

CBCS SCHEME

15EE72

Seventh Semester B.E. Degree Examination, Jan./Feb. 2023 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. Briefly explain the types of faults that occur in Power System. (04 Marks)
- b. Explain the primary and backup protection in case of relays. (06 Marks)
- c. Explain the essential qualities of protective relaying. (06 Marks)

OR

- 2 a. With the help of a neat diagram, explain the construction and working of an shaded pole type induction relay. (06 Marks)
- b. Briefly explain the duality between amplitude and phase comparators. (04 Marks)
- c. List down six points of comparison between Electromechanical relays and Numerical relays. (06 Marks)

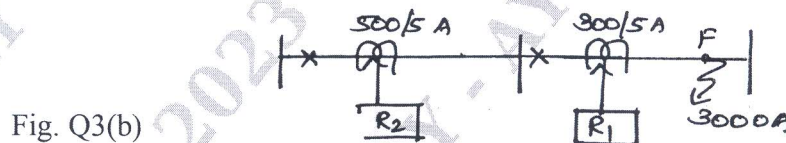
Module-2

- 3 a. Classify the different types of over current relays based on their time current characteristics. (06 Marks)
- b. Two relays R_1 and R_2 are connected in two sections to a feeder as shown in Fig. Q3(b) below : Relay R_1 : CT ratio = 300/5 , Plug setting = 50% , TMS = 0.3.
Relay R_2 : CT ratio = 500/5 , Plug setting = 75%.
Operating characteristics is below table 1.

PSM	2	4	5	8	10	20
Op. time (secs)	10	5	4	3	2.8	2.4

Table 1.

A fault at F results in a fault current of 3000A. Find TMS of R_2 to give time – grading margin of 0.5sec between the relays. (06 Marks)



- c. Briefly explain the over current protective scheme for parallel feeders. (04 Marks)

OR

- 4 a. Starting from the torque equation, explain the Operating characteristics of an impedance relay. (06 Marks)
- b. Explain the term 'reach' as in the case of a distance relay. Also explain how does a distance relay over – reach and under – reach during its sequence of operation. (06 Marks)
- c. Compare the effect of line length and source impedance on distance relays, with a suitable example. (04 Marks)

Module-3

- 5 a. Explain the Transley scheme protection with respect to pilot relaying schemes. (08 Marks)
- b. With the help of a neat diagram, explain the construction and working of a percentage biased differential relay. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

OR

- 6 a. Explain briefly the following with respect to protection of generators : (08 Marks)
 i) Restricted earth fault protection ii) Loss of excitation.
- b. A three phase 11KV/33KV , $Y - \Delta$ connected power transformer is protected by differential protection. The CTs on the LV side have current ratio of 400/5. What must be the ratio of CTs on the HV side show the connection with the help of a neat diagram? (08 Marks)

Module-4

- 7 a. With neat diagram and waveforms, explain the phenomenon of interruption of capacitive currents in a circuit breaker. (08 Marks)
- b. In a 132 kv system, the inductance and capacitance upto the location of the circuit breaker are 0.4H and 0.015 μ F respectively. Determine
 i) the maximum value of restriking voltage across the contacts of the circuit breaker.
 ii) frequency of transient oscillation and maximum value of RRRV. (08 Marks)

OR

- 8 a. Explain the properties of an SF₆ gas. (08 Marks)
- b. Write short notes on : (08 Marks)
 i) Unit testing ii) Synthetic testing of circuit breakers.

Module-5

- 9 a. Explain the cut off characteristics of fuse. (06 Marks)
- b. Explain the constructional details and working of an HRC fuse, with the help of a neat diagram. (06 Marks)
- c. List the various causes of over voltage in power system. (04 Marks)

OR

- 10 a. Explain the working of Klydonograph Instrument. (06 Marks)
- b. Briefly explain the working of a surge diverter. (04 Marks)
- c. Explain the various components of GIS briefly. (06 Marks)
