Electromagnetic Fields II Syllabus

Session 1: Time Varying Fields and Maxwell Equations - Faraday Law and Displacement Current – Ampere-Maxwell Equation in Differential (Point) and Integral Form – Retarded Potentials: Scalar and Vector Potentials.

Session 2: Wave Equation in media with / without losses – The Uniform Plane Wave as a solution of the Wave Equation. Plane Wave Propagation in dielectric and conductive media- Poynting Vector – Plane Wave Polarization.

Session 3: Reflection and Transmission of Plane Waves on a plane interface for normal and oblique incidence – Introduction to the concept of the standing wave.

Session 4: Introduction transmission line theory and waveguide propagation – Transmission line equations, parameters and practical examples –Waveguide operation fundamentals – Parallel plate waveguide analysis and propagation modes using the wave equation.

Session 5: Basic Antenna Principles – Far-Field Calculations for an arbitrary antenna shape using the Vector Potential – Thin linear antennas (dipoles)as a practical example.

Session 6: Uniqueness Theorem - Equivalence Principle & Image Sources - Duality and Complementarity