Radio Frequency and Communications

Course Syllabus Overview

Duration – 10 days (Estimate)

01. Concepts

- Waves
- Electromagnetic Waves
- Dipole Radiation
- Gain
- Free Space Propagation
- Harmonic Dipoles
- Link Equation
- Communications Systems
- Complex Propagation

02. Electromagnetic Waves

- Plane Waves
- Anisotropic Media
- Boundary Conditions
- Transmission through an Interface
- Oblique Incidence

03. Propagation Modifiers

- Multipath Interference
- Hills and Mountains
- Diffraction
- Ground Bounce
- Urban Propagation
- The Horizon
- Cross Polarisation
- Trees and other Vegetation
- Heavy Rain, Snow, or Fog

04. Ionospheric Duct

- Oblique Propagation
- Propagation Losses
- Fading
- Noise

05. Propagation in the Lower Atmosphere

- Tropospheric Ducts
- Topography
- Surface Waves
- Water

TRAINING SYLLABUS

06. Propagation through the Ionosphere

- Benign Ionosphere
- Faraday Rotation
- Doppler Shift
- Scintillation

07. Communications

- Types of Communication
- Modulation and Multiplexing
- Electromagnetic Spectrum
- Bandwidth

08. Fundamentals

- Gain
- Attenuation
- Decibels

09. Amplitude Modulation

- Principles
- Sidebands
- Power
- Single-Sideband

10. Frequency Modulation

- Principles
- Sidebands
- Noise Suppression

11. Digital Techniques

- Principles
- Parallel and Serial Transmission
- Data Conversion
- Pulse Modulation
- Signal Processing

12. Radio Systems

- Transmission Lines to Antenna
- Matched Load Power Transfer
- Standing Wave Ratio
- Reflection Coefficient
- Transmission Line Types
- Transmission Line Characteristics

13. Transmitters

- Fundamentals

- Carrier Generators
- Power Amplifiers
- Impedance Matching

14. Receivers

- Principles
- Superheterodyne Receivers
- Frequency Conversion
- Intermediate Frequency
- Noise

15. Antennas and Wave Propagation

- Fundamentals
- Antenna Types
- Propagation

16. Microwave Communications

- Fundamentals
- Lines and Devices
- Waveguides and Cavity Resonators
- Microwave Semiconductor Diodes
- Microwave Tubes
- Antennas

17. Satellite Communications

- Fundamentals
- Subsystems
- Ground Stations
- Navigation Systems
- Wavelength Division Multiplexing
- Passive Optical Networks

18. Cell Phones

- Fundamentals
- 2G and 3G
- Lite and 4G
- Base Stations and Small Cells

19. Wireless Technologies

- Fundamentals
- PANs and Bluetooth
- ZigBee and Mesh
- WiMAX and Wireless Metropolitan Networks
- Infrared Wireless

- RF Identification and Near-Field Communications
- Ultrawideband Wireless

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