



MANIPAL UNIVERSITY JAIPUR

School of Electrical, Electronics & Communication Engineering (SEEC)

Department of Electronics & Communication Engineering
Course Hand-out

Antennas | EC1504 | 4 Credits | 3 | 0 | 4

Session: Jan 14 – May 14 | Faculty: Prof. V. N. Tiwari | Class: Core Course

A. Course Outcomes: At the end of the course, students will be able to

[1504.1] Explain radiation phenomena and need of antenna theory for wireless applications to promote sustainable development in RF field.

[1504.2] Analyse radiation characteristics and designing techniques of different antenna structures and hence develop employability skills.

[1504.3] Understand the propagation of electromagnetic waves in different propagation modes.

[1504.4] Recognize the effect involved in free space propagation.

B. SYLLABUS

Introduction: Types of Antennas, Radiation Mechanism, current distribution; **Vector potentials:** Electric and magnetic vector potentials, solutions for wave equations, far-field radiation, Duality theorem, Reciprocity theorem; **Linear wire Antennas:** Infinitesimal, small and finite dipole Antennas, Region separation, Half wave length dipole, Image theory, vertical and horizontal antenna on perfect conductor, effect of earth curvature; **Loop Antennas:** Small circular loop Antenna, circular loop with constant current, Ferrite loop; **Arrays and other types of antennas:** Two element array, N-element array – uniform, broadside, ordinary end-fire, Non-uniform Amplitude Arrays, planar and circular arrays, Qualitative study of Folded dipole, long wire, V, Rhombic, Helical, Yagi-Uda, log-periodic, Aperture, and horn Antennas, Babinet's principle, Huygens's principle; **Micro Strip Antenna:** Rectangular and Circular Patch, Quality Factor, Bandwidth, Efficiency; **Propagation of EM waves:** Ground wave Propagation, Space Wave Propagation, Troposphere and ionosphere propagation and its effect on Radio Waves.

C. TEXT BOOKS

1. C. A. Balanis, "Antenna Theory" 3e, John Wiley & Sons, New Delhi, 2010
2. K. D. Prasad "Antenna and Wave Propagation", 3E, Satya Prakashan, New Delhi, 2009

D. REFERENCE BOOKS

1. J. Kraus "Antenna and wave Propagation", 4e, Tata McGraw – Hill, New Delhi, 2010
2. F. E. Termen "Radio Engineering" Tata McGraw – Hill, New Delhi, 1995

