

ECMC2T6B: SELECTED TOPICS IN ANTENNAS

Unit-I: Frequency Independent Antennas

General traveling waves review- slow wave, fast wave structures. Long wire antennas, beverage antenna, V- antenna, rhombic antenna. Yagi –Uda antennas- multiple feed and resonant loop Yagi-Uda antennas. Corrugated rod antenna, dielectric rod antenna.

Unit-II: Conical Antennas

Introduction, biconical antenna- radiated fields, input impedance, infinite biconical antenna, finite biconical antenna. Triangular sheet- bow tie and wire simulation. Cylindrical dipole. - band width, input impedance: resonance and ground plane simulation: radiation patterns: equivalent radii: dielectric coating. Discone, sleeve monopole & sleeve dipole.

Unit-III: Spiral Antennas

Introduction, equiangular spiral antennas-Archimedean spiral antenna planar spiral, conical spiral antenna.

Unit- IV: Log-Periodic Antennas

Historical introduction, principle of scaling and application to log periodic design. Log- periodic dipole antenna, feeding methods, phase center, elevation angle. Arrays of log-periodic dipole antennas, V- log- periodic array. Other log-periodic types.

Unit-V: Dielectric Resonant Antennas

Introduction, excitation methods applied to the DRA, analyses of the DRA- cylindrical DRA, hemispherical DRA, rectangular DRA, broad band DRAs, DRA arrays.

Unit-VI: Slot Antennas

Introduction, applications, types, feeding mechanisms, broad side array of slots, patterns of slot antennas in flat sheets, edge diffraction. Babinet's principle and complementary antennas. The impedance of complementary screens. Impedance of slot antennas, slotted cylinder antennas.

Unit-VII: Frequency – Selective Surfaces and Periodic Structures

Introduction, definition of FSS, the half wave dielectric radome, slotted metal radome, the simple hybrid radome, the ideal stealth radome, transmission and reflection properties of simple periodic surfaces of wires.

Unit-VIII: Complementary surfaces and babinet's principles. Oblique angle of incidence, on the shape and development of elements. Controlling bandwidth with angle of incidence and polarization, other applications.

Text Books:

1. Antennas for all Applications, 3rd Ed. – John D Kraus, Ronald J Marhefka, Ahmad. S Khan, McGraw- Hill, 2006.
2. Antenna Theory, 3rd Ed- Constantine A. Balanis, John Wiley & Sons. 2005.
3. Antenna Theory and Design, 2nd Ed. – Warren L. Stutzman, Gary A.Thiele, John Wiley, 1998.
4. Dielectric Resonator Antennas-Kwai-Man Luk, Kwok-Wa Leung; Research Studies Press-England, 2003.
5. Antenna Engineering Hand Book 3rd Ed.- Richard C.Johnson, McGraw-Hill, 1993.

Reference Books:

1. Antenna Theory and Design, Revised edition- Robert S. Elliott, Wiley India,2005.