



COM 1226: Computer Technology


Introduction to DC Circuit Analysis

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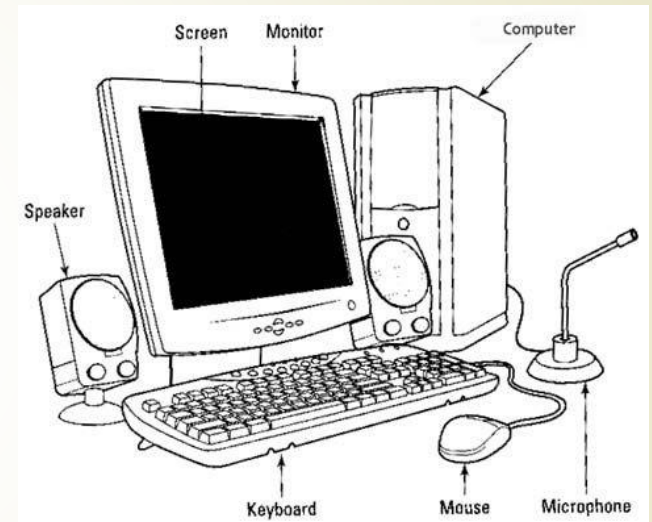


Agenda

- Introduction to Computer System
 - Overview of Simple DC Circuits
 - Summary
 - Exercise
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Introduction to Computer System

- ▶ Electronic machine operating under the control of instructions stored in its own memory
- ▶ –Accepts data
- ▶ –Manipulates data
- ▶ –Produces results
- ▶ –Stores results
- ▶ Computer system make use of Hardware and software to preform task
- ▶ Some examples of Hardware components are CPU, RAM and storage devices.....
- ▶ Computer process data/ actions on a computer system via circuits





Simple DC Circuits



- **Definition of Simple DC Circuit:**

- is an electrical circuit powered by a direct current (DC) source, such as a battery, and includes basic components like resistors, capacitors, and switches connected in a loop to control the flow of electric current.

- **Importance in Electronics:**

- Power Supply: Simple DC circuits provide the necessary power to run computer components like motherboards and processors.
- Component Functioning: They ensure that electronic components receive stable and consistent voltage for proper operation.
- Circuit Design: Understanding DC circuits helps in designing and troubleshooting computer hardware and peripherals.
- Efficiency: They contribute to the efficient performance of computer systems by regulating electrical flow.

- **Real-life Applications:**

Examples include peripheral devices, flashlights, remote controls, and most household electronics that use batteries.



Importance of Simple DC circuits

- ▶ **Foundation of Electronics:** They are the building blocks for more complex electronic devices and systems.
- ▶ **Learning Tool:** They are essential for understanding basic principles of electricity and electronics.
- ▶ **Widespread Use:** Many everyday devices, such as flashlights, toys, and remote controls, use simple DC circuits.



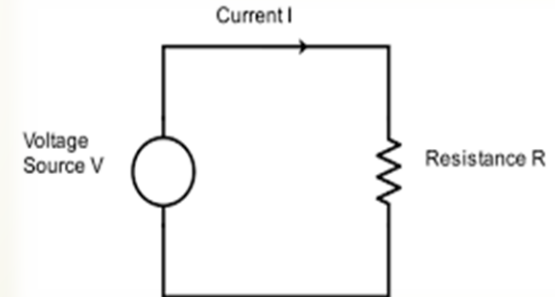
Key Components



- ▶ **Power Sources (Batteries):**
Provides the energy needed for current flow.
- ▶ **Resistors:**
Resistors limit the flow of current and are used to control voltage and current levels in a circuit.
- ▶ **Conductors:**
Wires that carries the current between components.

Basic Concepts in Simple DC Circuit Analysis

- **Voltage (V):**
Voltage is the electrical potential difference between two points. It's what drives current through a circuit.
- **Current (I):**
Current is the flow of electric charge. It's measured in amperes (A).
- **Resistance (R):**
Resistance is the opposition to the flow of current. It's measured in ohms (Ω).
- **Ohm's and Kirchhoff's Laws** are used in simple DC circuit analysis
 - Formula: $V = IR$
 - These laws are essential for analyzing complex circuits with multiple components.
 - **Why?**, helps understand power requirements and ensuring stable operation of computer components.



Tools for Simple DC Circuit Analysis

➤ **Multimeter**

- Used to measure voltage, current, and resistance in circuits.
- A multimeter allows for accurate measurement of electrical properties such as voltage, current, and resistance.
- It is essential for diagnosing, maintaining, and troubleshooting electronic and electrical systems.

➤ **Applications:**

- Power Supply Testing
- Motherboard Testing
- Testing Cables and Connectors
- Testing Batteries and CMOS
- Testing Peripheral Devices within computer system
- Diagnosing Network Cables






Motherboard

- ▶ A computer's motherboard is typically the largest printed circuit board in a machine's chassis.
- ▶ It distributes electricity and facilitates communication between and to the central processing unit (CPU), random access memory (RAM), and any other component of the computer's hardware.
- ▶ It facilitates communication between various components of the computer.
- ▶ Motherboards are such an essential part of computing systems
- ▶ They drive the entire working of the computer by letting other parts (the CPU, drivers, ports, etc.) communicate with each other.




Components of Motherboard

- 
- ▶ Mouse and keyboard connectors
 - ▶ Universal serial bus (USB)
 - ▶ CPU
 - ▶ RAM memory
 - ▶ Basic input/output (BIOS) system
 - ▶ Chipsets
 - ▶ Cooling fans
 - ▶ CMOS battery
 - ▶ Storage devices, Power connector, Front panel connectors



Functions of a Motherboard

- 
- Manages data flow
 - Conserves resources
 - Optimizes power distribution
 - Drives communication
 - Enhances performance
 - Improves reliability
 - Enables productivity



DC Circuits in a Motherboard



Power Supply:

The power supply unit (PSU) converts AC from the wall outlet to DC power, which is used by the motherboard and its components.



DC Power Distribution:

The motherboard distributes these DC voltages to different components such as the CPU, RAM, and peripheral devices.




Voltage Regulation:

Voltage regulator modules (VRMs) ensure that the CPU and other components receive stable DC power at the correct voltage.





Importance of DC Circuits in Motherboards

- ▶ Ensures reliable operation of the computer.
 - ▶ Provides stable and regulated power to sensitive components.
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Summary and Relevance



Summary

- Key concepts: Basic understanding of DC circuits and their relevance to computer technology.
- Importance: Ensuring reliable power delivery and operation of computer components.



Relevance to Computer Technology

- Understanding the basics helps in troubleshooting and maintaining computer hardware.
- Awareness of power requirements and regulation is crucial for system stability.



Exercise

1. What is the difference between analog and digital electronics?
2. Define what a computer system is and its components (hardware and software).
3. Explain the basics of electricity (voltage, current, resistance) and Ohm's Law.
4. Draw and label a simple DC circuit diagram.
5. What are the functions of basic electronic components (resistors, capacitors, inductors)?