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| Devi Ahilya University, Indore, India Institute of Engineering & Technology | | | | ME – I Year (Spl Digital Communication) Semester- B | | | | |
| Subject Code & Name | | Instructions Hours per Week | | | Credits | | | |
| DCP3G3 Advance Antenna System | | L | T | P | L | T | P | Total |
| Duration of Theory Paper: 3 Hours | | 3 | 1 | 0 | 3 | 1 | 0 | 4 |

Objectives: Achieve the skill to analyze and design advanced antennas and antenna systems using numerical techniques

Prerequisites: Electromagnetic field theory.

COURSE CONTENTS

UNIT I

Fundamental Concepts:

Physical concept of radiation, Radiation pattern, near- and far-field regions, reciprocity, directivity and gain, effective aperture, polarization, input impedance, efficiency, Friis transmission equation, radiation integrals and auxiliary potential functions.

UNIT II

Radiation from Wires and Loops:

Infinitesimal dipole, finite-length dipole, linear elements near conductors, dipoles for mobile communication, small circular loop.

UNIT III

Aperture Antennas:

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

Broadband Antennas:

Broadband concept, Log-periodic antennas, frequency independent antennas.

UNIT IV

Microstrip Antennas:

Basic characteristics of microstrip antennas, feeding methods, methods of analysis, design of rectangular and circular patch antennas.

Antenna Arrays:

Analysis of uniformly spaced arrays with uniform and non-uniform excitation amplitudes, extension to planar arrays.

UNIT V

Basic Concepts of Smart Antennas:

Concept and benefits of smart antennas, Fixed weight beamforming basics, Adaptive beamforming

Books Recommended:

- [1]. C.A. Balanis, "Antenna Theory and Design", 3rd Ed., John Wiley & Sons., 2005.
- [2]. W. L. Stutzman, and G. A. Thiele, "Antenna Theory and Design", 2nd Ed., John Wiley & Sons., 1998.
- [3]. R. S. Elliot, "Antenna Theory and Design", Revised edition, Wiley-IEEE Press., 2003.
- [4]. R. E. Collin, "Antennas and Radio Wave Propagation", McGraw-Hill., 1985.
- [5]. F. B. Gross, "Smart Antennas for Wireless Communications", McGraw-Hill., 2005.