Anand Kumar Pulse And Digital Circuits Printable PDF

Anand Kumar Pulse And Digital Circuits

Anand Kumar Pulse and Digital Circuits: Unlocking the World of Electronics with Clarity

anand kumar pulse and digital circuits is a phrase that resonates deeply with

students, educators, and electronics enthusiasts alike. For those venturing into the complex yet fascinating realm of electronics, understanding pulse and digital circuits is a fundamental stepping stone. Anand Kumar, renowned for his teaching prowess and clarity, has made these concepts accessible to countless learners, helping demystify the intricacies of electronics with practical insights and a student-friendly approach.

Understanding the Basics: What Are Pulse and Digital Circuits?

Before diving into the nuances that Anand Kumar emphasizes, it?s essential to grasp what pulse and digital circuits actually are. In essence, pulse circuits are electronic circuits that generate or manipulate pulses?short bursts of energy or signals that switch between two levels, typically representing binary values. These pulses form the backbone of digital electronics, where circuits operate using discrete signal levels, usually denoted as 0 and 1.

Digital circuits, on the other hand, process these binary signals to perform logical operations, data storage, and communication tasks. They are the foundation of modern electronics, from microprocessors and memory devices to communication systems and

consumer electronics.

Why Are Pulse Circuits Important?

Pulse circuits serve multiple critical functions in digital systems. They are used to:

Generate timing signals essential for synchronization.

Shape signals to reduce noise and interference.

Control switching devices like transistors and thyristors.

Produce speci?c waveforms used in communication and control.

Anand Kumar?s teachings often highlight how mastering pulse circuit concepts can dramatically improve a learner?s ability to design and troubleshoot complex digital systems.

The Anand Kumar Approach to Pulse and Digital Circuits

What sets Anand Kumar apart in the domain of electronics education is his methodical and student-centric style. His lessons on pulse and digital circuits focus on simplifying complex theories through relatable examples, hands-on experiments, and step-by-step explanations.

Conceptual Clarity Through Visualization

One of Anand Kumar?s signature teaching techniques involves visual aids and waveform illustrations. For instance, when explaining di?erent types of pulses?such as rectangular, triangular, or sawtooth pulses?he uses clear diagrams and real-life analogies. This approach helps students visualize how pulses behave over time, making abstract

concepts tangible.

Linking Theory with Practical Applications

Pulse and digital circuits are often perceived as dry and abstract topics. However, Anand Kumar bridges this gap by connecting theoretical principles with real-world applications. Whether it?s understanding how ?ip-?ops store data or how pulse width modulation controls motor speeds, his examples encourage learners to see the practical utility behind each circuit design.

Core Topics in Pulse and Digital Circuits Explained

Delving deeper into the subject, several key topics are fundamental to mastering pulse and digital circuits. Anand Kumar?s lessons cover these extensively, ensuring a solid foundation for students.

Types of Pulse Circuits

Pulse circuits can be broadly categorized based on their function:

Monostable Multivibrator: Also known as a one-shot pulse generator, it produces

1.

a single output pulse in response to an input trigger.

Bistable Multivibrator: A circuit with two stable states, commonly used in ?ip-?op

2.

designs for memory storage.

Astable Multivibrator: Generates a continuous square wave output without any

3.

external triggering.

Understanding these types helps students grasp how pulse generation and timing are controlled within digital circuits.

Digital Logic and Boolean Algebra

Digital circuits rely heavily on logic gates and Boolean algebra. Anand Kumar emphasizes mastering these concepts because they form the blueprint of digital circuit design. Logic gates like AND, OR, NOT, NAND, NOR, XOR, and XNOR combine to create complex decision-making structures in hardware.

Flip-Flops and Their Signi?cance

Flip-?ops are fundamental building blocks of sequential digital circuits. Anand Kumar?s teachings cover various ?ip-?op types?SR, JK, D, and T?and their operation, timing diagrams, and applications in counters, shift registers, and memory devices.

LSI Keywords Naturally Integrated

Throughout the exploration of anand kumar pulse and digital circuits, related terms such as ?multivibrator circuits,? ?logic gate functions,? ?digital signal processing,? ?timing diagrams,? ??ip-?op truth tables,? and ?pulse width modulation? naturally surface. These keywords enrich the content, making it valuable for learners looking to deepen their knowledge in electronics.

