ELECTROMAGNETIC WAVES

Course Code	19EC3402	**Year**	II	**Semester**	II
Course Category	Program Core	**Branch**	ECE	**Course Type**	Theory
Credits	3	**L-T-P**	3-0-0	**Prerequisites**	Engineering Physics (19EPH131); Engineering Mathematics-I (19EMA101) Engineering Mathematics-II (19EMA102)
Continuous Internal Evaluation	30	**Semester End Evaluation**	70	**Total Marks**	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Apply the knowledge of Laws, Concepts and proofs related to Electrostatic Fields and Magnetostatic Fields to solve field problems
CO2	Distinguish between the static and time-varying fields and derive the corresponding Maxwell's Equations with Boundary Conditions
CO3	Evaluate wave equations for good Conductors and Dielectrics also develop the power and polarization of waves
CO4	Analyze the uniform plane wave characteristics for propagation in practical mediums

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Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3-High, 2: Medium, 1:Low)

COs	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**	**PO8**	**PO9**	**PO10**	**PO11**	**PO12**	**PSO1**	**PSO2**
CO1	3	3	2	1	2			1	1	2	1	2	2	
CO2	3	3	2	1	2			1	1	2	1	2	2	
CO3	3	3	2	1	2			1	1	2	1	2	2	
CO4	3	3	2	1	2			1	1	2	1	2	2	

Syllabus		
Unit No.	**Contents**	**Mapped CO**
I	**Review of coordinate systems; Electrostatics:** Coulomb's Law, Electric Field Intensity, Field due to a line charge, Electric Flux Density, Guass's law, Electric Potential, Potential gradient, energy stored, Laplace's and Poison's equations.	CO1
II	**Magnetostatics:** Steady current, Biot-Savart's law, Static magnetic field due to line current, Magnetic flux Density, Ampere's circuital law, Lorentz force equation, Magnetic Vector Potential, energy stored.	CO1
III	**Time-varying Fields and Maxwell's Equations:** Time varying fields, Faraday's law of electromagnetic induction, Displacement	**CO2**

	current, Maxwell's equations in point form and integral form, boundary conditions of electromagnetic fields, Polarization, Magnetization.	
IV	**Uniform Plane Wave:** Wave equation, Wave propagation in free space, wave propagation in conductor and dielectrics, Poynting Theorem, skin effect, wave polarization, Direction cosines.	**CO3**
V	**Plane Waves at Boundaries and in Dispersive Media:** Reflection of uniform plane waves by perfect conductor – normal and oblique incidence, standing wave ratio, Reflection and transmission of uniform plane waves by perfect dielectric – normal and oblique incidence.	**CO4**

Learning Resources
Text Books
1. E. C. Jordan, EM Waves and Radiating Systems, PHI, 2nd edition,2007 2. William H. Hayt, Engineering Electromagnetics,.Tata McGraw Hill Publications
Reference Books
1. R Shevgaonkar, "Electromagnetic Waves ", Tata McGraw Hill Publications 2. Matthew N.O.Sadiku, "Principles of Electromagnetics", Oxford University Press
e- Resources & other digital material
1. https://ocw.mit.edu/courses/electrical-engineering-and-computer-science/6-013-electromagnetics-and-applications-spring-2009/ 2. https://nptel.ac.in/courses/117/103/117103065/
