EC-406D	SMART ANTENNAS (ELECTIVE - IV)	L T P C 4 - - 3

COURSE OBJECTIVES:

1. To provide the basic knowledge of smart antennas and their radiation characteristics.
2. To introduce the students various types of wire and aperture antennas.
3. To provide the knowledge of broad band antennas and their applications.
4. To develop the students understanding of various Microstrip antenna for smart antenna applications

COURSE OUTCOMES:

After successful completion of the course, the students are able to

1. understand the various antenna parameters.
2. demonstrate basic understanding of smart antennas for broad frequency range.
3. demonstrate basic understanding of wire and aperture antennas.
4. analyze the broadband antennas for different applications.
5. interpret the different microstrip antennas for smart antenna applications.

UNIT I *Text Book - 1* **(10)**

Physical concept of radiation, Radiation pattern, near- and far-field regions, reciprocity, directivity and gain, effective aperture, input impedance, efficiency.

Polarization, Friis transmission equation, radiation integrals and auxiliary potential functions.

UNIT II *Text Book - 2* **(10)**

Introduction to Smart Antennas : Need for smart antennas, standards for smart antennas, types of smart antennas, features and benefits ,architecture, advantages and disadvantages of smart antennas, introduction to orthogonal signals, signal propagation: multipath and co-channel Interference.

Concept and benefits of smart antennas, fixed weight beam forming basics. Adaptive beam forming. Switched beam systems, spatial division multiple access.

UNIT III *Text Book - 1* **(10)**

Radiation from Wires and aperture antennas : Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop.

Huygens' Principle, radiation from rectangular and circular apertures, design considerations, Babinet's principle, Radiation from sectoral and pyramidal horns, design concepts.

UNIT IV *Text Book - 1* **(10)**

Microstrip Antennas : Basic characteristics of microstrip antennas, feeding methods, methods of analysis.

Design of rectangular and circular patch antennas and their field expressions.

UNIT V *Text Book - 3* **(10)**

Broadband Antennas : Broadband concept,Biconical antenna, radiated fields and input impedance, Log-periodic antennas, Planer and wire surfaces, Dipole array and feed networks, frequency independent antennas, equiangular spiral antennas, Planner spiral, and conical spiral.

LEARNING RESOURCES:

TEXT BOOK(s):

1. C.A.Balanis - Antenna Theory and Design, 3rd Ed., John Wiley & Sons., 2005.
2. F.B.Gross - Smart Antennas for Wireless Communications, McGraw-Hill., 2005.
3. J.D.Kraus and Ronald J Marhefka - Antennas For all Applications, TMH, 2003

REFERENCE BOOK(s):

1. R. E. Collin - Antennas and Radio Wave Propagation, McGraw-Hill., 1985.
2. R. S. Elliot - Antenna Theory and Design, Revised edition, Wiley-IEEE Press., 2003.

WEB RESOURCES:

http://nptel.iitm.ac.in/courses/117107035