

NETWORK ANALYSIS AND SYNTHESIS

(Common to ECE and EEE)

Subject Code: 13EE1104

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UNIT-I

NETWORK TOPOLOGY

Linear Graphs in Electrical Networks, Basic Definitions, Incidence, Loop and cut-set matrices, Fundamental Loop and Fundamental Cut-Set Matrices, Graph Theoretic version of KCL and KVL, Loop Impedance and Node Admittance Matrices, Duality in Electrical Networks.

(12 Lectures)

UNIT-II

NETWORK ANALYSIS - I (Differential Equation Approach)

Network elements, Initial and final conditions (Constant flux linkage and Charge theorems), Step and Impulse response of RC & RL Circuits (Concept of time constant), Solution of RLC-Series & Parallel circuits for the step and impulse excitations, Analysis of Transformer (Mutual Inductance).

(12 Lectures)

UNIT-III

NETWORK ANALYSIS USING LAPLACE TRANSFORMS

The Transformed Circuit, Thevenin's and Norton's Theorems, The system function (with poles and zeros), the step and impulse responses, the convolution Integral, The Duhamel Superposition Integral.

(12 Lectures)

UNIT-IV

NETWORK ANALYSIS – II (Two- Ports)

Network functions, Two port Networks: Z,Y,H and T (ABCD) Parameters, Relationship between Two Port parameters, Transfer function using two port parameters, inter connection of two port networks, Analysis of Ladder networks.

(12 Lectures)

UNIT-V

SYNTHESIS OF NETWORKS

Causality and stability, Hurwitz polynomials, Positive Real Functions, Elementary Synthesis procedure, Properties of LC Immittance functions, Synthesis of LC driving point function by Foster's and Cauer Forms, Properties of RC & RL driving Point Function, Synthesis of RC & RL functions Foster's and Cauer Forms.

(12 Lectures)

Text Books:

1. Franklin F.Kuo, “Network Analysis and Synthesis”, Wiley International, 5th Edition, 2012.
2. N.C. Jagan and C. Lakshmi Narayana, “Network Analysis”, B.S. Publications, 2nd Edition, 2008.

Reference Books:

1. M.E. Van Valkenburg, “Network Analysis” Prentice Hall of India Pvt. Ltd., 2000.
2. M.E. Van Valkenburg, “Introduction to Modern Network Synthesis” Wiley Eastern Limited, 1993.
3. Charles K. Alexander, Mathew N.O Sadika “Fundamentals of Electric Circuits” TMH Education Pvt. Ltd, 3rd Editions, 2008.