

**CU5191 ADVANCED RADIATION SYSTEMS**

DETAILED SYLLABUS

**OBJECTIVES:**

- To understand antenna radiation and its parameters.
- To enhance the student knowledge in the area of various antenna design.
- To design mono pole, dipole and patch antenna and to impart the knowledge about modern antennas.

**UNIT I ANTENNA FUNDAMENTALS**

Wave equations, radiation pattern, HPBW, FNBW, gain and directivity, polarization, equivalent circuit, radiation resistance, Radiation integrals, Radiation from surface and line current distributions – dipole, monopole, loop antenna, Antenna parameters, Image theory; Induction, reciprocity theorem, Balance to unbalance transformer, Introduction to numerical techniques.

**UNIT II RADIATION FROM APERTURES**

Field equivalence principle, Radiation from Rectangular and Circular apertures, Uniform aperture, distribution on an infinite ground plane; Slot antenna; Horn antenna; Reflector antenna, aperture blockage, design considerations.

**UNIT III ARRAYS**

Introduction-General structure of phased array, linear array theory, variation of gain as a function of pointing direction, effects of phase quantization, frequency scanned arrays, analog beamforming matrices-Active modules, digital beam forming, MEMS technology in phased arrays-Retrodirective and self phased arrays.

**UNIT IV MICRO STRIP ANTENNA**

Radiation mechanism from patch; Excitation techniques; Microstrip dipole; Rectangular patch, Circular patch, and Ring antenna – radiation analysis from transmission line model, cavity model; input impedance of rectangular and circular patch antenna; Microstrip array and feed network; Applications of microstrip array antenna.

**UNIT V SPECIAL ANTENNAS AND MEASUREMENTS**

Mobile phone antenna, base station, hand set antenna, UWB antenna, PIFA, Vivaldi antenna, Antenna for automobiles, Broadband antenna, antenna factor, Gain, impedance and radiation pattern measurements, Test sites and anechoic chamber.

**REFERENCES:**

1. Balanis. A, "Antenna Theory Analysis and Design", John Wiley and Sons, New York, 1982.
2. Hubregt. J. Visser "Antenna Theory and Applications" 1st Edition, John Wiley & Sons Ltd, New York,2012.
3. S. Drabowitch et.al., "Modern Antennas", 2nd Edition Springer science business Media, Inc. 2005
4. Xavier Begaud, "Ultra-Wide Band Antennas", 1st Edition, ISTE Ltd and John Wiley & Sons Ltd, New York,2013.