Tips for Mastering Pulse and Digital Circuits

Learning pulse and digital circuits can be challenging, but with the right strategies, it

becomes manageable and even enjoyable. Here are some tips inspired by Anand Kumar?s

teaching philosophy:

Start with Fundamentals: Don?t rush into complex designs without

1.

understanding basic concepts like voltage levels, binary logic, and waveforms.

Practice Drawing Waveforms: Visualizing input and output signals helps in

2.

understanding circuit behavior.

Use Simulation Tools: Software like Multisim or LTspice allows you to build and

3.

test circuits virtually before physical implementation.

Build Simple Circuits: Hands-on experience with breadboards and ICs reinforces

4.

theoretical learning.

Relate to Real-Life Applications: Connect what you learn to devices you use

5.

daily to stay motivated and curious.

The Role of Anand Kumar in Electronics Education

Anand Kumar?s in?uence goes beyond just teaching pulse and digital circuits. His ability to

break down complex topics into digestible lessons has empowered students preparing for competitive exams, engineering courses, and hobbyist projects. His pulse and digital circuits tutorials?often accompanied by clear explanations, problem-solving sessions, and practical demonstrations?have become a go-to resource for many learners.

By focusing on conceptual understanding paired with application, Anand Kumar ensures that students don?t just memorize facts but truly comprehend how electronic circuits function, paving the way for innovation and creativity.

How to Access Anand Kumar?s Resources

For those keen to learn directly from Anand Kumar, numerous resources are available online, including video lectures, PDFs, and interactive sessions. These materials cover a wide array of topics in electronics, with pulse and digital circuits being a core part of the curriculum.

Engaging with these resources regularly, participating in doubt-clearing sessions, and attempting practice problems can signi?cantly boost one?s pro?ciency in the subject.

In the vast and evolving landscape of electronics, understanding pulse and digital circuits is indispensable. Thanks to educators like Anand Kumar, this journey becomes less daunting and more rewarding, inspiring a new generation of innovators and problem solvers. Whether you?re a student taking your ?rst steps or an enthusiast aiming to sharpen your skills, diving into anand kumar pulse and digital circuits is a smart and enriching choice.

Question

Answer

Who is Anand Kumar in the context of pulse and digital circuits?

Anand Kumar is an educator and author known for his contributions to teaching electronics, especially pulse and digital circuits, through his books and online tutorials.

What are the key topics covered by Anand Kumar in his pulse and digital circuits lectures?

Anand Kumar covers topics such as digital logic gates, ?ip-?ops, counters, shift registers, pulse generation, timing circuits, and digital system design.

How does Anand Kumar explain the concept of pulse circuits in digital electronics?

Anand Kumar explains pulse circuits by detailing the generation, shaping, and timing of pulses used to control

digital devices, emphasizing practical applications and

waveform analysis.

Are Anand Kumar?s digital

circuits tutorials suitable for

beginners?

Yes, Anand Kumar?s tutorials are designed to be

beginner-friendly, starting with fundamental concepts

and gradually progressing to more complex digital

circuit designs.

Where can I ?nd Anand

Kumar?s resources on pulse

and digital circuits?

Anand Kumar?s resources can be found on educational

platforms like YouTube, his o?cial website, and in

textbooks authored by him focusing on digital

electronics and pulse circuits.

Anand Kumar Pulse and Digital Circuits: A Comprehensive Review

anand kumar pulse and digital circuits have become a signi?cant reference point for

students and professionals delving into the intricacies of electronic engineering. Anand

Kumar, widely recognized for his educational contributions, particularly in mathematics

and engineering, has extended his expertise into the realm of pulse and digital circuits, o?ering valuable insights that bridge theoretical concepts and practical applications. This article aims to explore the nuances of his work, the educational methodologies he employs, and the broader signi?cance of pulse and digital circuits in modern electronics.

Understanding Pulse and Digital Circuits in Anand Kumar?s Framework

Pulse and digital circuits form the backbone of contemporary digital electronics, enabling the operation of devices from microprocessors to communication systems. Anand Kumar?s approach to these subjects is grounded in clarity and accessibility, which helps demystify complex topics such as signal waveforms, timing diagrams, and digital logic design.

In pulse circuits, transient signals or pulses?brief bursts of energy?are fundamental for switching and timing operations. Anand Kumar?s lessons often emphasize the importance of understanding pulse generation, shaping, and propagation, which are critical in designing clocks, timers, and digital counters.

