Kadi Sarva Vishwavidyalaya

Faculty of Engineering & Technology

Electronics and communication Engineering

(Academic Year 2019-20)

Subject Code:EC503-N	**Subject Title: ELECTROMAGNETIC THEORY**
Pre-requisite	

Course Objective:

At the end of this course, students will demonstrate the ability to

- Understand the basics of Electromagnetic fields.
- Understand the Electrostatics and Magnetostatics.

Teaching Scheme (Credits and Hours)

Teaching scheme				**Total Credit**	**Evaluation Scheme**					**Total Marks**
L	**T**	**P**	**Total**		**Theory**		**IE Marks**	**CIA Marks**	**Pract. Marks**	
Hrs	**Hrs**	**Hrs**	**Hrs**		**Hrs**	**Marks**				
03	00	00	03	03	03	70	30	20	--	120

Outline Of the Course:

Sr. No.	**Title of the Unit**	**Hours**
1.	Vector Analysis	4
2.	Coulomb's Law & Electric Field Intensity	4
3.	Electric Flux Density, Gauss's Law and Divergence	8
4.	Energy and Potential	8
5.	Conductors, Dielectrics And Capacitance	7
6.	Poisson's and Laplace equation	3
7.	The Steady Magnetic Field	7
8.	Time Varying Fields and Maxwell's Equations	7
		48

Total hours (Theory): 48
Total hours: 48

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Detailed Syllabus:

Sr. No.	Title	Lecture Hours	Weightage(%)
1.	**Vector Analysis :** Scalars & Vectors, Vector Algebra, Coordinate Systems – Cartesian, Cylindrical and Spherical, Dot & Cross Products, Three dimensional coordinate systems conversions.	4	10
2.	**Coulomb's Law & Electric Field Intensity:** Experimental Law of coulomb. Electric field intensity, Field due to continuous volume Charge Distribution, Filed of line charge, field of sheet charge.	4	10
3.	**Electric Flux Density, Gauss's Law and Divergence:** Electric flux density, Gauss's Law and applications: some symmetrical charge distributions, differential volume element. Divergence Theorem. Maxwell's First equations (electrostatics), The vector operator ∇ and the Divergence Theorem.	8	15
4.	**Energy and Potential:** Energy expanded in moving a point charge in an electric field, The line integral, definition of potential difference and potential, The potential field of a point charge, Potential Gradient, The Dipole.	8	15
5.	**Conductors, Dielectrics And Capacitance :** Definition of currents and current density, continuity of current, metallic conductors, conductor properties and boundary conditions, semiconductors, The nature of dielectric materials, boundary conditions for perfect dielectric materials, Capacitance.	7	15
6.	**Poisson's and Laplace equation :** Derivations of Poisson's and Laplace equations, Uniqueness theorem.	3	05
7.	**The Steady Magnetic Field :** Biot-Savart Law, Ampere's Circuital Law, Curl, Stoke's theorem, Magnetic Flux and Magnetic Flux density.	7	15
8.	**Time Varying Fields and Maxwell's Equations:** Faraday's law, Displacement current, Maxwell's equations in point form, Maxwell's equations in integral forms.	7	15
		48	100

Instructional Method and Pedagogy:

- At the start of course, the course delivery pattern, prerequisite of the subject will be discussed.
- Lectures will be conducted with the aid of multi-media projector, black board, OHP etc.
- Attendance is compulsory in lecture and laboratory which carries 10 marks in overall evaluation.
- One internal exam will be conducted as a part of internal theory evaluation.
- Assignments based on the course content will be given to the students for each unit and will be evaluated at regular interval evaluation.
- Surprise tests/Quizzes/Seminar/tutorial will be conducted having a share of five marks in the overall internal evaluation.
- The course includes a laboratory, where students have an opportunity to build an appreciation for the concepts being taught in lectures.

Learning Outcomes:

On successful completion of the course

- The student can be acquired the basic knowledge of electromagnetic field, its laws and their applications.

TEXT BOOKS & REFERENCE BOOKS:

- Engineering Electromagnetics by William H Hayt, John A Buck, M Jaleel Akhtar, 8th Edition, McGraw Hill Education.
- Matthew Sadiku, "Elements of Eletromagnetics", Oxford University Press, 4th edition.
- Electromagnetics by John D. Kraus, Keith R. Carver, 2nd Edition, McGraw Hill.