

CBCS SCHEME

18EE72



Seventh Semester B.E. Degree Examination, June/July 2023 Power System Protection

Max. Marks: 100

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

Module-1

- 1 a. Discuss various zones of protection for a modern power system. (06 Marks)
- b. List and explain the essential qualities of a protective relay. (06 Marks)
- c. Write short notes on :
 - (i) Current Transformer (CT)
 - (ii) Potential Transformer (PT) (08 Marks)

OR

- 2 a. Derive an expression for torque produced by an induction relay. (06 Marks)
- b. Discuss how an amplitude comparator can be converted to phase comparator and vice-versa. (06 Marks)
- c. State the merits and demerits of static relays and discuss the operating principle of a rectifier bridge phase comparator. (08 Marks)

Module-2

- 3 a. With a neat sketch, explain the construction and working principle of induction disc type reverse power relay. (08 Marks)
- b. Discuss a protective scheme for ring main feeders. (06 Marks)
- c. With a neat block diagram, explain the static inverse time over current relay. (06 Marks)

OR

- 4 a. With a neat sketch, explain the principle of operation, torque equation, and operating characteristics of impedance relay. Also, write the disadvantages of impedance relay. (10 Marks)
- b. With a neat connection diagram, explain the working of directional earth fault relay. (06 Marks)
- c. Explain the MHO Relay characteristics in the R-X diagram. (04 Marks)

Module-3

- 5 a. With a neat sketch, discuss the phase comparison scheme of carrier current protection. (07 Marks)
- b. With schematic diagram, explain balanced (opposed) voltage differential protection. (07 Marks)
- c. With a neat diagram, explain the working of Buchholz Relay. (06 Marks)

OR

- 6 a. With a neat diagram, explain percentage differential protection of star-delta connected transformer. (08 Marks)
- b. Explain the protection of a generator against:
 - (i) Loss of excitation
 - (ii) Stator inter turn fault (08 Marks)
- c. With a neat sketch, explain differential scheme for bus zone protection. (04 Marks)

Module-4

- 7 a. Discuss the recovery rate theory and energy balance theory of arc interruption in AC circuit breaker. (06 Marks)
b. With a neat sketch and waveform, explain the interruption of capacitive current. (06 Marks)
c. Derive an expression for restriking voltage and rate of rise of restriking voltage. (08 Marks)

OR

- 8 a. With a neat sketch, explain the working of axial blast circuit breaker. (07 Marks)
b. State the advantages and disadvantages of SF₆ circuit breaker. (05 Marks)
c. Explain the procedure adopted in unit test and synthetic testing of circuit breaker. (08 Marks)

Module-5

- 9 a. With a neat diagram, explain the HRC fuse and list its advantages and disadvantages. (06 Marks)
b. With a neat sketch, explain the phenomenon of lighting. (06 Marks)
c. Write short notes on: (i) Klydonograph (ii) Protective angle (08 Marks)

OR

- 10 a. With a neat diagram, explain : (i) Rod-gap arrester (ii) Expulsion Arrester (10 Marks)
b. Write short notes on:
(i) Insulation coordination
(ii) Gas Insulated Substation (GIS) (10 Marks)

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