

Course Number and Name												
BEE304 & Electromagnetic Theory												
Credits and Contact Hours												
3 & 45												
Course Coordinator's Name												
Mr.K.S.S.Prasad												
Text Books and References												
Text Books:												
1. K.A.Gangadhar, "Field Theory" – Khanna Publishers, New Delhi. 1997												
2. William Hayt, "Engineering Electromagnetics" – McGraw Hill, New York 1996												
References:												
1. S. Selly, "Introduction to electromagnetic fields" – McGraw Hill, 1958												
2. http://nptel.ac.in/downloads/115101005												
Course Description												
The purpose of this course is to enable the students to have a sound knowledge about the theory and problems in Electromagnetic Fields.												
Prerequisites						Co-requisites						
Engg Mathematics-I, Engg Physics -I, Engg Physics-II ,Basic Electrical Engineering						Nil						
required, elective, or selected elective (as per Table 5-1)												
Required												
Course Outcomes (COs)												
CO1: Apply vector calculus to understand the behavior of static electric fields in standard configurations.												
CO2: To lay the foundations of electromagnetism and to understand the concepts of Electrostatics and their applications.												
CO3: To understand the concepts of Magneto statics and their applications.												
CO4: Apply the concepts of induction to evaluate inductance and applications.												
CO5: To understand the concept of Electromagnetic Fields, waves and wave propagation.												
Student Outcomes (SOs) from Criterion 3 covered by this Course												
COs/SOs	a	b	c	d	e	f	g	h	i	j	k	l
CO1	H	M							M			M
CO2	H	H							M			M
CO3	H	H							M			M
CO4	H	H							M			M
CO5	H	H							M			M

List of Topics Covered

UNIT I ELECTROSTATICS

9

The field concept – sources of electromagnetic fields – Co-ordinate Systems– Coulomb’s law – electric field intensity – electric field due to point charge, line charge, surface charge and volume charge distribution – electric flux density – Gauss’s law – electric potential – potential gradient – divergence theorem – Poisson’s and Laplace equations.

UNIT II ELECTROSTATIC APPLICATIONS

9

Conductor and dielectrics – field due to dipole – moment – boundary conditions and conductor surfaces – capacitor – capacitance of system of conductors – energy density and pressure in electric fields – force between charges – charge in motion – conduction current – displacement current.

UNIT III MAGNETOSTATICS

9

Force on a current element – Biot Savart’s law – force between current carrying conductors– Ampere’s law – magnetic potential – boundary conditions at the magnetic surfaces – examples

UNIT IV MAGNETOSTATICS APPLICATIONS

9

Faraday’s law of electromagnetic induction – inductance of solenoids, toroids, transmission lines and cable – Mutual inductance of series and parallel circuits – energy stored in magnetic fields – electromagnets – forces and torques on closed circuits – magnetic circuits – examples.

UNIT V ELECTROMAGNETIC FIELDS AND WAVE PROPAGATION

9

Modified amperes circuital law – Maxwell’s equation in point and integral forms – wave equation – plane waves in free space – polarization – reflection and transmission of waves – pointing theorems and Poynting vector – energy in electromagnetic fields.