

Electromagnetic Field Analysis (3+0)

Code EE-849	Credit Hours 3-0
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Course Description:

A student who has successfully completed this course should be able to understand the main principles of electromagnetics and different phenomena of wave propagation including wave equations and its solutions, reflection and transmission of EM waves through different types of media, scattering from single and multi-layer structure, waveguide, cavities.

Text Book: 1. Advanced Engineering Electromagnetics, C. A. Balanis, 2nd Ed, 2012
Reference <ul style="list-style-type: none">· Engineering Electromagnetics by K. R. Demarest, Int. Ed, 1998
Books: <ul style="list-style-type: none">· Time Harmonic Electromagnetic Fields, R. F. Harrington, 1971· Foundations of Electromagnetic Theory, Reitz, Christy, Milford, 1968· Electromagnetic Theory, J. A. Stratton, 1941

Pre-requisites: EE-241 EMFT

ASSESSMENT SYSTEM

Quizzes	10-15%
Assignments	05-10%
MSE	25-30%
Labs/Projects	10%
ESE	40-50%

Teaching Plan:

Lecture Breakdown:		
W	Topics	Lectures

1,2	Curl, Divergence, Gradient, Maxwell's Equations, Constitutive Parameters and Relations.	1,2,3, 4,5,6
3,4	Boundary Conditions, Power and Energy, Time-Harmonic Electromagnetic Fields.	7,8,9 10,11,12
5	Wave Equations and its Solution in Rectangular Co-ordinates	13,14
6	Wave Equations and its Solution in Rectangular Co-ordinates	15,16
7,8	Propagation of EM Waves, Transverse Electromagnetic Modes in Lossless Medium at Normal and Oblique Incidence.	17,18,19,2 0,2 1
9	Mid Semester Exam	
10	Propagation of TEM Waves in lossy medium, Polarization: Linear, Circular, and Elliptical.	22,23,24

11,12	Reflection and Transmission of EM Waves-Normal and Oblique Incidence—Lossless Media	25,26,27 28,29,30
13,14	Reflection and Transmission of EM Waves- Total Transmission—Brewster Angle, Total Reflection—Critical Angle	31,32,33,3 4,3 5,36
15,16	Auxiliary Vector Potentials, Solution of Vector Potential Wave Equation, Far Field Radiation	37,38,39, 40,41,42
17	Rectangular Cross-Section Waveguides, TE/TM modes, TE ₁₀ mode, Artificial Impedance Surfaces and Antenna applications, Strip-Line and Microstrip lines	43,44,45
18	End Semester Exam	