	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

Programme	**Bachelor of Technology in Electrical and Electronics Engineering**	Year of Regulation	**2018-19**
Department	**Electrical Engineering**	Semester	**IV**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EE 212	**Electromagnetic Theory**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives	Course Outcomes	
To understand the fundamental aspects of electromagnetism in electrical system.	CO1	**To understand the basic concepts of electromagnetic fields**
To develop proficiency to analyse electromagnetic field distribution.	CO2	**Estimation of field intensity and distribution and related electromagnetic field properties**
To implement the concepts in practical applications.	CO3	**To estimate boundary characteristics of electromagnetic fields**
	CO4	**Application of electromagnetic fields in electrical system**
	CO5	**Introduction to electromagnetic wave phenomena in high frequency regime**
	CO6	

No.	COs	Mapping with Program Outcomes (POs)												Mapping with PSOs		
		PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
1	CO1	**3**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**1**
2	CO2	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**2**	**1**
3	CO3	**0**	**3**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**3**	**1**
4	CO4	**0**	**3**	**2**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**2**	**1**
5	CO5	**3**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**0**	**1**
6	CO6	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

SYLLABUS

No.	Content	Hours	COs
I	**Vector Analysis** **Introduction to Electromagnetism; Basic laws of vector algebra; Orthogonal coordinate system and transformation; Vector Calculus; Gradient, Divergence & Curl operator; Divergence theorem & Strokes theorem; Laplacian operator; Classification of vector fields; Maxwell's Equations.**	**07**	**CO1**
II	**Electrostatics** **Coulomb's law and electric field intensity; Charge distributions; Maxwell's electrostatic equations; Gauss's law; Electric potential and Potential gradient; Electric dipole and concept of polarisation; Electrical properties of materials, conductors and dielectrics; Electrostatic Energy; Boundary conditions; Applications.**	**08**	**CO2** **CO3** **CO4**
III	**Magnetostatics** **Biot- savart law, Magnetic forces and torques; Maxwell's Magnetostatic equations; Ampere's circuit law; Magnetic vector & scalar potential, Magnetic dipole and concept of magnetisation; Magnetic properties of materials, Inductors; Magnetostatic Energy; Boundary conditions; Applications.**	**08**	**CO2** **CO3** **CO4**
IV	**Time Varying Fields** **Maxwell's equations for time varying fields; Faraday's law; Transformer and motional EMF; Displacement current; Time varying potential; Boundary conditions; Charge – Current continuity relation; Applications.**	**07**	**CO2** **CO3** **CO4**
V	**Wave Propagation** **Introduction to wave propagation; Classification of waves; Time Harmonic Fields; Complex permittivity; Plane wave propagation in free space, lossless dielectrics, lossy dielectrics and good conductors; Electromagnetic power density; Concept of transmission lines; Applications.**	**06**	**CO1** **CO5**
Total Hours		**36**	

Essential Readings

1. F. T. Ulaby, "Electromagnetics for Engineers", Pearson Education, 1st Edition, 2005.
2. Mathew N.O. Sadiku, "Principles of Electromagnetism", Oxford University Press, 6th Edition, 2015.

Supplementary Readings

1. Joseph A. Edminister, "Theory and problems of Electromagnetics", Tata McGraw Hill, 2nd Edition, 1992.
2. Ashutosh Pramanik, "Electromagnetism- Theory and Applications", PHI, 2nd Edition, 2009.
3. N.N. Rao, "Elements of Engineering Electromagnetics", Pearson Education, 6th Edition, 2004.
4. W.H. Hayt & J.A. Buck, "Engineering Electromagnetics", Tata McGraw Hill, 6th Edition, 2002.