	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

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

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EC 312	**Fundamentals of Microwave Antenna and Propagation**	**3**	**1**	**0**	**4**	**50**	**50**	**100**	**200**

Course Objectives		Course Outcomes		
	To understand the fundamentals of antenna and its parameters		CO1	Able to acquire the knowledge about fundamentals of antenna and its parameters
	To understand the concepts of antenna array		CO2	Able to understand the basic concepts of antenna array
	To understand analyse different types of antenna		CO3	Able to understand and analyse different types of antenna
	To understand various of propagation characteristics		CO4	Able to understand various propagation characteristics

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	PSO4
1	CO1	**3**	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**2**	**-**
2	CO2	**3**	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**2**	**-**
3	CO3	**3**	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**2**	**-**
4	CO4	**3**	**2**	**3**	**2**	**2**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**3**	**2**	**2**	**-**
5	CO5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

SYLLABUS

No.	Content	Hours	COs
I	**Fundamentals of antenna and antenna parameters:** Antenna Characteristics: Radiation Pattern, Beam Width; Radiation Resistance and efficiency; Directivity and Gain, Impedance, VSWR, Polarization; Effective height and Receive Aperture; Noise Temperature of Antenna. Radiation fields and Characteristics of λ/2 dipole; discussion on λ/4 monopole antenna; Current distribution and Radiation patterns of center-fed dipoles of length λ, 3λ/2 and 2 λ. Horizontal and Vertical antennas over a plane ground.	**15**	**CO1**
II	**Array antenna:** Antenna Arrays: electric Field due to 2 element arrays, 3 element Arrays; Pattern Multiplication; Uniform Linear Array: End fire and Broad side; Phased array.	**6**	**CO2**
III	**Analysis of different types of antenna:** Compute the input and mutual impedance of the antennas, Characteristics and properties of :Travelling Wave Antenna, Helical Antenna, Folded Dipole, Yagi-Uda Array, Loop Antenna, Electrically Short Antennas, Broad Band Antenna (Log periodic Antenna), Microstrip Patch Antenna. Radiation from an aperture: Sectoral and Pyramidal Horn Antennas, Design of Optimum Horn Antenna; Parabolic and Corner Reflectors and feed systems.	**15**	**CO3**
IV	**Propagation characteristics:** Methods of Propagation: Ground Wave Propagation, Components of ground wave, Field strength dependence on physical factors. Sky wave Propagation, Ionospheric Layers, Virtual Height, Critical Frequency, MUF, Skip distance, Sporadic Reflections. Space wave propagation: Tropospheric Scatter, Ducting Super refraction, Sub refraction. Friss Transmission Formula, SNR of a Radio Link. Physical (Medium) effects on Radio wave Propagation: Absorption, Refraction and Radio Horizon, Diffraction, Multipath Propagation and fading, Noise, Doppler effect.,to study impedance characteristics of antennas.	**8**	**CO4**
	Total Hours	**44**	

Essential Readings

1. J. D. Kraus and R. J. Marhcfka, “Antenna for all application", Tata- MacGraw Hill, 3rd Edition, 2002.
2. C. A. Balanis, “Antenna Theory: Analysis & Design”, John Wiley & Sons, 3rd Edition, 2005.
3. A. R. Harish, M. Sachidananda, “Antennas and Wave Propagation”, Oxford University Press,4th Edition, 2007.

Supplementary Readings

1. E. C. Jordan, K. G. Balmain, “Electromagnetic Waves & Radiating Systems”, Prentice-Hall, 2nd Edition, 2007.
2. G. S. N. Raju, “Antennas and Wave Propagation”, Pearson Education, 1st Edition, 2014.
3. C. A. Balanis, “Modern Antenna Handbook”, John Wiley & Sons, 3rd Edition, 2007.