MEMT – 301 (A) Microwave Measurements

Unit 1

Microwave detectors, detector characteristics, law of detection, detector mounts, tuning arrangements of probes. Slotted line, effect of penetration of probe, measurement of VSWR and transmission line impedance, measurement of detection law, effect of detection law on VSWR measurement, techniques of high VSWR measurement, VSWR meter.

Unit 2

Measurement of impedance, S – parameter of networks, Smith chart, reflecto meter and network analysis. Measurement of high, medium and low microwave power, Bolometers, Power bridges and calorie meters.

Unit 3

Measurement of microwave frequency, standard resonating cavities, electronic method of measurement, Microwave counters, comparison of various methods.

Unit 4

Microwave components – attenuator, Phase shifters wave-guide joints, directional couplers, matching screw wave-guide excitation connectors and cables.

Unit 5

Antenna measurement – antenna pattern, antenna impedance, near field and far field errors, anechoic chambers, Antenna Range.

Books Recommended :

1. A.K. Maini – Microwave & Radar, Khanna Publisher

MEMT – 301(B) Antenna Engg.

Unit 1
Review of e.m. waves, fields solution in free space, generalized plane wave representation of spherical and other waves, radiation conditions at infinity, elementary current and aperture element sources, Equivalence theorems, antenna impedance, mutual impendence calculation between wire antennas and aperture antenna in infinite conductor plane.

Unit 2
Relationship between radiation pattern and source current distributions, Radiation pattern and aperture field distribution, Diploes, helical and rhombus antennas.

Unit 3
Antenna arrays, mathematical theory of uniform and non-uniform arrays. Beam width, SLL, gain of long arrays. Planar arrays, change in element radiation pattern in array environment. Trade off between SLL and beam width, design by Tsebycheff and other methods, optimum Taylor's distribution.

Unit 4
Aperture antenna analysis, box and horn antenna, reflector antennas, parabolic and cassagrain antenna design. Corrugated horns, Lense antennas – dielectric and metallic.

Unit 5
Antenna bandwidth considerations, broadband antennas.Electronically scanned arrays, design considerations feed systems. Strip line antennas, design and applications.

Reference Books:

1. Antenna Engineering – Krans

2. Electromagnetic Fields & Radiating Systems – Jordan & Balmaini

MEMT – 302 (A) Microwave Transmission Systems

Unit 1
Laplace and Poisson's equations, solution in two and three-dimensional space with finite and infinite boundaries, examples in rectangular, cylindrical and spherical coordinates.

Unit 2
Time harmonic fields, average energy stored, complex poynting vector Boundary condition, surface currents, surface resistance, oblique and normal incidence of polarized plane waves on dielectric discontinuities and conductor boundaries, reflection coefficients and equivalent transmission line representations, circular polarization, conversion of plane polarized to circular polarized wave representations, waves on guiding structures, modes on homogeneous uniform guides with singly connected and multi connected conductors boundaries.

Unit 3
Modal vectors and modal voltages, modal expansion of wave guide fields, application in excitation, transition, irises, windows etc. Non – homogeneous guides, hybrid modes, examples.

Unit 4
Dielectric wave-guides, optical fiber modal analysis, single mode operation of fiber, multimode operation and axially weak waves. Microwave resonators, general consideration, rectangular, cylindrical, circular and Andry Perrot resonators, microwave filters.

Unit 5
Variational and perturbational methods applied to wave-guides and cavities.Scattering parameter analysis of microwave networks. Loss less and non-reciprocal networks properties and examples.

Unit 6
Micro strip lines, quasi TEM modes, design considerations circuit design with micro strip lines, periodic and slow wave structures, Flouquet theorem and its applications.

Books Recommended :
1. Microwave Devices and Circuits – Liao S.
2. Foundation for Microwave Engineering – Collins
3. Microwave Engineering – K.C. Gupta.
4. Microwave Engineering and Applications – Gandhi

MEMT – 302 (B) System Programming

Unit 1
Fundamentals of Programming. Steps in problem solving with digital computer Algorithms. Flow charts and Textual representations. Primitive actions, Control constructs like conditionals, iterations, conditional repetitions, recursion, Programming with Pascal or C.

Unit 2
Data & Data types, Data representation Data Structure Array – Various operations with arrays, Concept of Pointers and Pointer manipulations. Pointers for data structures and functions, Static & Dynamic allocations. Implementation with arrays and pointers, Various operations like searching, appending, insertion and deletion in lists. Doubly linked lists and their implementation Stacks, Push/Pop and Top of Stack operations, Application of Stacks, Queues and various operations on Queues. Tree, Binary and K-ary trees, tree traversals, insertions and deletion in trees, B-trees & AVL trees, operations on these trees applications.

Unit 3
Searching and Sorting Linear, Binary & Hash Search, Minimum and Maximum Selection, Divide & Conquer, Sorting, Insertion Sort, Bubble Sort, Quick Sort & Heap Sort, Matrix operations, Dynamic Programming.

Unit 4
Overview of Systems Programs, Assemblers, Interpreters, Compilers, Editors and Operating Systems.
Reference Books:

1. Kunz, Data Structures & Program Design, Prentice Hall 1987.

2. Wirth N, Algorithms + Data Structures = Programs, Prentice Hall.

3. Kernighan & Ritchie, The Programming Language, Prentice Hall.

4. Schieder, Introductory Problem Solving in Pascal, John Wiley.