Linear Circuit Analysis

Code	Credit Hours
EE-111	3-1

Course Description

The course is designed to acquaint students with basic circuit concepts, theorems and analysis techniques for circuits consisting of resistance, capacitor , inductor and independent/dependent sources with emphasis on the procedures for equivalence, modeling, loading, DC response and power transfer. In addition to class lectures, comprehensive laboratory exercises are also designed so that theoretical knowledge may be consolidated with practical examples.

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 ,9th Edition. by W. H. Hayt Jr (late), Jack Kemmerly (late) and Steven Durbin

Prerequisites

Nil

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	Fundamental Circuit Concepts	Current, Voltage, Power, Circuit Terminology, Passive Sign Convention, Power Conservation, Electrical Sources, Ohm Law, KCL, KVL, Equivalent Resistance, Voltage and Current Dividers
4-8, and 10	Circuit Analysis Techniques	Nodal Analysis, Loop/Mesh Analysis, Linearity and Superposition, Source Transformation, Thevenin Theorem, Norton Theorem, Maximum Power Transfer Theorem
9	**MID TERM EXAM**	
11-12	Operational Amplifier	Basic OP Amp Configurations: Inverting and Non-Inverting Amplifiers, Voltage Follower, Summing and Difference Amplifiers, Circuit Analysis using Op Amp
13-14	Capacitor and Inductor	Element Laws, Voltage and Current Characteristics, Energy Storage and Power, Series and Parallel Connections, Duality
15-17	Transient Response of First Order Circuits	Natural Response of RC and RL Circuits, Forced Response of RC and RL Circuit, Transients Response of General First Order Circuits

18	**End Semester Exam**

Practical:

Experiment No	Description
1	Introduction: Basic Concepts and Lab Equipment
2	Experimental Verification of Kirchoff's Current Law (KCL) and Kirchoff's Voltage Law (KVL)
3	Experimental Verification of Voltage & Current Divider Rule
4	Computer Aided Analysis of Circuits: Introduction to LTSpice
5	Experimental Verification of Nodal Analysis
6	Experimental Verification of Mesh Analysis
7	Experimental Verification of Superposition Theorem
8	Experimental Verification of Star-Delta Transformation.
9	Experimental Verification of Thevenin's & Norton Theorems
10	Experimental Verification of Maximum Power Transfer Theorem.
11	Implementation of Inverting & Non-Inverting Amplifier (OP AMP Applications).
12	Implementation of Summing Amplifier (OP AMP Applications)
13	Transient Analysis & Time Constant Determination of RC Circuit
14	Open Ended Lab (OEL)