Introduction to Radio Frequency and Communications

Course Syllabus Overview

Duration – 4 days

01. Concepts

- Maths
- Electromagnetic (EM) waves and propagation
- Standards
- Tuned circuits
- Filters

02. Communications

- Human Communication
- Communication Systems
- Transmitter
- Communications Channel
- Receiver
- Transceiver
- Noise
- Types of Communication
- Baseband and Broadband Transmission
- Modulation
- Bandwidth
- Multiplexing
- Frequency Division Multiplexing
- Time Division Multiplexing
- Code Division Multiplexing
- Free space link equation

03. Amplitude Modulation

- Principles
- Modulation Index
- Percentage Modulation
- Sidebands
- AM Power
- Applications of AM Modulation
- Single Sideband Modulation

04. Frequency Modulation

- Frequency Modulation
- Phase Modulation

TRAINING SYLLABUS

05. Digital Techniques

- Digital transmission of data
- Benefits of digital communications
- Disadvantage of digital communications
- Parallel and serial transmission
- Parallel transmission
- Serial transmission
- Data conversion principles
- Analogue to digital conversion
- Undersampling / aliasing
- Oversampling
- Sigma-Delta converter
- Transmitting digitised data: pulse modulation
- Pulse-Code Modulation
- Companding
- CODECs and Vocoders
- Digital Signal Processing
- DSP Processors

06. Transmitters

- Transmitter Fundamentals
- Transmitter Configurations

07. Radio Systems

- Carrier Generators
- Power Amplifiers
- Noise
- Standing Waves and Reflection
- Antennas

08. Receivers

- Receiver
- Selectivity
- Sensitivity
- Bit Error Rate
- Simplest Receiver Configuration
- Superheterodyne Receiver
- Purpose of Intermediate Frequency
- Direct Conversion Receivers
- Software Defined Radio
- Transceiver

09. Multiplexing

- Multiplexing
- Duplexing

10. Digital Data Transmissions

- Digital codes
- Principles
- Transmission efficiency
- Modem concepts and methods
- Wideband modulation
- Error detection and correction
- Protocols

11. Microwave Communications

- Fundamentals
- µwave Communications Systems
- µwave Devices
- Intelligent Antennas

12. Satellite Communications

- Satellite orbits
- Sub-systems
- Ground stations
- Repeater
- Transponder
- Frequency allocation
- Spectrum usage
- Typical satellite sub-systems
- Communications sub-system
- Very Small Aperture Terminal (VSAT)
- RF AND COMMUNICATIONS

13. Cell Phones

- Concept
- Call process
- Frequencies
- Communication channel access
- Road to LTE
- Frequency
- Bandwidth
- Modulation
- OFDM
- LTE Advanced
- Voice over LTE
- Base Station Small Cell
- Distributed Antenna System
- Heterogeneous Network (Hetnet)

14. Wireless Technologies

- PANs and Bluetooth
- ZigBee and mesh
- WiMAX and Wireless Metropolitan Networks
- RF Identification and Near-Field Communications
- RF AND COMMUNICATIONS