Electrical Network Analysis

Code	Credit Hours
EE-211	3-1

Course Description

The course is designed to analyze the natural and complete response of first and second order circuits to constant/ non constant forcing functions in time, frequency and s domain. Concepts like frequency/AC response of RLC circuits, phasors, complex impedance, power transfer, resonance and Laplace transform as circuit analysis tools are discussed in detail. In addition to class lectures, comprehensive laboratory exercises are also designed so that theoretical knowledge may be coincided with practical.

Text Book:

1. Electric Circuits Fundamentals, 1st Edition, by Sergio Franco, Oxford English Press

Reference Book:

1. Fundamentals of Electric Circuits, 5th Edition, by Charles K. Alexander & Matthew N.O.Sadiku, McGraw Hill.
2. Engineering Circuit Analysis ,8th Edition. by W. H. Hayt Jr (late), Jack Kemmerly (late) and Steven Durbin

Prerequisites

EE-111 Linear Circuit Analysis

ASSESSMENT SYSTEM FOR THEORY

Quizzes	10%
Assignments	10%
Mid Semester Exam	30%
ESE	50%

ASSESSMENT SYSTEM FOR LAB

Project	10%
Lab Work and Report	70-80%
Lab ESE/Viva	20-30%

Teaching Plan

Week No	Topics	Learning Outcomes
1-3	Transient Response	Natural Response of Series and Parallel RLC Circuits, Step Response of Series and Parallel RLC Circuits, Transients Response of General Second Order Circuits
4-5	AC Response	AC Response of First and Second Order Circuits, AC Resonance in Series and Parallel Circuits
6-8	AC Circuit Analysis	Phasor Analysis of AC Circuits: Nodal Analysis, Loop/Mesh Analysis, Source Transformation, Superposition , Op Amp AC Circuits, Thevenin and Norton Theorem, Maximum Power Transfer Theorem
9	**MID TERM EXAM**	
10-11	AC Power and Three Phase Circuits	Real, Reactive, Apparent and Complex Power, Power Factor Correction. Power Conservation, Introduction to Three Phase Circuits
12-13	Frequency Response	Network Function in S- Domain and Frequency Response Using Bode Plots

14	Magnetically Coupled Circuits	Dot Conventions, Mutual Inductance and Magnetically Coupled Circuits, Ideal Transformer
15-17	Laplace Transform and S-Domain Circuit Analysis	Intro to Laplace Transform, Circuit Analysis in S-Domain,
18	**End Semester Exam**	

Practical:

Experiment No	Description
1	Introduction to Lab Equipment
2	Transient Analysis of RC circuit and determination of Time Constant
3	Transient Analysis of 2nd Order Circuit
4	Introduction to LT Spice
5	Study of Resonance in Series RLC Circuit
6	Study of Frequency Response of Passive RC & RL Low Pass Filters
7	Study of Frequency Response of Passive RC & RL High Pass Filters
8	Study of Frequency Response of Passive RC based Band Pass Filter
9	Analysis of Active Low Pass Filter using R, C & OP AMP
10	Analysis of Active High Pass Filter using R, C & OP AMP

11	Analysis of Active Band Pass Filter using R, C & OP AMP
12	Analysis of Multi-Source AC Circuits Using Superposition Theorem
13	Determination of and Power Factor and Significance of PF correction for AC Circuit
14	Open Ended Lab (OEL)