Electrical Network Analysis

Code	Credit Hours
EE 211	3-1

Course Description

This is the second course in two part sequence of Electrical Circuit Analysis stream. The course revises the First Order Circuits. Then course introduces the time domain analysis of second order circuits, resonance and analogue filters. Then it covers the steady state solution of linear circuits (comprising resistors, capacitors, inductors and controlled sources) excited by sinusoidal sources using 'Phasor Method'. AC power analysis and poly-phase circuits are introduced. Next part of the course introduces the students to magnetically coupled circuits and linear and ideal transformers. Laplace Transform techniques are introduced followed by their application to linear circuit analysis.

Text Book:

1. Fundamentals of Electric Circuits (Fifth Edition); by Charles K Alexander and Matthew N.O. Sadiku
2. Engineering Circuit Analysis (Eighth Edition); by W. H. Hayt Jr (late), Jack Kemmerly (late) and

Reference Book:

1. Introductory Circuit Analysis by Rober L. Boylestad

Prerequisites

EE-111

ASSESSMENT SYSTEM FOR THEORY

Quizzes	15%
Assignments	5%
Mid Terms	30%
ESE	50%

ASSESSMENT SYSTEM FOR LAB

Assignments	n/a
Lab Work and Report	70%
Lab ESE/Viva	30%

Teaching Plan

Week No	Topics	Learning Outcomes
1-2	Revision of First Order Circuits	Course Introduction ,Step response of RL and RC Circuits. Natural, Forced and Complete Response.
3-5	Second Order Circuits	Characteristic Equation, Overdamped Response, Critically and Underdamped Response to DC and AC Sources. Lossless LC circuit. Series and Parallel resonance. Quality Factor and Analog Filters
6-8	Sinusoidal Steady State Analysis	Properties of Sinusoids, Phasors, Impedance, Circuit analysis in phasor domain
9	**MID Term Exam**	
10-13	AC Power	Real power Reactive Power Complex Power RMS – DC value Power factor correction Poly Phase circuits Delta Connected sources and loads Wye connected sources and loads
14	Magnetically coupled circuits	Dot convention Energy in coupled circuits Ideal transformer
15-17	Laplace Transform	Complex Frequency S domain Analysis Two port parameters
18	**End Semester Exam**	

Practical:

Lab Experiments:	
Lab 01:	Function Generator and Digital Oscilloscope Operation
Lab 02:	Step Response to RL and RC Circuits
Lab 03:	Step Response to Series RLC Circuits
Lab 04:	Sinusoidal Response Analysis and Simulation of Phase Shifter
Lab 05:	Capacitive Phase Shift and Reactive Power (Part 1)
Lab 06:	Inductive Phase Shift and Reactive Power
Lab 07:	Power in AC Circuits
Lab 08:	Balanced Three-Phase Delta and Wye Circuits (**Part One**)
Lab 09:	Balanced Three-Phase Delta and Wye Circuits (**Part Two**)
Lab 10:	Use of Matlab for s-Domain Circuit Analysis
Lab 11:	Use of PSpice for Phasor Domain Circuit Analysis and Frequency Response Analysis
Lab 12:	Analysis of Series RLC Circuit in Terms of Amplitude and Phase Angle – Hardware
Lab 13:	Implementation of Tuned Circuit and Frequency Response