

Course Title: Network Analysis

Course Code: EEEG 213

Credit Hours: 3

Course Description:

This course presents the understanding of analysis and synthesis of electrical networks including passive and active filters.

Course Contents:

Unit 1: Classical Solution of First Order Differential Equations

Differential operator, Operational impedance, Forced solution, Transient solution, Formulation of differential equations, Step response of RL circuit, Time constant, Step response of RC circuit, time constant

Unit 2: Classical Solution of Second Order Differential Equations

Step response of second order system – RLC circuit, Response as related to s-plane location of roots, Response of RL circuit to sinusoidal input, Response of RLC circuit to sinusoidal input

Unit 3: Laplace Transform techniques for Solutions of Ordinary Differential Equations

Basic theorems of Laplace transform, Laplace transform of common forcing functions, partial fraction expansion, Solution of first order RL and RC circuits, Solution of second order RLC circuit, transformed circuit

Unit 4: Transfer functions, Poles and Zeros of Networks

Transfer function, Relationship between pole/zero locations and system time response

Unit 5: One Port Passive Circuits

Properties of passive circuits, Positive real functions; Properties of lossless circuits

Unit 6: Two-Port Parameters of Networks

Definitions of two-port networks, Short circuit admittance parameters, Open circuit impedance parameters, Transmission parameters, Hybrid parameters, inter-relationship between parameters of two port network, series, parallel and cascade networks.

Unit 7: Introduction to Filters

Frequency response and Bode plots, kinds of filters in terms of frequency response, passive and active filters, design of analog filters

References:

1. M E Van Valkenberg, *Network Analysis*, 3rd Ed. PHI 1994
2. V. Del Toro, *Electrical Engineering Fundamentals*, 2nd edition, PHI, 1986
3. J. Michael Jacob, *Applications and design with analog integrated circuits*, 2nd edition, PHI, 1996
4. M. E. Van Valkenberg, *Analog Filter Design*, HRW Inc. New York 1982