	National Institute of Technology Meghalaya An Institute of National Importance	CURRICULUM

Programme	**M.Tech/Ph.D**	Year of Regulation	**2020-21**
Department	**Electronics and Communication Engineering**	Semester	**I**

Course Code	Course Name	Credit Structure				Marks Distribution			
		L	T	P	C	INT	MID	END	Total
EC 561	**MICROWAVE ENGINEERING**	**3**	**0**	**0**	**3**	**50**	**50**	**100**	**200**

Course Objectives	Course Outcomes	
To introduce the idea of microwave frequency bands with their application, mathematical model of transmission lines.	CO1	Able to develop knowledge about microwave frequency with their application along with mathematical model of transmission lines.
To develop the fundamental concept of Microwave Network and passive devices.	CO2	Able to analyze different types of Microwave Network and passive devices.
To develop the idea of fundamental concept of Microwave design principles.	CO3	Able to understand the concepts of microwave design principle like filter and oscillator design.
To introduce the idea of different types of microwave antenna.	CO4	Able to understand the fundamental concepts of different types of microwave antenna.
To familiarize some concept about the Modern Trends in Microwaves Engineering.	CO5	Able to analyze the fundamental knowledge of the Modern Trends in Microwaves Engineering.
	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	PSO4
1	CO1													3	2	2	0
2	CO2													3	2	2	0
3	CO3													3	2	2	0
4	CO4													3	2	2	0
5	CO5													2	3	3	0
6	CO6													0	0	0	0

SYLLABUS

No.	Content	Hours	COs
I	**Introduction** History of Microwaves, Microwave Frequency bands, Applications of Microwaves: Civil and Military, Medical, EMI/EMC.	02	CO1
II	**Mathematical Model of Microwave Transmission** Concept of Mode, Characteristics of TEM, TE and TM Modes, Losses associated with microwave transmission, Concept of Impedance in Microwave transmission, Field analysis of transmission line.	06	CO1
III	Analysis of Microwave Transmission Lines and Microwave Network Coaxial Line, Circular waveguide, Strapline, Microstrip Line, CPW Line, Equivalent Voltages and currents for non-TEM lines, Network parameters for microwave Circuits, Scattering Parameters.	06	CO2
IV	Microwave Passive Devices Microwave Passive components: Directional Coupler, Power Divider, Microwave Passive components: Magic Tee, attenuator, resonator.	06	CO2
V	Microwave design principles and Microwave Oscillator Design Impedance transformation, Impedance Matching, Microwave Filter Design, Introduction, Oscillator versus amplifier design, Oscillation conditions, Design of transistor oscillators, Generator tuning networks.	05	CO3
VI	Microwave Antenna Microwave Antenna Parameters, Microwave antenna for ground-based systems, Microwave antenna for airborne based systems, Microwave antenna for satellite borne systems, Microwave Planar Antenna	06	CO4
VII	Modern Trends in Microwaves Engineering Effect of Microwaves on human body, Artificially engineered surface, Electromagnetic Interference / Electromagnetic Compatibility (EMI /EMC), Monolithic Microwave IC fabrications	05	CO5
	Total Hours	36	

Essential Readings

1. D. M. Pozar, “Microwave Engineering”, Wiley, 4th Edition, 2011

2. R. E. Collin, “Foundations for Microwave Engineering”, Wiley, 2nd Edition, 2001

Supplementary Readings

1. M. M. Radmanesh, “Radio Frequency and Microwave Electronics”, Person Education Inc, 1st Edition, 2001

2. Joseph Helszain, “Microwave Engineering, Active and Non-reciprocal Circuits”, McGraw Hill, 1st Edition, 1992