2nd Semester

ANTENNA DESIGN & MEASUREMENT

MODULE-I

Antenna parameters and array fundamental: Radiation Patterns, Directivity and Gain, Antenna Impedance, Radiation Efficiency. Antenna Polarization

Arrays: Array factor for linear arrays, uniformly excited, equally spaced Linear arrays, pattern multiplication, directivity of linear arrays, non- uniformly excited -equally spaced linear arrays, Mutual coupling, multidimensional arrays, phased arrays, feeding techniques, perspective on arrays.

MODULE-II

Antenna Synthesis: Formulation of the synthesis problem, synthesis principles, line sources shaped beam synthesis, linear array shaped beam synthesis — Fourier Series, Woodward — Lawson sampling method, comparison of shaped beam synthesis methods, low side lobe narrow main beam synthesis methods Dolph Chebyshev linear array, Taylor line source method.

MODULE-III

Method of Moments : Introduction to method of Moments, Pocklington's integral equation, integral equations and Kirchoff's Networking Equations, Source Modeling Weighted residuals formulations and computational consideration, calculation of antenna and scatter characteristics. CEM for Antennas: Finite Difference Time Domain Method Geometrical Optics Wedge diffraction theory, ray fixed coordinate system, uniform theory of wedge diffraction, E - Plane analysis of Horn antennas. Cylindrical parabolic antenna, radiation by a slot on a finite ground plane, radiation by a monopole on a finite ground plane, equivalent current concepts, multiple diffraction formulation, by curved surfaces, physical optics, method of stationary phase, Physical theory of diffraction, cylindrical parabolic reflector antennas.

MODULE-IV

Measurements of Antenna and design considerations:

Design consideration of different types of antennas: Aperture Antenna: Techniques for evaluating Gain, Reflector Antenna: - Parabolic reflector antenna principles, Axial-symmetric parabolic reflector antenna, offset parabolic reflectors, dual reflector antennas, Gain calculations for reflector antennas, feed antennas for reflectors, field representations, matching the feed to the reflector, general feed model, feed antennas used in practice, Microwave and optical Metamaterials, Nano antenna, Optical rectenna Antenna, Fractal Antenna, Smart Antenna, Antenna for Space and Medical Applications

2nd Semester

Text Books:

1. Antenna Theory: Analysis and Design, 3rd Edition by Constantine A. Balanis (Author)

2. Antenna Theory by J. D Kraus, TMH Publication.

3. Antenna Theory and Design 2nd Editionby Warren L. Stutzman (Author), Gary A. Thiele (Author)

4. Antennas 3rd Edition by John D. Kraus (Author), Ronald J. Marhefka (Author)

Recommended Books:

1. .Practical Antenna Handbook 4th Edition by Joseph Carr (Author)

2. Cai, Wenshan, Shalaev, Vladimir, Optical Metamaterials, Fundamentals and Applications (Springer series)