Sixth Semester B.E. Degree Examination, Dec.09/Jan.10
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. With neat sketch explain the time current and cut-off characteristics of H.R.C fuse. What are the advantages and disadvantages of H.R.C fuse? **(12 Marks)**

   b. Explain the principle of D.C. circuit breaking. **(08 Marks)**

2 a. Explain the problems involved in interruption of low inductive and capacitive currents. **(12 Marks)**

   b. In a 220 kV system, the reactance and capacitance up to the location of circuit breaker is 8 Ω and 0.025 µF respectively. A resistance of 600 Ω is connected across the contacts of the circuit breaker. Determine the following:
   i)   Natural frequency of oscillation.
   ii) Damped frequency of oscillation.
   iii) Critical value of resistance which will give no transient oscillation.
   iv) The value of resistance which will give damped frequency of oscillation, $\frac{1}{4}^{th}$ of the natural frequency of oscillation. **(08 Marks)**

3 a. Explain the working of air blast circuit breaker with reference to i) Axial blast ii) Cross blast. **(10 Marks)**

   b. With neat sketch explain the construction and working of non-buffer type SF_6 breaker. **(10 Marks)**

4 a. With neat sketch explain construction and working of vacuum C.B. What are the advantages and disadvantages of the above? **(10 Marks)**

   b. With neat circuits, explain briefly the two types of synthetic test on circuit breaker. **(10 Marks)**

Part – B

5 a. What are the basic requirements of protective relaying? Explain briefly. **(10 Marks)**

   b. With the aid of neat sketch explain the operation of directional over current relay. **(10 Marks)**

6 a. Explain the principle of operation of, i) Percentage differential relay, ii) Voltage balance differential relay. **(10 Marks)**

   b. With the aid of neat diagram, explain Buchholz relay for protection of transformer. **(10 Marks)**

7 a. Draw and explain the Merz-Price protection of alternator stator windings. State its advantages. **(10 Marks)**

   b. The neutral point of a 11 kV alternator is earthed through a resistance of 12 Ω, the relay is set to operate when there is out of balance current of 0.8 A. The C.T.S have a ratio of 200/5. What percentage of winding is protected against earth faults? What must be the minimum value of earthing resistance required to give 90% of protection to each phase? **(10 Marks)**

8 a. With the aid of neat circuit diagram, explain how protection for induction motor is given by, i) Single phase preventer   ii) Ground fault protection. **(12 Marks)**

   b. A 11 kV/132 kV power transformer is connected in delta-star. The C.T.S on the low voltage side have turns ratio of 600/5. Find the suitable turns ratio for the C.T.S on high voltage side. **(08 Marks)**

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