SAFE OPERATION PROCEDURE (SOP)

Switchgear & Protection Laboratory, Department of EEE, BUET

1. Purpose

This SOP establishes safe operating practices for undergraduate experiments in the Switchgear & Protection Laboratory involving low-voltage (LT) switchgear, protection relays, and feeder management systems. The objective is to ensure personnel safety, prevent equipment damage, and promote disciplined laboratory practice.

2. Scope

This SOP applies to all students, instructors, and lab staff conducting experiments using **LT supply only**: - Rated supply: **415 V (line-to-line), 230 V (line-to-neutral)** - Vacuum Circuit Breaker (VCB) - SF_6 Circuit Breaker (SF_6 CB) - Air Circuit Breaker (ACB) - Drop-Out (DO) Fuse - Overcurrent relays: **DTOC and IDMT** - Differential relay - Overvoltage and undervoltage relay - Feeder management relay using **De Lorenzo relay blocks** - De Lorenzo 3-phase supply units, loads, ammeters, and voltmeters

3. Authorization & Supervision

- Experiments shall be conducted **only under supervision** of the course teacher or lab engineer.
- Students are permitted to perform **only the assigned experiment**.
- Modification of internal wiring of relay blocks or switchgear panels without permission is strictly prohibited.

4. General Safety Rules

- Treat all circuits as **energized** unless isolated and verified.
- Wear closed footwear; avoid loose clothing and metallic accessories.
- Keep hands dry; liquids are strictly prohibited near panels.
- Do not touch exposed terminals, busbars, or breaker contacts.
- Maintain a safe distance during breaker operation and tripping.

5. Pre-Operation Checklist

Before energizing the circuit: - Verify circuit connections with the instructor/lab staff. - Ensure all **MCBs/ isolators are OFF** during wiring. - Confirm correct relay type, CT/PT connections (if applicable), and settings. - Set relay dials, pickup values, and time multipliers to **minimum safe values** initially. - Select proper ranges of ammeters and voltmeters. - Ensure proper earthing of all metallic enclosures and panels.

6. Operating Procedure (Switchgear)

- Energize the supply only after receiving clearance from the supervisor.
- Close breakers (VCB/SF_6 CB/ACB) smoothly from the **designated operating position**.
- Do not attempt manual intervention while a breaker is in operation.
- Observe breaker behavior: closing time, tripping action, and indication lamps.
- Never exceed rated current, voltage, or duty cycle of LT equipment.

7. Operating Procedure (Protection Relays)

- Apply load current gradually using the De Lorenzo load modules.
- Simulate faults only as instructed by the experiment manual.
- Observe relay pickup, operating time, and coordination characteristics.
- Do not change relay settings or wiring while the circuit is energized.
- Reset relays and breakers only after the fault condition is fully removed.

8. Handling of De Lorenzo Equipment & Instruments

- De Lorenzo relay blocks and meters are **precision training equipment**; handle carefully.
- Avoid mechanical stress on terminals, knobs, and selector switches.
- Never short-circuit supply terminals intentionally unless specified in the experiment.
- Immediately report abnormal heating, noise, smell, or meter deflection.

9. Abnormal Conditions & Fault Response

- In case of unintended tripping, excessive current, or abnormal sound: **switch OFF supply immediately**.
- Inform the instructor/lab engineer before re-energizing.
- Do not bypass protective devices under any circumstance.

10. Post-Operation Procedure

- Reduce load to zero and switch OFF the supply.
- Open all breakers and isolators.
- Allow time for relay reset and thermal cooling.
- Restore connections to original condition if instructed.
- Keep the workbench and panels neat and organized.

11. Emergency Procedures

- In case of electric shock: disconnect supply immediately and seek assistance.
- For electrical fire: use **CO_2 or dry powder extinguisher only**.
- Report all incidents to lab authorities.

12. Compliance

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

Note: Although this is a low-voltage laboratory, unsafe operation can still cause serious injury and equipment damage. Strict adherence to procedure is mandatory.