

[illegible]

**Total No. of Questions : 08**

**Time : 3 Hrs.**

**Max. Marks : 100**

1. Attempt any FIVE questions out of EIGHT questions.
2. Each question carries TWENTY marks.

1.
  - a) Explain design factors affecting performance of protection scheme for various faults,
  - b) How static differential relay is constituted from static elements? Draw block diagram and explain.
2.
  - a) Describe the construction and operation of impedance type distance relay with R-X diagram.
  - b) Draw and explain operating principle of directional over current relay. Why IDMT relays are widely used for overcurrent protection?
3.
  - a) Describe the type of protection scheme employed for protection of loss of excitation of alternators.

A generator is protected by restricted earth protection. The generator ratings are 13.2 KV, 10 MVA. The percentage of winding protected against phase to ground fault is 85%. The relay setting is such that it trips for 20% out of balance. Calculate the resistance to be added in the neutral to ground resistance,
  - b) Explain a biased differential protection scheme applied to a 3 phase transformer with diagram. Also tabulate different types of CT connections used for different types of transformer primary and secondary winding connections.
4.
  - a) Describe the differential pilot wire protection of feeder.
  - b) With relevant sketches explain ground fault protection and phase fault protection of induction motor.

5.
  - a) Draw block diagram of automated relay test system and list the test performed for the relays.
  - b) Explain SCADA based protection system.
6. Discuss with the help of neat diagram, the hardware and software of the digital protection scheme for transmission lines using distance relays.
7.
  - a) Explain magnetization characteristics of CT for protection. Why CT and PT are required for protection scheme,
  - b) Explain operation of under-frequency relays for protection of power system.
8. What are advantages of using digital techniques in power system protection? Explain digital relay structure.

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