	National Institute of Technology Meghalaya An Institute of National Importance		CURRICULUM
Programme	**Bachelor of Technology in Electrical and Electronics Engineering**	Year of Regulation	**2019-20**
Department	**Electrical Engineering**	Semester	**IV**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EE 214	**Electrical Engineering Materials**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives		Course Outcomes		
	To understand the characteristics and electrical properties of various materials		CO1	**Able to acquire knowledge about electrical properties of conducting and magnetic materials**
	To design and select suitable material for application in electrical system.		CO2	**Able to acquire knowledge about dielectric and insulating materials**
			CO3	**Able to understand electrical characteristics of semiconducting materials**
			CO4	**Able to select and design suitable materials for electrical applications**

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**	**2**	**0**
2	CO2	**3**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**2**	**0**
3	CO3	**3**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**2**	**0**
4	CO4	**3**	**2**	**1**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**3**	**2**	**0**

SYLLABUS

No.	Content	Hours	COs
I	**Conducting and Magnetic Materials** **Conducting Materials: Free electron theory, electrical and thermal conductivity, Wiedemann-Franz law, drawback of classical theory, quantum free electron theory, Fermi-Dirac distribution; Electron emission; Thermal properties; Thermo-electric effects; Applications.** **Magnetic materials: Classification of magnetic materials, Ferro, Ferri & antiferro-magnetism; Hysterisis curve; Magnetostriction; Magnetic resonance; Hard and soft magnetic materials- Applications.**	**12**	**CO1**
II	**Dielectric and Insulating Materials** **Dielectric polarization under static fields - electronic, ionic and dipolar polarizations; Behavior of dielectrics in alternating fields; Factors influencing dielectric strength; Capacitor materials – Ferro and piezo materials, Complex dielectric permittivity; dipolar relaxation; dielectric loss; Applications.**	**10**	**CO1**
III	**Semiconducting Materials** **Concept of energy band in solids; Mechanism of conduction in semiconductors; Types of semiconductors; Thermal and Electrical properties; Compound semiconductors; Hall Effect; Basic ideas of amorphous and organic semiconductors, Applications.**	**08**	**CO1** **CO2**
IV	**Special purpose Materials** **Application based materials - Thermo couple, soldering, fuse, and fluorescent; Super conducting materials; Materials for electronic components; Nano materials and Smart Materials.**	**06**	**CO2** **CO3** **CO4**
	Total Hours	**36**	

Essential Readings

1. Indulkar C.S. and Thiruvengadam S, “An Introduction to Electrical Engineering Materials”, S. Chand & Co Pvt Ltd, 6th Edition, 2011.
2. A.J. Dekker, “Electrical Engineering Materials”, Prentice Hall of India, 1st Edition, 1963.
3. T. K. Basak, Electrical Engineering Materials, New age Science, Ist Edition, 2009

Supplementary Readings

1. P.L. Kapoor, “Electrical and Electronics Engineering Materials”, PHI, 1st Edition, 2014.
2. L. Solymar and D. Walsh, “Electrical Properties of Materials”, Oxford University Press, 9th Edition, 2014
3. TTTI Madras, “Electrical Engineering materials”, Tata McGraw Hill, 1st Edition, 2004.