CBCS SCHEME

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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 5 Ω, 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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