

MICROWAVE NETWORKS

17ECMC2T3

Lecture: 4 periods/week

Credits: 4

Internal assessment: 40 marks

Semester end examination: 60 marks

Prerequisites: Transmission lines & Wave guides, Microwave Engineering

Course Objectives:

- Understand the concepts of microwave networks.
- Design various impedance matching networks.
- Analyze Excitation techniques of waveguides, and cavities.
- Design of various Microwave filters.

Course Outcomes:

Students will be able to

- Apply different two port network parameters to microwave networks
- Analyze impedance matching networks using S matrix
- Apply various Excitation techniques to waveguides, and cavities.
- Design various microwave filters

UNIT I

Introduction to Circuit Concepts: The Network concept, One-port network, Two-port network, Impedance and Equivalent voltages and currents, Impedance and Admittance Matrices, The Transmission (ABCD) Matrix-relation to Impedance Matrix, Equivalent circuits for two port networks, Parameter conversion, Signal flow graphs.

UNIT II

Scattering Matrix and Matching Networks: Formulation for N-port network, S-Matrix for Reciprocal and Lossless junctions, shift in Reference plane, Generalized S-Matrix, conversion of S-parameters to other network parameters, S-Matrix for common systems-Transmission Line, Transition between a co-axial line and Waveguide. Matching Networks: Matching with Lumped elements (L Networks), The Quarter wave Transformer, Single-stub tuning, Double-stub tuning.

UNIT III

Excitation of Waveguides & Cavities: Waveguide Feeds, Excitation of waveguides-Electric and Magnetic current, Aperture coupling. Basics of Rectangular and Cylindrical cavities. Equivalent circuits for cavities-Aperture coupled cavity, Loop coupled cavity. Field expansion in a general cavity, Excitation of cavities.

UNIT IV

Filters: Introduction, Filter Design- Image parameter and Insertion Loss methods. Filter Transformations, Filter Implementation (Richard's Transformation and Kuroda's Identities), Stepped-Impedance Low pass filters and Coupled line Filters.

Text Books

1. "Foundations for Microwave Engineering", 2nd Edition, Robert E. Collin, Tata McGraw Hill.
2. "Microwave Engineering", 2nd Edition, David M. Pozar, Wiley student Edition.

References

1. "Microwave Circuits", Jerome L. Altman, The Von Nostrad Series.
Student will be able to