Digital circuits, on the other hand, operate using discrete voltage levels, representing binary states (0 and 1). Anand Kumar?s instructional material systematically covers logic gates, ?ip-?ops, multiplexers, and sequential circuits, providing a robust foundation for learners to grasp how digital systems process information.

The Educational Impact of Anand Kumar?s Teaching Style

One of the distinguishing features of Anand Kumar?s coverage of pulse and digital circuits is his pedagogical strategy. He blends theoretical exposition with problem-solving

exercises, which is particularly e?ective for engineering students preparing for competitive exams or university courses.

His teaching often includes:

Step-by-step derivations of circuit equations

1.

Visual aids such as waveform diagrams and circuit schematics

2.

Real-world examples illustrating the application of pulse circuits in timers and digital

3.

clocks

Comparative analysis of di?erent digital logic families like TTL and CMOS

4.

This multifaceted approach not only aids comprehension but also fosters analytical thinking, enabling students to troubleshoot and design circuits independently.

Technical Aspects and Key Concepts Highlighted by Anand Kumar

Anand Kumar?s content on pulse and digital circuits extensively covers core concepts that are crucial for both academic and practical understanding.

Pulse Generation and Characteristics

Pulse circuits are vital for generating signals with speci?c timing and amplitude

characteristics. Anand Kumar meticulously explains parameters such as pulse width, rise time, fall time, and duty cycle, which directly in?uence circuit behavior.

For example, in monostable multivibrators, a single pulse of a de?ned duration is generated upon triggering. Anand Kumar?s analysis outlines how component values a?ect pulse duration, providing formulas and examples that link theory to circuit design.

Digital Logic Gates and Their Implementation

Digital circuits rely heavily on logic gates, which perform basic Boolean operations. Anand Kumar?s tutorials cover:

AND, OR, NOT gates ? fundamental building blocks

1.

NAND and NOR gates ? universal gates used to implement any logic function

2.

XOR and XNOR gates ? for parity checking and equality detection

3.

He further explores the practical implementation of these gates using di?erent transistor technologies and their voltage-level characteristics, providing insight into speed, power consumption, and noise margins.

Flip-Flops and Sequential Logic

Sequential circuits, which depend on past inputs to determine current outputs, are a complex topic that Anand Kumar addresses with clarity. His explanations of SR, JK, D, and T ?ip-?ops delve into their truth tables, excitation tables, and timing diagrams, essential

for understanding memory elements in digital systems.

He also connects these concepts to real-world applications such as counters and shift registers, emphasizing how pulse inputs control state transitions.

Comparative Insights: Pulse and Digital Circuits in Contemporary Electronics

While Anand Kumar?s educational materials provide foundational knowledge, it is important to contextualize pulse and digital circuits within today?s rapidly evolving electronic landscape.

Advantages and Challenges in Modern Circuit Design

Pulse circuits are indispensable in timing and control applications, but they also face challenges such as signal distortion and noise susceptibility. Anand Kumar?s work touches upon these issues, highlighting the need for careful design considerations like impedance matching and shielding.

Digital circuits, celebrated for their robustness and scalability, still contend with power dissipation and heat generation as device densities increase. Comparisons among logic families, including TTL, CMOS, and ECL, feature in Anand Kumar?s teachings, shedding light on trade-o?s between speed, power, and cost.

Integration with Microcontrollers and DSP Systems

The integration of pulse and digital circuits with microcontrollers and digital signal processors (DSPs) marks a signi?cant advancement in electronics. Anand Kumar?s

materials often illustrate how pulse shaping and digital logic underpin communication protocols, timing controls, and data processing in embedded systems.

This linkage underscores the relevance of mastering pulse and digital circuit principles for engineers aspiring to innovate in ?elds such as IoT, telecommunications, and automation.

Essential Learning Tools and Resources in Anand Kumar?s Curriculum

Beyond theoretical exposition, Anand Kumar emphasizes hands-on learning through simulation software and experimental kits, which are invaluable for mastering pulse and digital circuits.

Simulation Software

Tools like Multisim, Proteus, and MATLAB Simulink are frequently recommended to visualize circuit behavior, perform transient analysis, and validate design parameters without physical hardware constraints.

