EOPE3008 ANTENNA ANALYSIS AND SYNTHESIS (3-0-0)

Course Objectives:

1. To understand the antenna radiation mechanism, fundamental parameters and their measurement techniques.
2. To analyze and synthesis various conventional wire, aperture and planar antennas.
3. To design Micro strip for different modes.
4. To gain knowledge of active integrated antennas.

Module-I:Antenna Fundamentals [8 hours]

Vector potential antenna theorems and parameters. Dipole, Monopole, Loop, Helical, Log-periodic, frequency independent antennas, slot and horns antennas.

Module-II:Micro strip Antennas [8 hours]

Basic characteristics of micro strip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas, internal electric and magnetic field patterns for different modes, predicting its resonant frequency, far-field radiation patterns.

Module-III:Antenna Arrays and Smart Antennas [7 hours]

Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays. Concept of smart antennas, Fixed weight beamforming Adaptive beamforming. Active integrated antennas

Module-IV:Application of Fourier transforms to antenna theory [3 hours]

GTD/UTD techniques and its applications antennas.

Module V:Antenna Measurements [4 hours]

Test ranges, near field and far field techniques, plotting field patterns, measurement of gain, radiation efficiency, bandwidth.

Course Outcomes:

By the end of this course, students will be able to:

CO1 Understand the radiation mechanism and fundamental parameters of antenna.
CO2 Analyse wire antennas: dipole, monopole, loop, broadband and aperture antennas.
CO3 Design and synthesis Microstrip antenna array.
CO4 Apply antenna array concepts to synthesize linear and planar arrays with specified performance.
CO5 Learn antenna measurement methods and Apply Fourier transforms to antennas applications.

Text Books:

1. C. A. Balanis, Antenna Theory : Analysis and Design, John Wiley & Sons, 2004
2. J. D. Kraus, Antennas, McGraw Hill

References:

1. R. E. Collin, Antennas and Radio Wave Propagation, McGraw- Hill, 1985
2. F. B. Gross, Smart Antennas for Wireless Communications, McGraw-Hill, 2005.