MICROWAVE ENGINEERING

Module – I **(12 hours)**

Transmission lines: The Lumped -Element Circuit model for a Transmission line. Wave propagation. Field Analysis of two wire & Co-ax Transmission Lines. Terminated transmission line. Reflection coefficient, Scattering matrix, Signal flow graph. Transmission line problems Single Stub and Double Stub matching using Smith Chart.

Rectangular and Cylindrical waveguide: Design & analysis to support various modes. Field solution for TE and TM modes, Field patterns of power flow through waveguide. Attenuation due to conductor and dielectric losses

Module – II **(10 hours)**

Power Dividers and Couplers: Basic Properties, T -Junction Power Divider, Wilkinson Power divider, Waveguide Directional Couplers, Fixed and Precision Variable Attenuator, Ferrite Isolator. Rectangular Cavities Resonator, Resonant frequencies and of Cavity Supporting dominant mode only, Dielectric resonator. Strip line and micro strip.

Microwave Filters: Periodic structures, design by image parameter method and insertion loss method , Filter transformations, Filter implementations, Coupled line filters.

Module – III **(12 hours)**

Reflex Klystron: Velocity Modulation. Electronic Admittance. Output Power and Frequency

Multicavity Magnetron: Principle of Operation, Rotating Field. II-Mode of Operation, Frequency of Oscillation. The Ordinary type (O- Type) TWT - Principle of Operation as an amplifier.

Microwave Transistor: modes of operation, transconductance, max operating frequency and microwave applications, Gunn Oscillator Principle and performance Simple Analysis Electron – field interaction.

Microwave radiation hazards: Hazards of EM radiation, Radiation hazard limits, radiation protection

Text Books:

1. Microwave Engineering by D. M. Pozor, 2nd Edition, John Willy & Sons.
2. Microwave Device and Circuit, 3rd Edition, Sammuel Y, Liao, Perason

Reference Books:

1. Principles of Microwave Engineering, Reich, Oudong and Others.
2. Elements of Engineering Electromagnetics, 6th Edition, N. N. Rao, Pearson Education,
3. Electromagnetic Waves and Radiating Systems, 2nd Edition, E.C. Jordan and K.G. Balman, Pearson Education, New Delhi.
4. Engineering Electromagnetics, 7th Edition, William H. Hayt, Tata McGraw Hill Publishing Company Ltd., New Delhi