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learn how to apply superposition thevenin s theorem and norton s theorem to analyze linear circuits with resistive capacitive and inductive elements see examples definitions and applications of linear circuits in electronics linearity is a mathematical concept that has a profound impact on electronic design the idea itself is quite simple but the implications have great meaning for our field first we will talk about the mathematical meaning of linear then we will apply the idea to electronic circuits analyzing a linear circuit requires basic electronics knowledge particularly in ohm s law and kirchoff s laws ohm s law defines the relationship of voltage current and resistor with the following formula $v = ir$ this course explains how to analyze circuits that have direct current dc current or voltage sources a dc source is one that is constant circuits with resistors capacitors and inductors are covered both analytically and experimentally some practical applications in sensors are demonstrated the analysis of a linear circuit can often be done by hand using a scientific calculator in contrast nonlinear circuits usually do not have closed form solutions they must be analyzed using approximate numerical methods by electronic circuit simulation computer programs such as spice if accurate results are desired although all real circuits are nonlinear to some degree in most cases a linear treatment gives sufficiently accurate results and even for circuits containing highly non linear elements methods can often be devised for dealing with them on a linear basis linear circuits consisting solely of components with constitutive relations that pass through the origin of $i-v$ curves and that are straight lines¹ are considered to be linear circuits for example consider a voltage divider as sketched below circuit elements are described by linear operators linear operations are prevalent in circuit analysis reason 2 to our great relief the two characteristics of linear operators allow us to perform these mathematical operations with relative ease analysis of general lrc circuits consider a circuit with n nodes and b branches containing 2 independent sources 2 linear elements resistors op amps dep sources 2 inductors capacitors such a circuit is described by three sets of equations this course explains how to analyze circuits that have alternating current ac voltage or current sources circuits with resistors capacitors and inductors are covered both analytically and experimentally linear circuit analysis is a comprehensive textbook designed for students pursuing electrical and electronic engineering courses written by bernard james ley this book is part linear circuit analysis i ece 20100 3 cr volt ampere characteristics for circuit elements independent and dependent sources kirchhoff s laws and circuit equations linear circuit analysis davis systematically builds students analytical and problem solving skills through a carefully graduated presentation of concepts the use of catalog description volt ampere characteristics for circuit elements independent and dependent sources kirchhoff s laws and circuit equations source transformation thevenin s and norton s theorems superposition step response of 1st order rc rl and 2nd order rlc circuits use of laplace transform techniques to analyze linear circuits with and without initial conditions characterization of circuits based upon impedance admittance and transfer function parameters determination of frequency response via analysis of poles and zeroes in the complex plane the course introduces the fundamentals of the lumped circuit abstraction topics covered include resistive elements and networks independent and dependent sources switches and mos transistors digital abstraction amplifiers energy storage elements dynamics of first and second order networks design in the time and frequency domains and volume 2ed xvi 717 pages 25 cm an introduction to the basics of electric circuit analysis this textbook covers both traditional material as well as topics such as op amps and the use of digital computers for circuit analysis includes index circuit analysis is the process of finding all the currents and voltages in a network of connected components we look at the basic elements used to build circuits and find out what

happens when elements are connected together into a circuit use circuit analysis techniques to analyze rc rl and rlc circuits with dc excitation perform calculations involving electric charge voltage current energy and power analyze simple resistive dc circuits using ohm s law kirchhoff s voltage law and kirchhoff s current law a linear circuit is an electric circuit in which circuit parameters resistance inductance capacitance waveform frequency etc are constant in other words a circuit whose parameters are not changed with respect to current and voltage is called a linear circuit

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