العملي

هذه المحاضرة الخامسة لطلاب الامن السيبراني اقيمة بشكلها العملي وتضمنة ما يلي :

١ . فحص المقاومات الكهربائية بانواعها وبطرق مختلفة (بالالوان وبالاوفوميتر).

٢ . فحص المتسعات بانواعها وبطرق مختلفة .

٣. فحص الملفات الكهربائية بانواعها وبطرق مختلفة .

• The Capacitor (C)

Definition: A device that stores electrical energy in an electric field between two conducting plates.

Unit of Measurement: Farads (*F*).

Working Principle: It blocks Direct Current (*DC*) and allows Alternating Current (*AC*) to pass.

Common Uses:

- Filtering noise in power supplies.
- Energy storage (Camera flashes).
- Timing circuits.

Capacitors (The Storage) ▶

Function: To store electrical energy and filter signals.

How to Check: * Discharge first! (Short the terminals with a resistor).

- Use the **Capacitance (F)** setting on the DMM.

Signs of Damage: * Physical: Bulging top, leaking fluid (Electrolytic types).

- **Electrical:** High ESR (Equivalent Series Resistance) or short circuit (0 Ω).

test a capacitor

Safety First: Always discharge the capacitor before testing to avoid damaging the meter or causing injury.
Digital Multimeter (Capacitance Mode): Place probes on terminals (red to
, black to
for polarized). A good capacitor will show a reading close to its rated value, while a faulty one will show "OL" or a reading far outside its tolerance range.
Analog Multimeter (Resistance Mode): Set to
or
Good: Needle kicks toward 0, then gradually moves back to
Short: Needle moves to 0 and stays there.
Open: No movement at all.
Physical Inspection: Replace if the top is bulging, the casing is cracked, or it is leaking fluid.

• The Inductor (*L*)

Definition: A passive component (usually a coil of wire) that stores energy in a magnetic field when current flows through it.

Unit of Measurement: Henrys (*H*).

Working Principle: It resists changes in current. It allows *DC* to pass easily but blocks high-frequency *AC*.

Common Uses:

- Transformers and motors.
- Inductive filtering (chokes).
- Tuning radio frequencies.

Inductors & Transformers (The Magnetic Coils)

Function: Store energy in a magnetic field; step voltage up or down.

How to Check: * Check **Continuity (Beep)**. Coils should have low resistance.

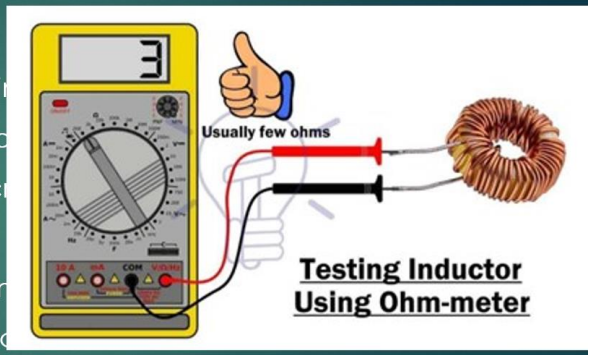
- Check insulation between primary and secondary windings (Should be "OL").

Signs of Damage: * Smell of burning (shorted turns).

Open winding (no continuity

test an inductor

To test an inductor, use a multimeter i
continuity or resistance mode to chec
a low-resistance path (close to 0) acr
terminals, indicating the coil is intact.
A functional inductor should show cor
and low resistance, while an open circ
(no reading) or short (0) typically indicates a
faulty component
.



Connection & Basic Control

3. Jumper (Jumper Wire)

- **Function: Short lengths of wire used to connect components on a breadboard or PCB (Printed Circuit Bo without soldering.**
- **Key Detail: Usually color-coded to help track VCC (R Ground (Black), and Signal (various).**
- **PPT Tip: Include a photo of a breadboard with jumper neatly organized.**

4. Push Button (Momentary Switch)

- **Function: Only closes the circuit while it is being physically pressed.**
- **Types:**
  - **Normally Open (NO): Circuit is broken until pressed.**
  - **Normally Closed (NC): Circuit is continuous until pressed.**
- **PPT Tip: Use an animation or diagram showing the internal spring mechanism.**

Electronic components (Battery , jumper, fuse, push button, switch, rotary switch)

Battery

- Function: Converts chemical energy into electrical energy to provide a DC (Direct Current) voltage source.
- Key Detail: Consists of one or more cells. The long line in the symbol represents the positive (+) terminal.
- PPT Tip: Use an image of a standard 9V battery next to its schematic symbol.

2. Fuse

- **Function:** A safety device that protects circuits from overcurrent. It contains a metal strip that melts and breaks the circuit if the current is too high.
- **Key Detail:** Once a fuse "blows," it must be replaced.
- **PPT Tip:** Show a "blown" fuse vs. a "good" fuse to help trainees identify failures.

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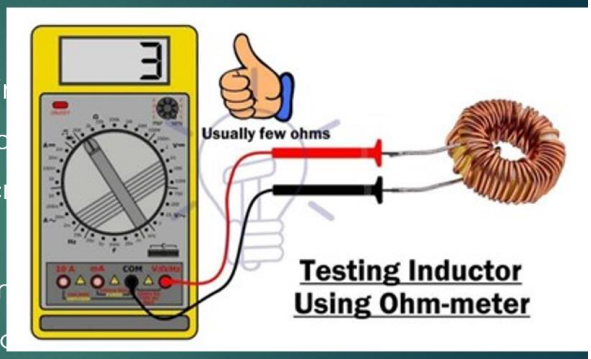
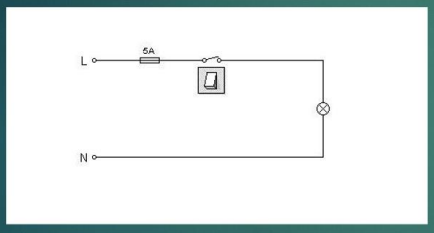
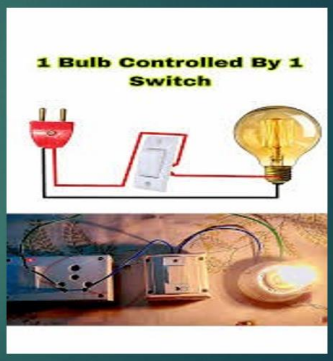
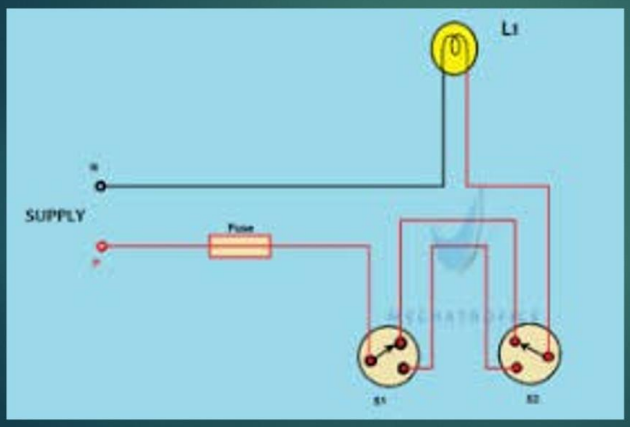


ONE LAMP CONTROLLED BY ONE SWITCH





Drawing a Staircase Lamp (Two-Way Switch) Circuit



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- TOW LAMP CONTROLLED BY ONE SWITCH

In this, two bulbs are connected in parallel with the supply wires (phase and neutrals) which are routed by single one-way switch as shown in figure