Practical Experimentation

Using breadboards, oscilloscopes, and logic analyzers, students can observe pulse signals and digital waveforms ?rsthand. Anand Kumar?s problem sets often encourage such experimentation, reinforcing concepts through experiential learning.

The Role of Anand Kumar Pulse and Digital Circuits in Academic and Professional Settings

The comprehensive nature of Anand Kumar?s work has made it an indispensable resource for competitive exam aspirants, undergraduate students, and early-career engineers. The

clear articulation of fundamental and advanced concepts enables learners to build a solid foundation, which is critical for ?elds like electronics design, embedded systems development, and telecommunications engineering.

Moreover, his integration of analytical reasoning with practical examples equips readers to tackle real-world challenges, making his contributions valuable beyond academic contexts.

The evolving nature of pulse and digital circuits, driven by advances in semiconductor technology and digital communication standards, ensures that Anand Kumar?s educational approach remains relevant. By focusing on fundamental principles alongside contemporary applications, he prepares learners to adapt and innovate in a technology-driven world.

Anand Kumar electronics, pulse circuits, digital electronics, Anand Kumar lectures, pulse and digital circuit theory, digital logic design, signal processing, electronic pulses, digital systems, Anand Kumar tutorials

topic 4 electric circuits

Topic 4 Electric Circuits

Topic 4 Electric Circuits: Understanding the Basics and Beyond

topic 4 electric circuits form the foundation of countless devices and systems we rely

on every day, from the simplest ?ashlight to the most complex computer motherboard.

Diving into this topic not only reveals the principles behind electricity ?ow but also opens

up a world of practical applications and innovations. Whether you?re a student beginning

your journey in electronics or an enthusiast curious about how circuits work,

understanding topic 4 electric circuits is essential.

The Fundamentals of Topic 4 Electric Circuits

When discussing topic 4 electric circuits, it's important to start with the basic elements

that make up any circuit. At its core, an electric circuit is a closed loop that allows current

to ?ow, powering various components along the way.

Key Components in Electric Circuits

Every electric circuit includes several fundamental parts:

Power Source: Supplies electrical energy, often a battery or power supply.

1.

Conductors: Usually wires that connect components, allowing current to ?ow.

2.

Load: The device or component that consumes electrical energy, like a resistor,

3.

motor, or light bulb.

Switch: Controls the ?ow of electricity by opening or closing the circuit.

4.

Understanding these components helps explain how current ?ows, voltage is distributed,

and energy is consumed within topic 4 electric circuits.

Understanding Voltage, Current, and Resistance

Voltage, current, and resistance are the trio of concepts that de?ne circuit behavior. Voltage can be thought of as electrical pressure pushing electrons through the circuit, current is the ?ow rate of electrons, and resistance is anything that impedes that ?ow. Ohm?s Law, which states that V = IR (Voltage = Current × Resistance), is fundamental when analyzing topic 4 electric circuits. This relationship allows you to calculate one quantity if the other two are known, making troubleshooting and design more manageable.

Types of Electric Circuits in Topic 4

Electric circuits can be broadly categorized based on their con?guration and complexity. Each type serves di?erent purposes and behaves uniquely under various conditions.

Series Circuits

In a series circuit, components are connected end-to-end, forming a single path for current. One of the de?ning features is that the current ?owing through each component is the same, but the voltage divides among them.

This setup is simple and easy to analyze but has a downside: if one component fails, the entire circuit stops working. Series circuits are often used in applications like holiday string lights, where a single bulb?s failure a?ects all others.

Parallel Circuits

Parallel circuits, on the other hand, have multiple paths for current to ?ow. Each component is connected across the same voltage source, so the voltage across all components remains constant, but the current divides.

This arrangement is more reliable because if one path fails, the others can still operate. Household wiring typically uses parallel circuits to ensure appliances work independently.

Combination Circuits

Many real-world circuits are a mix of series and parallel components, known as combination circuits. These can be more challenging to analyze but o?er ?exibility in design, balancing the advantages of both series and parallel con?gurations.

Analyzing Topic 4 Electric Circuits: Tools and Techniques

Grasping theory is crucial, but being able to analyze and troubleshoot electric circuits is where practical skills shine.

Using a Multimeter

A multimeter is an indispensable tool for anyone working with topic 4 electric circuits. It measures voltage, current, and resistance, helping you verify circuit operation or identify faults.

