Sixth Semester B.E. Degree Examination, December 2010
Switch Gear and Protection

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1 a. Explain the differences between isolating switch and load break switch.   (04 Marks)

   b. With a neat sketch, explain the time-current and cut-off characteristics of HRC fuse.
                                                                                    (08 Marks)

   c. Explain in detail, the two theories of arc interruption in circuit breaker. State the assumptions made.   (08 Marks)

2 a. Define the following terms as applied to circuit breaker:
      i) Restriking voltage   ii) RRRV.   (04 Marks)

   b. Describe the principle of resistance switching and derive the value of the critical resistance where L & C are inductance and capacitance per phase of the system respectively upto the C.B. location point.   (08 Marks)

   c. For a 132 kV, 50 Hz system, the reactance and capacitance upto the location of circuit breaker are 3 Ω and 0.015 μf respectively. Calculate the following :
      i) Frequency of transient oscillations.
      ii) Maximum value of restriking voltage across the contacts of the circuit breaker.
      iii) Maximum value of RRRV.   (08 Marks)

3 a. Explain the phenomena of current chopping with wave forms.   (06 Marks)

   b. What are the advantages and disadvantages of (i) bulk oil circuit breaker (ii) minimum oil circuit breaker.   (08 Marks)

   c. With a neat sketch, explain the working of axial blast air circuit breaker.   (06 Marks)

4 a. With a neat sketch, explain the construction and working of vacuum circuit breaker.
                                                                                    (08 Marks)

   b. Mention the ratings specified for a circuit breaker.   (04 Marks)

   c. Mention the different types of short-circuit testing stations and write the schematic diagram of a short-circuit test plant. What is the function of master circuit breaker in the test plant?
                                                                                    (08 Marks)

PART – B

5 a. What is a relay? Define (i) pick up level (ii) burden (iii) drop out, with respect to relays.
                                                                                    (04 Marks)

   b. State and briefly explain the characteristics of good protective relaying.   (08 Marks)

   c. With a neat sketch, explain the working of induction type directional over current relay.
                                                                                    (08 Marks)

6 a. Explain the working principle and characteristics of an impedance relay. (08 Marks)

b. With a suitable diagram, explain a negative sequence relay and mention its applications. (08 Marks)

c. What are the advantages of microprocessor based protective relays over electromagnetic and static relays? (04 Marks)

7 a. Explain the protection of a generator against (i) loss of excitation, (ii) stator interturn fault and (iii) over speeding. (12 Marks)

b. The neutral point of a 10,000V alternator is earthed through a resistance of 10Ω, the relay is set to operate when there is an out of balance current of 1 A. The CTs have a ratio of 1000/5. What percentage of the winding is protected against fault to earth and what must be the minimum value of earthing resistance to give 90% protection to each phase winding? (08 Marks)

8 a. What measures are taken to distinguish between the fault current and magnetizing inrush current? With a neat sketch, discuss the protective scheme which protects the transformer against faults but does not operate in case of magnetizing inrush current. (10 Marks)

b. With a neat sketch, explain the working of a Buchhotz relay and state its limitations. (10 Marks)

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