Course Type	Course Code	Name of Course	L	T	P	Credit
DC	NECC508	Advanced Engineering Electromagnetics	3	1	0	4

Course Objective

To familiarize the students with the basic electromagnetism and formulation of boundary value problem with respect to real time situation. The course prepares the first year PG students where the advance topics like rigours analysis of metallic and dielectric waveguide with Green's function, application of EM theorems, wave solution and reflection and transmission of multiple interfaces will be covered, particularly those including an in depth description.

Learning Outcomes

Upon successful completion of this course, students will:

- able to solve challenging boundary value problems involving waveguide, stripline, cavity and scattering and radiation problems.
- Understanding of the basic and advanced topics related to dieletric and metallic waveguide.
- have idea to find the wave solution and reflection and transmission of multiple interfaces will be covered.

Module No.	Topics to be Covered	Contact Hours	Learning Outcome
1	Maxwell's Equation, Circuit field relations, Boundary conditions, Power Energy and Time harmonic electromagnetic fields.	08+2T	Understanding of basic electromagnetism and formulation of boundary value problem with respect to real time situation
2	Transverse EM modes, Uniform plane wave in unbounded lossless media, Principal axis, Oblique angle, Transverse EM modes in lossy media, Polarization, Reflection and transmission across an interface, Reflection and transmission of multiple interfaces	10+3T	This unit will help student in understanding the wave solution and reflection and transmission of multiple interfaces, student will also learn the application of Polarization, Reflection and transmission of EM wave in real world problems.
3	Wave equation and solution, Auxiliary vector potential Construction of solution, Solution of inhomogeneous vector potential wave equations, Far field radiation and scattering equations with Antenna concept, Rectangular waveguides and its EM analysis, Partially filled waveguide, Transverse resonance method, Dielectric waveguide.	10+3T	Students will able to solve challenging boundary value problems involving waveguide, stripline, cavity and scattering and radiation problems.
4	Duality theorem, Uniqueness theorem, Image theorem, Reciprocity theorem, Reactiontheorem, Volume equivalence theorem and Surface equivalence theorem.	07+3T	Student will familiarize the different EM theroems and understanding of relevant mathematical analysis with respect to these theroems.
5	Duality Green's function with integral transform techniques, Strum Liouville problems, Green function in closed and series form, Green's identities and methods, Green's functions of the scalar Helmholtz equation and Dyadic functions.	07+3T	This unit will help student in understanding the Green's function and its application in solve challenging real world problems.
	Total	**42L+14T**	

Text Books:

1. C A Balanis, 'Advanced Engineering Electromagnetics', John Wiley Sons, US, 2nd edition, 2012.

Reference Books:

1. R F Harrington, 'Time Harmonic Electromagnetics Field', John Wiley Sons and IEEE, USA, 2nd edition, 2001.
2. Magdy F. Iskander, Electromagnetic Fields and wave, Prentice Hall Publications.
3. David K. Cheng, Field and Wave Electromagnetics, Pearson Education Indian Learning Private Limited