When testing a circuit, always start by measuring voltage across components to ensure power is present. Then check current ?ow and resistance to detect issues like short circuits or broken connections.

Applying Kirchho??s Laws

For more complex circuits, Kirchho??s Current Law (KCL) and Kirchho??s Voltage Law

(KVL) provide systematic methods for analysis.

KCL: The total current entering a junction equals the total current leaving it.

1.

KVL: The sum of voltage drops around any closed loop equals zero.

2.

Using these laws, you can set up equations to solve for unknown values in circuit networks, which is especially useful in combination circuits.

Practical Applications and Tips for Working with Topic 4 Electric Circuits

Electric circuits are everywhere, and understanding how to work with them safely and e?ectively is invaluable.

Safety First

Always remember that electricity can be dangerous. Before working on any electric circuit, ensure the power is o? and use insulated tools. Familiarize yourself with the circuit diagram and double-check all connections before powering up.

Building Your Own Circuits

Starting with simple circuits on a breadboard is a great way to learn. A breadboard allows you to connect components without soldering, making experimentation easier. Try creating basic series and parallel circuits to see ?rsthand how current and voltage behave.

Common Troubleshooting Tips

If a circuit doesn?t work as expected:

Check all connections for loose wires or poor contacts.

1.

Verify component orientation, especially for polarized parts like diodes and

2.

capacitors.

Measure voltages at di?erent points to locate where power is lost.

3.

Replace suspicious components one at a time to isolate faults.

4.

Advancements and the Future of Topic 4 Electric Circuits

With technology evolving rapidly, electric circuits continue to become more sophisticated and compact. Integrated circuits (ICs) now incorporate thousands or millions of components into tiny chips, powering everything from smartphones to spacecraft. Emerging trends include ?exible circuits for wearable technology, printed electronics, and circuits designed for energy e?ciency and sustainability. Understanding the foundational concepts of topic 4 electric circuits prepares you to appreciate and engage with these cutting-edge developments.

Exploring topic 4 electric circuits reveals a fascinating interplay between physics, engineering, and creativity. Whether you?re wiring a simple LED or designing complex electronics, the principles remain a fascinating and rewarding area to master.

Question

Answer

What is an electric

circuit?

An electric circuit is a closed loop or pathway that allows

electric current to ?ow through it, consisting of components

such as resistors, capacitors, inductors, power sources, and

conductors.

What are the main types

of electric circuits?

The main types of electric circuits are series circuits, parallel

circuits, and series-parallel (combination) circuits.

How does Ohm's Law

apply to electric circuits?

Ohm's Law states that the current ?owing through a

conductor between two points is directly proportional to the

voltage across the two points and inversely proportional to

the resistance, expressed as V = IR.

What is the di?erence

between a series and a

parallel circuit?

In a series circuit, components are connected end-to-end, so the same current ?ows through each component. In a parallel circuit, components are connected across the same voltage source, so the voltage is the same across each component but currents can vary.

How do resistors a?ect electric circuits?

Resistors limit the ?ow of electric current in a circuit and are used to control voltage and current to protect components and manage circuit functionality.

What role do capacitors play in electric circuits?

Capacitors store and release electrical energy, ?lter signals, and manage power supply stability in electric circuits.

What safety precautions should be taken when working with electric circuits?

Safety precautions include turning o? power before working on circuits, using insulated tools, avoiding water near

circuits, wearing protective gear, and understanding circuit diagrams to prevent electric shocks and short circuits.

Topic 4 Electric Circuits: An In-Depth Exploration of Fundamentals and Applications

topic 4 electric circuits form a crucial foundation in the study and application of electrical engineering and physics. These circuits represent the pathways through which electric current ?ows, enabling the operation of countless devices and systems in modern technology. Understanding the principles behind electric circuits, their components, and con?gurations is essential for professionals and enthusiasts aiming to design, analyze, or troubleshoot electrical systems e?ectively.

Understanding the Basics of Topic 4 Electric Circuits

At its core, an electric circuit consists of a closed loop that allows electrons to ?ow uninterrupted, driven by a voltage source such as a battery or power supply. The fundamental components in these circuits include resistors, capacitors, inductors, switches, and power sources, each serving distinct purposes in controlling current, voltage, and energy storage.

