Power System Protection & Switch Gear Laboratory

1) STUDY OF CHARACTERISTICS OF IMDT OVER CURRENT RELAY

For experiments of plotting of characteristics of relays, three test sets are mounted and wired on three practical panels in Power System Laboratory. The output cannot be guaranteed to be perfectly harmonic free but for demonstration to the students, it serves the purpose.

Following relays of our laboratory can be tested using this test set:

1. Single-phase or three-phase IDMT overcurrent or earth-fault relays giving normal inverse, very inverse or extremely inverse characteristics. (Electromagnetic and static relays).
2. Single-phase instantaneous overcurrent relay (Electromagnetic and static relays).
3. Single-phase definite time overcurrent relay (Electromagnetic and static relays).
4. Single-phase electromechanical thermal relay.

2) STUDY AND TESTING OF UNDER VOLTAGE RELAY

System Parameters	
System Voltage	230V AC
contactor for isolation	C1
Control Transformer	230 / 110 V AC (for relay sensing)
Relay PT sec	110V AC
Characteristics	Definite Time Instantaneous Operation

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4) RELAY COORDINATION IN RADIAL FEEDER PROTECTION SCHEME

The whole of the power system can be subdivided into number of radial feeders fed from one end. Generally such radial feeders are protected by over current (O/C) and earth fault (E/F) relays used as primary relays for 11kV and 66kV lines. For lines of voltage rating beyond 66kV, distance protection is applied as a primary protection whereas O/C and E/F relays are used as back up relays.

5) RELAY COORDINATION IN PARALLEL FEEDER PROTECTION SCHEME

The demand of electrical energy is increasing day by day with establishment of new industries, commercial buildings, agricultural sectors and residential blocks. Therefore, it is necessary to increase the capacity of the existing transmission line accordingly. One approach for doing so, is by retaining the existing transmission system, and building the new one to carry the extra power; thus transmitting the power through two parallel lines. This forms the network of parallel feeders. The protection of parallel feeders is somewhat complex than that of radial feeder. If a fault occurs on one of the feeder, the fault current will flow from both directions due to presence of another feeder connected in parallel. Generally such parallel feeders are protected by over current (O/C) and earth fault (E/F) relays used as primary relays for 11kV and 66kV lines with an additional feature of directional units to sense the direction of flow of current.

6) PERFORM THE PRINCIPLE OF REVERSE POWER PROTECTION

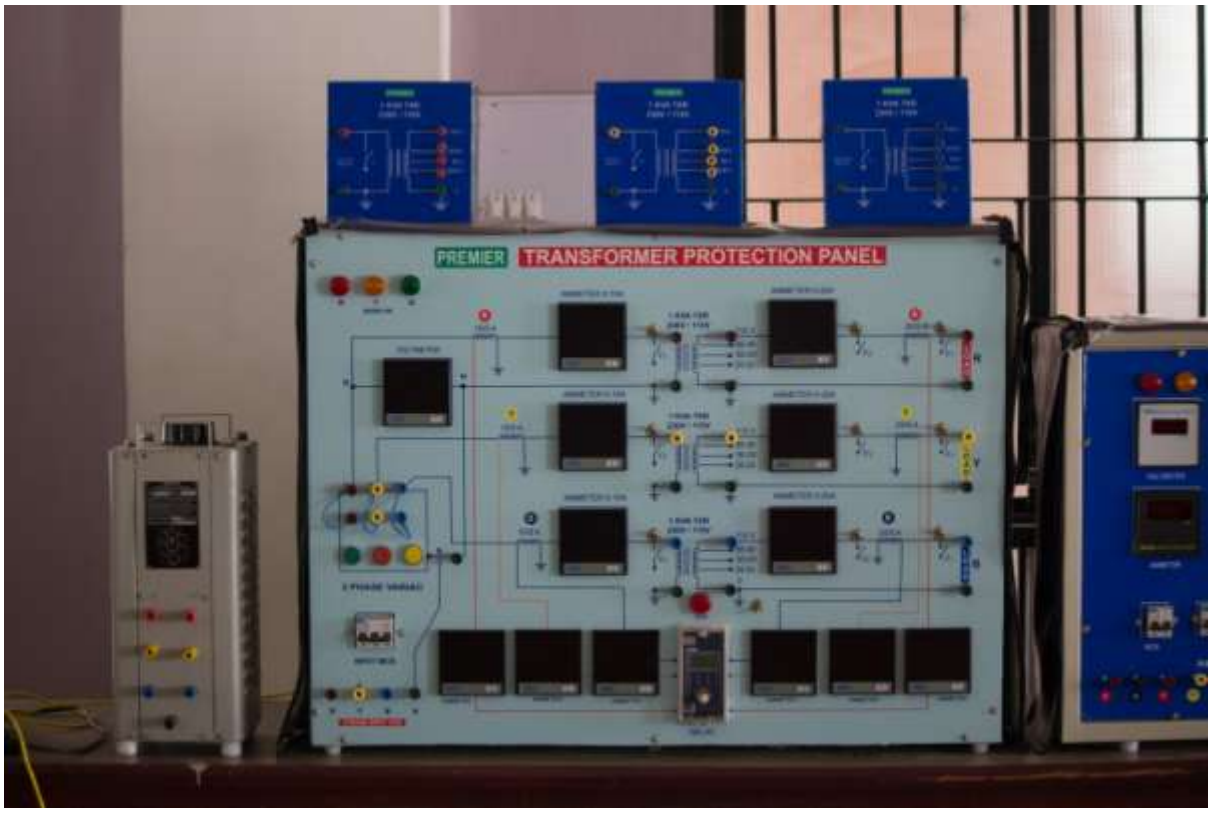
Failure of prime mover of an alternator (connected to an infinite bus in an interconnected system) leads to motoring of an alternator. The prime mover, in this case, will be damaged. Moreover all class B protections are routed through a low forward power relay to finally result in class A trip of generator. Thus study and practical understanding of reverse power protection is interesting**.**

7) DIFFERENTIAL PROTECTION OF GENERATOR USING ELECTROSTATIC RELAY

Generator forms the starting point of the power system. It is the costliest and most important equipment of the power system network. An internal fault due to short circuit or ground fault in stator winding may result in enormous damage to the machine; eventually leading the unit shutdown and huge loss of revenue. So, comprehensive protection schemes are used for its protection.

8) DIFFENTIAL PROTECTION OF TRANSFORMER USING NUMERICAL RELAY

Transformer is one of the most important devices and the costly equipment of a power system. An internal fault due to short circuit in windings or ground fault in winding may result in enormous damage to the winding and the core. Hence, use of most reliable, fast and selective protective scheme is inevitable here. Differential protection scheme is obsessed with all these features and hence is used in transformer protection. Howsoever, problems do exist. Some problems encountered in differential protection of transformer will be highlighted along with their solutions which would be followed by experimentation and demonstration of differential protection of a 1kVA transformer



9) PROTECTION OF THREE PHASE INDUCTION MOTOR USING NUMERICAL RELAY