May-25-0442

EE-601 (Switchgear & Protection)

B.Tech. 6th (CBCS)

Time : 3 Hours   Max. Marks : 60

The candidates shall limit their answers precisely within the answer-book (40 pages) issued to them and no supplementary/continuation sheet will be issued.

Note : Attempt five questions in all, selecting one question from each of the section A, B, C and D and all the subparts of the question in Section E. Marks for each question are given in bracket and assume missing data if any suitably.

SECTION - A

1. (a) Explain the construction and working of an induction disc type relay. State its advantages and limitations. (6)

   (b) Explain the construction and working of a hinged armature type relay. State its merits and demerits. (6)

2. (a) State the working principle of a directional over current relay with the help of a diagram. (6)

   (b) Explain the working principle and application of an impedance relay clearly mentioning the tripping and blocking criteria. State how the operating and restraining quantities are provided in this relay. (6)

SECTION - B

3. (a) Explain the concept of time graded protection scheme. State its limitations and how these limitations can be overcome. (6)

   (b) Explain the Merz-Price voltage balance type differential protection. State its application. (6)

4. (a) State various causes and types of faults in power transformers and purpose of inbuilt safety devices. (6)

   (b) State the faults and various abnormal operating conditions in induction motors and protection provided against each one of them. (6)

SECTION - C

5. (a) Explain the protection against rotor earth fault in an alternator by DC injection method. (6)

   (b) Explain the various types of comparators used in relays. State the functioning of circulating current type amplitude comparator with the help of circuit diagram and wave shapes. (6)

6. (a) Explain the protection of alternator stator against phase to phase faults clearly mentioning its limitations. (6)

   (b) Explain the working of any one coincidence type phase comparator clearly mentioning the relay operating criterion. (6)

SECTION - D

7. (a) Explain the high resistance theory of arc interruption in a circuit breaker in detail. (6)

   (b) Explain the construction and operation of a SF_6 circuit breaker. State its advantages and disadvantages. (6)

8. (a) In a 220 kV system, the inductive reactance and capacitive reactance are 5 Ohm and 200 k Ohm, respectively. Calculate: (i) the frequency of oscillations (ii) The maximum value of restriking voltage across the circuit breaker contacts (iii) The maximum value of RRRV. (6)

   (b) Explain the cut-off characteristic of a fuse clearly mentioning various currents and timings. (6)

[P.T.O.]

SECTION - E (Compulsory)

9. (a) State the functioning of an IDMT over current relay with characteristic.

    (b) State the advantages of static relays over electromechanical relays.

    (c) State the arc phenomenon in circuit breaker.

    (d) State the concept of three zone protection.   (4×3=12)