

SAFE OPERATION PROCEDURE (SOP)

Circuit Laboratory, Department of EEE, BUET

1. Purpose

This SOP defines safe operating practices for undergraduate experiments in the Circuit Laboratory involving basic electrical and electronic circuits using passive components, AC/DC supplies, and measurement instruments. The aim is to ensure student safety and protect sensitive laboratory equipment.

2. Scope

This SOP applies to all students, instructors, and lab staff performing experiments using **low-voltage (LT) supply**: - Rated supply: **415 V (line-to-line), 230 V (line-to-neutral)** (bench supplies stepped down as required) - Breadboards and jumper wires - Passive components: **Resistors (R), Inductors (L), Capacitors (C)** - AC/DC regulated power supplies - Oscilloscopes and function generators - Ammeter, voltmeter, wattmeter, and other measuring instruments

3. Authorization & Supervision

- Experiments shall be conducted **only under supervision** of the course teacher or lab engineer.
- Students must perform **only the experiments prescribed** in the laboratory manual.
- Direct connection of breadboard circuits to 230 V supply is **strictly prohibited**.

4. General Safety Rules

- Treat all circuits as energized unless switched OFF and verified.
- Wear closed footwear; keep hands dry at all times.
- Do not place metallic objects on breadboards or benches.
- Avoid loose jumper wires that may cause short circuits.
- Keep food, drinks, and liquids out of the laboratory.

5. Pre-Operation Checklist

Before energizing any circuit: - Verify circuit connections with the instructor/lab staff. - Ensure power supply output knobs are set to **minimum/zero**. - Check correct polarity of DC supplies and electrolytic capacitors. - Select proper range and terminal of meters. - Ensure oscilloscope probes and function generator leads are intact and properly grounded.

6. Operating Procedure

- Energize the circuit only after approval from the supervisor.
- Increase voltage/current **gradually** and within component ratings.
- Never short the output terminals of power supplies.
- Do not change wiring, component values, or meter connections while energized.
- Observe components for abnormal heating, smoke, or smell.

7. Use of Oscilloscope & Function Generator

- Ensure common ground reference before connecting oscilloscope probes.
- Do not exceed maximum input voltage ratings of oscilloscope channels.
- Set function generator output amplitude and offset to minimum before connection.
- Disconnect probes before modifying the circuit.

8. Abnormal Conditions & Response

- In case of short circuit, component failure, or abnormal heating: **switch OFF supply immediately.**
- Inform the instructor/lab engineer before resuming the experiment.
- Do not reuse damaged components.

9. Post-Operation Procedure

- Reduce power supply output to zero and switch OFF.
- Discharge capacitors before handling the circuit.
- Remove power leads first, then dismantle the circuit.
- Return components and instruments to designated locations.
- Keep benches clean and organized.

10. Emergency Procedures

- In case of electric shock: disconnect supply immediately and seek assistance.
- For electrical fire: use **CO₂ or dry powder extinguisher only.**
- Report all incidents to lab authorities.

11. Compliance

Non-compliance with this SOP may result in **termination of the experiment** and disciplinary action as per BUET regulations.

Note: Although experiments are conducted at low voltage, careless wiring and improper grounding can cause injury and equipment damage. Follow procedures strictly.