Linear Circuit Analysis

Code	Credit Hours
EE 111	3-1

Course Description

The Linear Circuit Analysis is the first course covering the Electric Circuits and Electronics stream. This course provides the undergraduate students with the foundation of basic laws and theory of basic linear electric circuits using passive elements. The course introduces concepts of charge, current and voltage to be followed with the description of current and voltage sources. An introduction to networks and circuits is accompanied by detailed discussion of Ohm's law and the Kirchhoff's laws. This is followed by circuit analysis techniques using Nodal and Mesh Analysis with particular reference to *super-node* and *super-mesh.* A comparison of Nodal and Mesh analysis is also made. The course also covers Circuit Analysis Techniques including linearity and superposition and source transformations; important theorems like Thevenin's, Norton's and Maximum Power Transfer Theorem. The circuit reduction techniques covering Delta-Wye conversion are also covered to allow the students to analyze the simplified circuits. After the resistive circuit analysis, the study of an important building block (Operational Amplifier) and energy storage elements (capacitors and inductors) is made. Transient and Steady State analysis of first order RC and RL circuits with unit step forcing function followed by more complex series and parallel RLC circuits are covered.

Text Book:

1. Fundamentals of Electric Circuits (Fifth Edition); by Charles K Alexander and Matthew N.O. Sadiku

Reference Book:

1. Engineering Circuit Analysis (Eighth Edition); by W. H. Hayt Jr (late), Jack Kemmerly (late) and Steven Durbin

Prerequisites

NA

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	Introduction	Charge, Current, Voltage, Power, Energy in circuits
3-8	Circuit Analysis	Ohms law, KVL, KCL Mesh and Nodal Analysis Series and Parallel connections Superposition Source Transformation Thevenin and Nortons thoerem
9	**MID Term Exam**	
10-13	Op Amp	Operational Amplifier Summing and difference amplifier Instrumentation amplifier
14	1st order circuits	RC Circuits RL Circuits Transient and Forced Response to DC
15-17	2nd order circuits	Series RLC Overdamped Critically damped Underdamped
18	**End Semester Exam**	

Practical:

Lab Experiments
Lab1: Introduction To Basic Laboratory Equipment and Identification of Resistor colour codes
Lab 2: Introduction To PSPICE/LTSpice
Lab 3: Verification of KVL, KCL, Voltage & Current Divider Rule
Lab 4: Introduction to Multisim
Lab 5: Nodal Analysis
Lab 6: Mesh Analysis
Lab 7: Thevenin's Equivalent Circuit
Lab 8: Norton's Equivalent Circuit
Lab 9: Verification of Maximum Power Transfer Theorem
Lab 9: Verification of DELTA-WYE Conversion
Lab 10: Operation Of Oscilloscope and Function Generator
Lab 11 & 12: Operational Amplifier
Lab 13 & 14: RC and RL Circuits Transient and Forced Response
Lab 15: RLC Circuits Transient and Forced Response
Lab 16: Lab Exam/Semester Project Presntation