

CBCS SCHEME

15EE72

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Seventh Semester B.E. Degree Examination, Dec.2019/Jan.2020 Power System Protection

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. With schematic diagram, explain various zones of protection of a power system. (06 Marks)
- b. Explain the importance of automatic reclosing. (04 Marks)
- c. What are the advantages of static relays over electro mechanical relays? (06 Marks)

OR

- 2 a. The current rating of a relay is 5Amps, PSM = 1.5 CT ratio is 400/5. Fault current = 6000 Amps. Determine the operating time of the relay for a TMS = 0.4. The operating time at various PSM at TMS = 1 are given in the below table. (06 Marks)

| PSM | 2 | 4 | 5 | 8 | 10 | 20 |
|---------------------------|----|---|---|---|-----|-----|
| Operating time in seconds | 10 | 5 | 4 | 3 | 2.8 | 2.4 |

- b. Draw the schematic diagram of numerical relay and explain the functions of various components. (06 Marks)
- c. With neat sketch, explain the working principle of reed relay. (04 Marks)

Module-2

- 3 a. Explain different types of over current protective schemes. (08 Marks)
- b. Explain impedance relay characteristics in the R-X diagram. (04 Marks)
- c. What are the advantages of numerical over current relays over conventional over current relays? (04 Marks)

OR

- 4 a. Explain stepped time-distance characteristics of three distance relaying units used for I, II and III zone of protection. (06 Marks)
- b. Explain how reactance relay and MGO relay characteristics are realized using a sampling comparator. (06 Marks)
- c. With neat diagram, explain an over current protective scheme for a ring feeder. (04 Marks)

Module-3

- 5 a. What are the important operating principles which are used in wire 'pilot' schemes? With schematic diagram, explain circulating current principle. (06 Marks)
- b. Explain the working principle of 'Buchholz' relay used for the protection of transformer. (05 Marks)
- c. With schematic diagram, explain balanced (opposed) voltage differential protection. (05 Marks)

OR

- 6 a. With neat sketch, explain frame leakage protection scheme. (04 Marks)
b. With schematic diagram, explain protection of stator against over heating in an alternator. (06 Marks)
c. What is simple differential protection scheme? Explain its behavior during normal condition. (06 Marks)

Module-4

- 7 a. With neat sketches, explain the recovery rate theory of arc interruption in a circuit breaker. (06 Marks)
b. What are the advantages and disadvantages of SF₆ circuit breaker? (06 Marks)
c. Explain the phenomenon of current chopping in a circuit breaker. (04 Marks)

OR

- 8 a. With neat circuit diagram explain synthetic testing of a circuit breaker. (06 Marks)
b. With neat sketch, explain the working principle of axial-blast circuit breaker. (05 Marks)
c. With schematic diagram, explain the working of 'HVDC' circuit breaker. (05 Marks)

Module-5

- 9 a. With neat diagrams, explain the phenomenon of lighting. (06 Marks)
b. Describe the construction and working of the HRC cartridge fuse. (05 Marks)
c. With neat sketch, explain the construction and working of 'Klydonograph'. (05 Marks)

OR

- 10 a. What are the various components of GIS? Briefly describe their functions. (07 Marks)
b. With neat diagram, explain the working of expulsion type lightning arrester. (05 Marks)
c. What is insulation coordination? Explain its volt time curve. (04 Marks)

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