Electrical Circuit Analysis

Authors

Dr. V. Chandra Jagan Mohan
Associate Professor
Department of EEE
Institute of Aeronautical Engineering College
Dundigal, Hyderabad-500043

Mr. T. Anil Kumar
Assistant Professor
Department of EEE
Institute of Aeronautical Engineering College
Dundigal, Hyderabad -500043

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P.No:+91 40 23710657, 238000657 Fax: +91 40 23810657

Reg. Off

5-68, Pedda Gorpadu, Pakala, Tirupati, Chittoor - 517 112 AP, INDIA
mail:studentshelpline.in@gmail.com
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Electrical Circuit Analysis

Module-I: Introduction to Electrical Circuits

Circuit Concept: Basic definitions, Ohm's law at constant temperature, classifications of elements, R, L, C parameters, independent and dependent sources, Kirchhoff's laws, Equivalent Resistance of series, Parallel and series parallel networks.

Analysis of Electrical Circuits: Source Transformation, Star to Delta and Delta to Star transformation, Mesh analysis and Nodal analysis by Kirchhoff's laws, inspection method, super mesh, super node analysis.

Module-II: AC Circuits

Single Phase AC Circuits: Representation of alternating quantities, Instantaneous, peak, RMS, average, form factor and peak factor for different periodic waveforms, phase and phase difference, 'j' notation, Concept of reactance, impedance, susceptance and admittance, rectangular and polar form. Concept of power, real, reactive, apparent power and complex power, power factor. Analysis of single phase AC Circuits consisting of R, L,C, RL, RC and RLC combinations.

Module-III: Magnetic Circuits and Network Theorems

Faraday's laws of electromagnetic induction, conpect of self and mutual inductance, dot convention, coefficient of coupling, composite magnetic circuit, analysis of series and parallel magnetic circuits, behaviors of series and parallel resonant networks.

Theorems: Zero Current Theorem, Tellegen's, Superposition, Reciprocity, Voltage Shift Theorem, Thevenin's, Norton's, Maximum power transfer and Milliman's and compensation theorems for DC excitations.

Module-IV: Solution of First and Second Order Networks

Inditial conditions, transient response of RL, RC and RLC series circuits with DC excitation, differential equation and Laplace transform approach.

Module-V: Two Port Network Parameters

Two port network parameters: Z,Y,ABCD, nybrid and inverse hybrid parameters, conditions for symmetry and reciprocity, inter relationships of different parameters, interconnection(series, parallel and cascade) of two port networks, image parameters .

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Chapter-I: Introduction to Electrical Circuits