

AME22 RF & MICROWAVE ENGINEERING

UNIT-1 INTRODUCTION

- 1.1 What are Microwaves,
- 1.2 Characteristic Features of Microwaves,
- 1.3 Applications of Microwaves, Outline of Books

UNIT-2 TRANSMISSION STRUCTURES AND RESONATORS

- 2.1 Transmission Lines,
- 2.2 Waveguides,
- 2.3 Resonators.

UNIT-3 GENERATION OF MICROWAVES BY VACUUM TUBES

- 3.1 Limitations of Conventional Tubes,
- 3.2 Klystron Amplifiers, Relax Klystron Oscillator,
- 3.3 Magnetrons,
- 3.4 Traveling Wave Tubes (TWT).

UNIT-4 MICROWAVE SOLID STATE SOURCES

- 4.1 Bipolar Transistors, field Effect Transistors,
- 4.2 Transferred Electron Oscillators,
- 4.3 Avalanche Diode Oscillators.

UNIT-5 MICROWAVE NETWORK REPRESENTATION

- 5.1 Kirchhoff's Laws and Maxwell's Equations,
- 5.2 Voltages and Currents,
- 5.3 Waveguide Impedance,
- 5.4 Scattering Matrix Representation,
- 5.5 Scattering Matrices for some typical Networks.

UNIT-6 MICROWAVE MEASUREMENTS

- 6.1 Detection of Microwaves,
- 6.2 Microwave Power Measurement,
- 6.3 Impedance Measurement,
- 6.4 Measurement of Scattering Parameters,
- 6.5 Frequency Measurement.

UNIT-7 PASSIVE CIRCUIT COMPONENTS

- 7.1 Impedance Transformers,
- 7.2 Microwave Filters, Directional Couplers.

UNIT-8 FERRITE DEVICES

- 8.1 Introduction, Ferrites and Tensor Permeability,

- 8.2 Wave Propagation in a Ferrite Medium,
- 8.3 Faraday Rotation in Ferrites,
- 8.4 Isolator Circulators,
- 8.5 Faraday rotation Switch and Modulator,
- 8.6 Port Circulators, Resonance Absorption in Ferrites,
- 8.7 YIG Resonators.

UNIT-9 MICROWAVE CONTROL AND LOGIC COMPONENTS

- 9.1 PIN diodes, PIN diode Switches,
- 9.2 Phase Shifters, PIN Attenuators,
- 9.3 Modulators and Limiters,
- 9.4 Logic Circuits using transferred Electron Devices,
- 9.5 Logic Circuits using GaAs MESFETs.

UNIT-10 MICROWAVE INTEGRATED CIRCUITS

- 10.1 Planar Transmission Lines,
- 10.2 Technology of Hybrid MICs,
- 10.3 Advantages of MICs,
- 10.4 Difficulties with MICs.

UNIT-11 LUMPED ELEMENTS AT MICROWAVE FREQUENCIES

- 11. Design of Lumped Elements,
- 12. Fabrication of Lumped Elements,
- 13. Measurements on Lumped Elements,
- 14. Circuits using Lumped Elements.

UNIT-12 INDUSTRIAL APPLICATION

- 12.1 Industrial Control and Measurements,
- 12.2 Doppler Motion Sensors,
- 12.3 Applications Based on Microwave Heating.

Reference books:

1. Detlefsen J, Siart U (2009) Grundlagen der Hochfrequenztechnik. Oldenbourg.
2. Heuermann H (2009) Hochfrequenztechnik. Vieweg.
3. Pozar DM (2005) Microwave Engineering. John Wiley & Sons.
4. Dellsperger F (2010) Smith-Chart Tool <http://www.fritz.dellsperger.net/downloads.htm>.