Topic 4 electric circuits often emphasize the interplay between these elements and their arrangement. The behavior of the circuit is governed by key laws such as Ohm's Law, Kirchho??s Voltage Law (KVL), and Kirchho??s Current Law (KCL), which provide analytical tools for calculating current, voltage drops, and power distribution across the circuit.

Key Components and Their Roles

Resistors: Used to limit current ?ow and divide voltage, resistors are fundamental

1.

in controlling the electrical characteristics within circuits.

Capacitors: These store and release electrical energy, playing a vital role in

2.

?ltering, timing, and coupling applications.

Inductors: Components that store energy in a magnetic ?eld, inductors are

3.

essential in tuning circuits and managing transient responses.

Power Sources: Batteries and DC power supplies act as the driving force,

4.

providing the necessary voltage and current to the circuit.

Switches: Allow control over the circuit by opening or closing the pathway for

5.

current ?ow.

Types of Electric Circuits in Topic 4

Electric circuits can be broadly categorized based on their con?guration and functionality.

Topic 4 electric circuits typically examine the distinctions between series, parallel, and

combined circuits, each with unique characteristics a?ecting current ?ow and voltage

distribution.

Series Circuits

In a series circuit, components are connected end-to-end, forming a single path for current ?ow. The current remains constant throughout the circuit, but the voltage divides among components based on their resistance values. This con?guration is straightforward to analyze but has limitations, such as the entire circuit ceasing operation if one component fails.

Parallel Circuits

Parallel circuits, in contrast, feature components connected across the same voltage source, creating multiple paths for current. The voltage across each component remains equal, while current divides according to resistance. Parallel circuits o?er advantages in reliability and ?exibility, commonly used in household wiring and electronic devices.

Combination Circuits

Combination or complex circuits integrate series and parallel elements, requiring more sophisticated techniques such as Thevenin?s and Norton?s theorems for analysis. These circuits re?ect real-world applications where devices contain multiple interconnected components.

Analytical Techniques and Tools

Mastering topic 4 electric circuits necessitates pro?ciency in several analytical methods. The cornerstone is Ohm?s Law (V=IR), which relates voltage (V), current (I), and resistance (R). Beyond this, Kirchho??s Laws enable the examination of multi-loop and multi-node circuits by ensuring energy conservation and charge balance.

Mesh and Nodal Analysis

Two powerful techniques for solving complex circuits are mesh analysis and nodal analysis. Mesh analysis focuses on loops within the circuit, de?ning loop currents and applying KVL to form solvable equations. Nodal analysis centers on node voltages, applying KCL to determine potential di?erences.

These analytical approaches are supported by modern simulation tools such as SPICE, Multisim, and MATLAB, which facilitate design validation and troubleshooting without physical prototyping.

Practical Applications and Implications

The study of topic 4 electric circuits extends well beyond theoretical exercises. Electric circuits underpin the operation of everyday electronics, from smartphones and computers to industrial machinery and automotive systems. Understanding their behavior informs the design of energy-e?cient devices and innovative technologies.

Energy E?ciency and Circuit Design

Designers must balance performance with energy consumption. Topic 4 electric circuits explore how component selection and con?guration impact power loss, heat generation, and overall system e?ciency. For example, using low-resistance materials and optimizing circuit layouts can reduce energy waste.

Safety Considerations

Electrical safety is paramount when working with circuits, particularly those operating at

high voltages or currents. Proper grounding, insulation, and circuit protection devices such as fuses and circuit breakers are critical to prevent hazards like short circuits, electrical ?res, or equipment damage.

Emerging Trends and Future Directions

Advancements in semiconductor technology, printed circuit boards (PCBs), and integrated circuits (ICs) continue to evolve the landscape of electric circuits. Topic 4 electric circuits increasingly integrate digital and analog elements, enabling sophisticated control systems, IoT devices, and renewable energy solutions.

Moreover, the rise of simulation software and educational platforms enhances learning and innovation, allowing engineers and students to experiment with complex circuits virtually.

As electric circuits become more compact and multifunctional, the demand for precise analysis and optimization only grows, highlighting the ongoing relevance of foundational knowledge in topic 4 electric circuits within both academic and professional realms.

electric circuits, voltage, current, resistance, Ohm's law, series circuit, parallel circuit, circuit components, electrical power, Kirchho?'s laws

Read the full article online: topic 4 electric circuits