

ECMC1T4: Microstrip Components And Microstrip Antennas

Unit-I: : Microstrip Transmission Lines

Introduction, microstrip capacitance evaluation, characteristic impedance, the microstrip line in free space, effective relative permittivity. Practical microstrip lines- losses, shielding, substrate materials, dispersion, modes of propagation.

Unit-II: Microstrip Components (Lumped & Distributed) – 1

Planar microwave lumped inductors and capacitors, quasi lumped elements- short line sections & stubs. Interdigital, Metal –Insulator- Metal(MIM) capacitors. Design of inductors and capacitors. Micro strip resonators.

Unit-III: Microstrip Components – 2

High and low impedance short line sections open and short circuited stubs. Power dividers & combiners-type's circulators. Microstrip filters – low pass, high pass, band elimination and band pass filters. Microstrip terminations- short, matched and other terminations.

Unit-IV: Introduction to Microstrip Antenna

Definition, advantages, disadvantages of microstrip antenna. Radiation mechanism and radiated fields of microstrip antenna. Various microstrip antenna configurations and their excitation techniques. Surface wave phenomena.

Unit-V: Rectangular Microstrip Antennas

Analysis methods of rectangular microstrip antennas- vector potential approach, Dyadic Green's function technique, radiating aperture method, cavity model, model expansion model, transmission line model and others. Procedure to determine width, length, radiation pattern, band width, beam width, directivity, gain and losses of rectangular microstrip antenna, applications of rectangular microstrip antenna.

Unit –VI: Circular Microstrip Antenna

Analysis methods, cavity model with feed, model expansion model, Greens function model. Analysis of half disc antenna and annular antennas- resonance frequency, radiation fields. Procedure to determine radius, input impedance, radiation pattern, band width, directivity, gain, radiation resistance, losses of circular disc antennas. Applications of circular microstrip antennas.

Unit-VII: Microstrip Slot Antennas

Rectangular slot antennas- narrow slot, wide slot, tapered slot, circularly polarized antennas. Annular slot antennas. Comparison of slot antennas with patch antennas.

Unit-VIII Microstrip Antenna Feeds

Introduction, coupling to microstrip patches-coplanar coupling, probe coupling, aperture coupling, electromagnetic coupling. Parallel feeds for one and two demensions, series feed for one dimensions, combined feeds.

Text Books:

1. Microstrip and Printed Antenna Design – Bancroft, PHI
2. Microstrip Antennas – Prakash Bhartia and Inder Bahl, Artech House.
3. Microstrip Antennas- David M. Pozar and Daniel H. Schaubert, IEEE Antennas & Propagation Society, 1995.
4. Hand book of Microstrip Antennas- J.R. James and P.S.Hall, peter peregrinus Ltd., London,1989.
5. Microstrip Filters for RF / Microwave Applications- JIA-Sheng Hong, M.J.Lancaster, John Wiley & Sons. 2001.
6. Compact Broad Band Microstrip Antennas- Kin-Lu Wong, John Wiley & Sons. 2002.
7. Microwave Engineering using Microstrip Circuits- E.H.Fooks, R.A.Zakarevicius,Prentice Hall,1990.
8. Microstrip Circuits – Fred Gardiol, John Wiley & Sons.

Reference Books:

1. Microwave Solid State Circuits and Applications- Kai Chang, John Wiley & Sons.
2. Microstrip Antenna Design Hand Book – Ramesh Garg, Prakash Bhartia,Inder Bahl, Apisak Ittipiboon, Artech House,2001.
3. Broad Band Microstrip Antennas – Girish Kumar, K.P.Ray, Artech House,2003.
4. Microwave Devices Circuits and their Applications- Charles A. Lee & G.Conrod Delman, John Wiley & Sons.

