

Designing Electrical Circuits for Consumer Electronics and Industrial Machines

Part 1: Dialogue

Context: An electrical engineer is discussing the design of electrical circuits for consumer electronics and industrial machines with a colleague.

Jake: We need to finalize the **circuit schematic** before moving on to the next phase of development.

Sophia: Agreed. Have you checked the layout for the **printed circuit board (PCB)**? We need to ensure proper spacing between components.

Jake: Yes, but I'm still adjusting the **resistor-capacitor network** to stabilize the signal. Some fluctuations are causing noise in the system.

Sophia: That makes sense. Are you applying **Ohm's Law** to verify the voltage and current across each component?

Jake: Exactly. We need to make sure the **load resistance** is correctly calculated to prevent overheating.

Sophia: Good point. We should also run a simulation before manufacturing the prototype to confirm circuit behavior.

Jake: Yes, let's use a modeling tool to predict potential failures and optimize efficiency.

Sophia: I'll also double-check the power distribution to ensure we don't exceed the safety limits.

Jake: Great. Once we validate the design, we can prepare for prototype testing.

Sophia: Sounds like a plan! Let's meet tomorrow to review the final schematic.

Part 2: Comprehension Questions

1. What is Jake currently working on?
 - (A) Adjusting the resistor-capacitor network
 - (B) Designing the product casing

- (C) Writing the software for the system
 - (D) Installing new batteries
2. Why does Sophia mention Ohm's Law?
 - (A) To check the physical dimensions of the PCB
 - (B) To verify voltage and current levels
 - (C) To measure the circuit's temperature
 - (D) To assess mechanical durability
 3. What step will they take before manufacturing the prototype?
 - (A) Order components for production
 - (B) Perform a thermal resistance test
 - (C) Run a simulation to confirm circuit behavior
 - (D) Install the PCB into the final product
 4. What aspect of the design is Jake concerned about?
 - (A) The software's processing speed
 - (B) The PCB's physical size
 - (C) The placement of the screen display
 - (D) The load resistance and overheating
-

Part 3: Key Vocabulary with Definitions

- **Circuit schematic (回路図)** – A diagram representing the electrical connections and functions of a circuit.
- **Printed circuit board (PCB) (プリント基板)** – A board used to mechanically support and electrically connect electronic components.
- **Resistor-capacitor network (抵抗-コンデンサネットワーク)** – A circuit that stabilizes signals and controls electrical flow.
- **Ohm's Law (オームの法則)** – A fundamental principle that relates voltage, current, and resistance in an electrical circuit.

- **Load resistance (負荷抵抗)** – The resistance in a circuit that determines the amount of current flowing through it.
-

Part 4: Answer Key

1. **What is Jake currently working on?**
☒ (A) Adjusting the resistor-capacitor network
2. **Why does Sophia mention Ohm's Law?**
☒ (B) To verify voltage and current levels
3. **What step will they take before manufacturing the prototype?**
☒ (C) Run a simulation to confirm circuit behavior
4. **What aspect of the design is Jake concerned about?**
☒ (D) The load resistance and overheating