PARVATHANENI BRAHMAYYA
SIDDHARTHA COLLEGE OF ARTS & SCIENCE
Autonomous
Siddhartha Nagar, Vijayawada–520010
Re-accredited at 'A+' by the NAAC

ELECTROMAGNETICTHEORY

Offered to : M.Sc.(PHYSICS)	Course Code : 22PH3D1
Course Type : Domain specific elective (DSE)	Course : ELECTROMAGNETICTHEORY
Year of Introduction : 2004	Year of offering : 2022
Year of Revision : 2022	Percentage of Revision : 60%
Semester : III	Credits : 4
Hours Taught: 60 hrs. per Semester	Max.Time : 3 Hours

Course Description : Electromagnetic Theory course is designed to review the fundamentals and application of electromagnetic field theory. This course also enables the students to understand all Maxwell's equation in time varying field and their role in solving the problems related to electromagnetics. In this course the students will also learn about waveguides, electric and magnetic dipole, and electric quadrupole radiation besides the relativistic electrodynamics.

CourseObjectives:

1. ToUnderstandingoftheimportanceofMaxwell's equationsinsolvingpracticalelectromagnetic fieldproblems.
2. To understand the propagation of waves in wave guides.
3. To learn about the fields produced by stationary and moving charge charged systems andpropagationofelectromagneticfields.
4. Tomakethestudentslearnaboutradiationfromelectricandmagneticdipole,andelectricquadrupole
5. To learn about four vector space and notations

CourseOutcomes: Attheendofthis course,studentsshouldbeableto:

CO1: Derive the electromagnetic wave equations from Maxwell's equations and calculate the energy carried by electromagnetic waves.
CO2: To measure the charge on a surface, calculate the energy stored in a Electromagnetic field and intensity of energy crossing a point in EM field.
CO3: Understand the concept of retarded potentials in electromagnetic fields.
CO4: Derive fields of different systems
CO5:work in four vector space

CO-POMATRIX								
	CO-PO	**PO1**	**PO2**	**PO3**	**PO4**	**PO5**	**PO6**	**PO7**
22PH3D1	**CO1**	H					L	M
	CO2		H				L	M
	CO3	H					L	M
	CO4		H				L	M
	CO5	H					L	M

Syllabus		
Unit	**LearningUnits**	**Lecture Hours**
I	**ElectromagneticWaves** Maxwell's equations in differential and integral forms, Electromagnetic waves in vacuum, Plane waves innon-conducting media: Energy flux in a plane wave, radiation pressure and momentum, plane waves inconducting media, the skin effect, Reflection and refraction of plane waves at a plane interface-Fresnel'slaws;Reflectionfromthesurfaceof ametal. (CO1)	12
II	**Waveguides** Introduction-Propagation of Waves between conducting Planes, Waves in Guides of arbitrary Cross-section, Wave Guides of rectangular Cross –section, coaxial wave guide, Resonant Cavities, DielectricwaveGuides (CO2)	12
III	**ScalarandVectorPotentials:** Coulomb and Lorentz gauge, Wave equation for potentials: Hamiltonian in generalized potential form.Field equations and their solution. Retarded potentials – Radiation from an Oscillating Dipole - LinearAntenna.(CO3)	12
IV	**Electromagneticradiation:** Lienard-Wiechert potentials,Potentials foracharge in uniform motion-Lorentz formula, radiation froman acceleration charged particle at low velocity- Larmor formula,radiation from a charged particlemovinginacirculararorbit,electric quadrupoleradiation.(CO4)	12
V	**RelativisticElectrodynamics** Review of special theory of relativity, Lorentz transformations-consequences, Minkowski four vectors,energy-momentumfourvector,covariantformulationofmechanics,Transformationofelectricandmagnetic fields under Lorentz transformations, field tensor, invariants of electromagnetic field, covariantformulationofelectrodynamics.radiationfromrelativisticparticles (CO5)	12

ReferenceBooks:

1. B.B.LAUDElectromagnetics,NewAge InternationalPublishers,secondedition,2009
2. D.J.GRIFFITHSIntroductiontoElectrodynamics,PearsonAddisonWesley,sixthimpression,2008
3. SATYAPRAKASHElectromagnetictheoryandElectrodynamics,KedarnathRamnath.Pub.2010