

Course code: Course Title	Course Structure			Pre-Requisite
	L	T	P	
EP104: Fundamentals of Electrodynamics	3	0	2	NIL

Course Objective: This course aims to impart basic knowledge to students regarding electrostatic and magnetostatic fields and its applications. To understand the Maxwell's equations and its solution to the problem related to wave propagation and Transmission lines. To develop understanding of various types of antenna radiation mechanism.

S. NO	Course Outcomes (CO)
CO1	Describe basic concept of fields.
CO2	Describe physical interpretation and ability to solve the problem by applying fundamental laws.
CO3	Apply Maxwell's equations and its physical consequences for different parameters.

CO4	Describe the basic mathematical concepts related to Electromagnetic vector fields.
CO5	Describe Transmission Lines and their application in EM wave propagation. Also, to analyse radiation patterns for various types of reflectors.

S. NO	Contents	Contact Hours
UNIT 1	Scalars and vectors, multiplication of vectors, the Gradient of a scalar field, the Divergence of a vector field, line integral and surface integral, curl of a vector, Stoke's theorem and Gauss divergence theorem. Gauss's law and Applications of Gauss's law.	10
UNIT 2	Gauss's law in Electrostatic and Magnetostatic, Current, current density, Equation of continuity, Ampere's circuital law, displacement current. Magnetization and Magnetic Flux.	5
UNIT 3	Maxwell's equations: Differential and Integral form, Physical Significance. Poynting Theorem, Physical significance of each term of Poynting Theorem and Poynting Vector.	8
UNIT 4	Propagation of plane electromagnetic waves in free space, Isotropic Dielectric (non-conducting) medium, and conducting medium. Wave equation derivation and its solution in terms of Electric & Magnetic field vectors, condition for Poor conductors and good conductors, skin depth or penetration depth.	9
UNIT 5	Introduction to Antenna and Transmission lines: Radiation intensity, Directive gain, Directivity, Power gain, and Beam Width. Transmission lines : transmission line équation in time and frequency domain.	10
TOTAL		42

REFERENCES

S.No.	Name of Books/Authors/Publishers	Year of Publication / Reprint
1	Introduction to Electrodynamics; D. J. Griffiths, Pearson Education, 4th Edition.	2017
2	Electromagnetic Waves and Radiating Systems; E. C. Jordan, K. G. Balmain, Pearson Education.	2015
3	Microwave Devices and Circuits; S. Y. Liao, Prentice-Hall of India, Pvt Ltd.	2003
4	Advanced Engineering and Electromagnetics; C. A. Balanis.	2012

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Antennas and Wave Propagation, J. D. Kraus, R. J. Marhefka, A. S. Khan.

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