

PPH438: MICROWAVE THEORY AND TECHNIQUES

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Course Learning Objectives: To build up the concept from basics of microwave communications to modern applications

Microwave Transmission. Basics, Concept of Mode: TEM, TE and TM Modes and their characteristic, Losses and concept and microwave impedance.

Microwave Transmission Lines. Coaxial Line, Rectangular Waveguide, Circular waveguide, Stripline and Microstrip Line.

Microwave Network Analysis and Measurements: Equivalent Voltages and currents for non-TEM lines, Network parameters and Scattering Parameters for microwave Circuits. Power, Frequency and impedance measurement, Network Analyser and measurement of scattering parameters.

Microwave Devices. Active component: Diodes, transistors, oscillators and mixers. Passive component: Directional coupler, Power divider, Magic tee, attenuator and resonator. Low power microwave devices: Gun diodes. High power microwave devices: Travelling wave tubes (TWT), Magnetron and klystron.

Microwave Systems and Applications: Radar, Cellular Phone., Satellite Communication, Electromagnetic interference / Electromagnetic Compatibility (EMI / EMC) as modern application.

Course Learning Outcomes (CLO):

Students will have understanding of:

1. microwave transmission modes and transmission lines.
2. microwave network analysis, parameter and their measurements.
3. the concepts of various microwave devices
4. modern day applications of microwaves.

Recommended Books:

1. David, M. Pozar, *Microwave Engineering*, Wiley India.
2. Ramo, S., Whinnery, J.R., and Duzer, T.V., *Fields and Waves in Communication Electronics*, Wiley India.
3. Collin, R.E., *Foundations for Microwave Engineering*, IEEE Press.