

Year & Sem: E1S2	Course Code: EC4601	Course Name: Antenna Engineering	No. of Credits: 4	L 2	T&PS 2	P 0
Unit I: Fundamental concepts of Antennas Introduction, Role of an Antenna in communication, Historical Advancement, Types of Antennas Physical concept of Radiation, Radiation Pattern, Near and Far-field regions, Radiation Power density, Radiation intensity, Beam Width, Directivity, Antenna Efficiency, Gain of an Antenna, Beam efficiency, Band width, Polarization, Input Impedance, Antenna Radiation Efficiency, Maximum Directivity and Maximum Effective area, Friis Transmission Equation and Radar Range Equation. Background and brightness temperature, Antenna Noise temperature, G/T ratio, system temperature and signal to noise ratio Radiation Integrals and Auxiliary Potential Functions. Unit II: Linear Wire and Loop Antennas Infinitesimal Dipole, Small Dipole, Finite Length Dipole, Half wave length Dipole, Linear Elements Near or on Infinite Perfect Conductors, Small Circular loop and loop antenna. Unit III: Array Antennas Introduction to array, Two-Elemental Array, Array Factor, N-Element Linear Array: Uniform Amplitude and Spacing, N-Element Linear Array: Directivity, Design Procedure, Broad Side and End-Fire Array, Planar Array. Unit IV: Broad Band Antennas and Horn Antennas Concept of Broad Band, Log-Periodic Antennas, Frequency Independent Antennas, E-plane Sectoral Horn, H-plane Sectoral Horn, Pyramidal Horn, and their properties. Unit V: Microstrip and Reflector Antennas Basic Characteristics of Microstrip Antenna, Different types Feeding methods, Design of Rectangular Patch and Circular Patch Antennas. Introduction to Reflector, Plane Reflector, Corner Reflector, Parabolic Reflector, Spherical Reflector. Unit VI: Radio wave Propagation Antenna located over flat earth, spherical earth coverage diagrams, field diffraction zones and losses, surface wave propagation, ionospheric propagation, microwave and millimeter wave propagation, scattering by rain, tropospheric scatter propagation, propagation into sea water, atmosphere ducts and non-standard refractions References/Text Books: 1. C.A Balanis, "Antenna Theory and Design", 3rd Ed, John Wiley & Sons, 2015. 2. R.E.Collin, Antenna and Radiowave Propagation, McGraw-Hill, New York, 1985. 3. John D. Kraus "Antennas" McGraw-Hill series, 2nd edition, 1988 4. W L Stutzman, and G.A Thiele, "Antenna Theory and Design", 2nd Ed., John Wiley & Sons, 1998. 1. R.S. Elliot, "Antenna Theory and Design", Revised edition, Wiley IEEE-Press, 2003. 2. E. Jordan and K. Balmain, "Electromagnetic Waves and Radiating Systems", Prentice-hall, New York, 1968. 3. R Garg, "Design of Microstrip Antenna", McGraw-Hill, New York, 1991 Lecture Plan: Unit-I & -II syllabus for MID-I, Unit-III & -IV syllabus for MID-II and Unit-V & -VI syllabus for MID-III examinations. Video Lectures (Web Links): 1. http://nptel.ac.in/courses/117101056/						