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17EE72

Seventh Semester B.E. Degree Examination, Feb./Mar. 2022

Power System Protection

Time: 3 hrs.

Max. Marks: 100

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

Module-1

- 1 a. With the help of a neat diagram, explain the different zones of protection. (07 Marks)
- b. Explain the concept of primary and back-up protection. (06 Marks)
- c. Explain the essential qualities of protective relays. (07 Marks)

OR

- 2 a. Explain the theory behind induction relay torque in induction type relays. (07 Marks)
- b. Briefly give a comparison between electromechanical and numeric relays. (06 Marks)
- c. Classify the over-current relays on the basis of their time current characteristics. (07 Marks)

Module-2

- 3 a. Briefly explain the protection of ring mains in over current protection scheme of relays. (06 Marks)
- b. The time-current (PSM) characteristic of an over current relay for TMS of 1 is given below:

PSM	2	3	5	7	10	13	15	18	20
Operating Time	10	6.8	4.4	3.4	2.8	2.5	2.4	2.3	2.2

If the current plug setting is adjusted to 50% and time multiplier is adjusted to 0.75. Calculate the time of operation of the relay when the fault current is 3000A and relay is connected to a CT ratio 400/5. (07 Marks)

- c. Explain combined earth fault and phase fault protective scheme. (07 Marks)

OR

- 4 a. Explain the effect of arc resistance on the performance of distance relays. (10 Marks)
- b. Explain the working principle and characteristics of a reactance relay. (10 Marks)

Module-3

- 5 a. Explain the circulating current scheme in wire pilot protection. (08 Marks)
- b. Explain phase comparison carrier current protection with the help of a neat block diagram. (12 Marks)

OR

- 6 a. Explain percentage or biased differential relay with the help of a neat diagram. (07 Marks)
- b. The neutral point of 50 MVA, 11 KV generator is grounded through a resistance of 5Ω , the relay is set to operate when there is an out of balance current of 1.5A. The CTs have a ratio of 1000/5. What percentage of the winding is protected against the ground fault? What should be the minimum value of grounding resistance to protect 90% of the winding? (07 Marks)
- c. Explain Merz-Price scheme for protection of a star-delta transformer. (06 Marks)

Module-4

- 7 a. Explain the two theories of zero current interruption of arc. (06 Marks)
b. Derive the expression for restriking voltage and rate of rise of recovery voltage (RRRV) in circuit breakers. (08 Marks)
c. Explain the phenomenon of current chopping in circuit breakers. (06 Marks)

OR

- 8 a. List the advantages of air blast circuit breakers over oil circuit breakers. Explain cross blast circuit breakers and axial blast circuit breaker. (12 Marks)
b. Explain the two types of short circuit testing stations in circuit breakers. (08 Marks)

Module-5

- 9 a. With a neat sketch, explain the construction and working of an HRC fuse. (10 Marks)
b. Explain the cut off characteristics of a fuse with the help of a neat diagram. Also define the important parameters in the characteristics. (10 Marks)

OR

- 10 a. Explain working of Klydonograph with the help of a neat diagram. (07 Marks)
b. List the different types of lightning arresters. Explain expulsion type in detail. (07 Marks)
c. List the advantages of GIS. (06 Marks)

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