PVP 22

CONFORMAL ANTENNAS

22ECMC1T5B   **Credits: 4**
 Lecture: 4 periods/week   **Internal assessment: 40 marks**
                                                              Semester end examination: 60 marks

Prerequisites: Antennas and Propagation

Course Outcomes

Upon successful completion of the course, the student will be able to

- Interpret the fundamental parameters of conformal antennas in wireless communication (L2)

- Analyze the characteristics and shapes of conformal antennas (L4)
- Examine the single surface and double surface conformal antennas and its radiation patterns (L4)
- Utilize various feeding methods to improve performance the wireless communication system (L3)

UNIT -1

Introduction: The definition of a conformal antenna, why conformal antennas, history, metal radomes, sonar arrays**.**

UNIT -II

The Shapes of Conformal Antennas

Introduction, 360° Coverage, 360° Coverage Using Planar Surfaces, 360° Coverage Using Curved Surface, Hemispherical Coverage, Hemispherical Coverage Using Planar Surfaces Half Sphere Cone Ellipsoid Paraboloid and Comparing Shapes

UNIT III

Geodesics on Curved Surfaces

Introduction, Definition of a Surface and Related Parameters, The Geodesic Equation, Solving the Geodesic Equation and the Existence of Geodesics, Singly Curved Surfaces, Doubly Curved Surfaces-The Cone, Rotationally Symmetric Doubly Curved Surfaces, and Properties of Geodesics on Doubly Curved Surfaces Geodesic Splitting.

UNIT IV

Conformal Array Characteristics and Beam Forming

Introduction, Mechanical Considerations - Array Shapes, Element Distribution on a Curved Surface, Multifacet Solutions, Tile Architecture, Static and Dynamic Stress. Radiation Patterns - Introduction, Grating Lobes, Scan-Invariant Pattern, Phase-Scanned Pattern. Beam forming - Introduction, A Note on Orthogonal Beams, Analog Feed Systems - Vector Transfer Matrix Systems, Switch Matrix Systems, Butler Matrix Feed Systems, Digital Beam Forming

Learning Resources

Text Books

1. Conformal Array Antenna Theory– Lars Josefsson, Patrik Persson A Wiley-Interscience Publication 4th Ed., 2021.

2. Conformal Antenna Array Design Handbook – R C Hansen

Reference Books

1. Antenna Theory and Applications – Constantine A. Balanis, John Wiley & Sons, 4th Ed., 2021

E-Resources

1. https://nptel.ac.in/courses/117107035

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