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, Initial conditions and final conditions in network, Response of RL circuit with step input, exponential input and sinusoidal input, Time constant for RL circuit, Response of RC circuit with step input, exponential input and sinusoidal input

Unit 2: Classical Solution of Second Order Differential Equations
Response of series and parallel RLC circuit to step and exponential inputs, Response of series 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, Heaviside's expansion theorem, Responses of RL and RC circuits with step, exponential and sinusoidal input, Response of series and parallel RLC circuit with step, exponential and sinusoidal input, transformed circuit

Unit 4: Transfer functions, Poles and Zeros of Networks
Transfer function, poles and zeros of networks, Relationship between poles/zeros locations and system time response

Unit 5: One Port Passive Circuits
Hurwitz polynomials and properties, Positive real functions, Foster and Cauer forms, Synthesis of RL, RC and LC networks

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: Frequency Response of networks
Frequency response, Magnitude and phase response, Bode plots

References:
1. M E Van Valkenberg, *Network Analysis,* Prentice Hall India
2. V. Del Toro, *Electrical Engineering Fundamentals*, Prentice Hall India
3. F. Kuo, Network Analysis and Synthesis, Wiley India Pvt. Ltd.

Evaluation:
In-Semester Evaluation: 50%
End-Semester Evaluation: 50%