EECEVAC02- Antenna Design Using HFSS

Unit I Fundamentals of Antenna

Fundamental Theory of antenna: Reciprocity theorem, antenna equivalent circuit, Classification of antennas, Special types of antennas for different frequency bands.

Antenna Parameters: Radiation Impedance, Radiation Pattern, Antenna Impedance, Bandwidth, Directivity, Gain, Antenna efficiency, Radiation Efficiency, Antenna Polarization, Antenna Apertures, Antenna temperature, near-field and far-field concepts, and radiation mechanism.

Unit II Antenna Arrays

Two-Element Array N-Element Linear Array: Uniform Amplitude and Spacing N Element Linear Array: Directivity Design Procedure, N Element Linear Array: Three-Dimensional Characteristics, Rectangular-to-Polar Graphical Solution, N-Element Linear Array: Uniform Spacing, Non uniform, Binomial Array Amplitude, Planar and Circular Arrays.

Unit III Introduction to HFSS

The mathematical method used by HFSS, The adaptive solution process and its importance to HFSS, The Six general steps in HFSS simulation, The three solution types in HFSS, available boundaries with in HFSS, Excitation in HFSS,HFSS Solution setup, HFSS Post Processing.

Unit IV Design of Microstrip Antennas using HFSS

Feeding methods, Method of analysis, Rectangular and Circular Patch, Quality Factor, Bandwidth, and Efficiency, Input Impedance, Coupling, Circular Polarization, Arrays and Feed Networks, Multi Band, Recent advances in fractal antenna and patch array.

Unit V Fabrication and Testing

Method of Fabrication-Chemical Etching, Photo Lithography and Computer controlled coordinatograph. Testing of Antenna-Network Analyzer: Scalar Network Analyzer (SNA), Vector Network Analyzer (VNA) and Large Signal Network Analyzer (LSNA).

References:

Balanis C.A, "Antenna Theory", 2nd Edition, Wiley, 2003

Kyohei Fujimoto, Koichi Ito,Antennas for Small Mobile Terminals,Artech House,2018.

https://www.ansys.com/products/electronics/ansys-hfss