Course Number and Name

BEC403 – ELECTROMAGNETIC FIELDS AND WAVES

Credits and Contact Hours

4 and 60

Course Coordinator's Name

Dr.S.Arulselvi

Text Books and References

Text Books:

1. William H Hayt and Jr John A Buck, "Engineering Electromagnetics",Tata McGraw-Hill Publishing Company Ltd, NewDelhi, 2008
2. Sadiku MH,"Principles of Electromagnetics", Oxford University PressInc, NewDelhi,2009
3. David K Cheng, "Field and Wave Electromagnetics", Pearson EducationInc,Delhi,2004

References:

1. John D Kraus and Daniel A Fleisch,"Electromagnetics with Applications", McGrawHill Book Co,2005
2. Karl E Longman and SavaV Savov,"Fundamentals of Electromagnetics", Prentice Hall of India,NewDelhi,2006
3. Ashutosh Pramanic,"Electromagnetism", Prentice Hall of India,NewDelhi,2006
4. www.Wiley.com

Course Description

- To understand and gain complete knowledge about
- Theorem, Laws, Principle & Applications of Static Electromagnetic Fields
- Various Laws of Static Magnetic Field
- Various relation & parameters of Electric Field in Dielectrics
- Magnetic Field with different structure in Ferromagnetic Materials
- Time Varying Electric And Magnetic Fields

Prerequisites	Co-requisites
BMA301-Engineering Mathematics -III	Nil

required, elective, or selected elective (as per Table 5-1)

required

Course Outcomes (COs)

CO1 : To understand the Theorem, Laws, Principle and their related problems over Static Electromagnetic Fields.

CO2 : To learn the basic laws in Static Magnetic Field and able to find various parameters with the Related problems.

CO3 : To know how the Electric Field is applied in Dielectrics with various equations and Applications.

CO4 : To understand how the Magnetic field works with Ferromagnetic Materials.

CO5: To analyse how the Time is Varying in both Electric And Magnetic Fields with various Derivation.

CO6 : To understand, and analyse the electromagnetic field distribution which forms the basis For advanced subjects related to electromagnetic field.

Student Outcomes (SOs) from Criterion 3 covered by this Course

COs/SOs	A	b	C	d	e	f	g	h	i	j	K
CO1	H			M		M					
CO2	M	M	M				M			H	
CO3	M						L				
CO4					H		M		M	M	
CO5		L	M	M					M		
CO6	M				H	H			H		

List of Topics Covered

UNIT I STATIC ELECTROMAGNETIC FIELDS 12

Introduction to co-ordinate system, Gradient, Divergence, Curl, Divergence Theorem, Stoke's Theorem, Coulomb's Law, Electric field Intensity, Principle of superposition, Electric Scalar potential, Line charge distribution by Moment method, Electric flux Density, Gaus's Law and its applications, Field Computations and Problems.

UNIT II STATIC MAGNETIC FIELD 12

Magnetic field of a current carrying element, Ampere's Force law, The Biot-Savart Law, Magnetic Flux density, Gauss law for magnetic fields, Torgue on a loop, Magnetic moment, Ampere's Law and Magnetic field intensity, Magneto motive force, Field cells and permeability, Vector potential, Field computation and problems.

UNIT III ELECTRIC FIELD IN DIELECTRICS 12

Permittivity, Polarization, Boundary relation, Capacitance, Dielectric strength, Energy and energy density, Poisson's and Laplace equations and applications, Electric Current, Current Density, Ohms law at a point, Resistance and Conductance, Continuity relations for current problems.

UNIT IV MAGNETIC FIELD IN FERROMAGNETIC MATERIALS 12

Magnetic materials, Magnetic dipoles, Loops and Solenoids, Magnetization, Inductance, Energy in an Inductor and Energy Density, Boundary relations, Ferro magnetism, Hysteresis, Reluctance and Permeance, Problems.

UNIT V TIME VARYING ELECTRIC AND MAGNETIC FIELDS 12

Faraday's Law, Transformer and Motional Induction, Maxwell's equation from Faraday's Law, Self and Mutual Inductance, Displacement current, Maxwell's equation from Ampere's Law and its in-consistency, Boundary relation, Poynting Vector, Comparison of field and circuit theory, Circuit Application of pointing Vector.