
2. Software Defined Radio: Architectures, Systems and Functions: M. Dillinger, K. Madani, N. Alonistioti, John Wiley & Sons, 05-Aug-2005