10EE62

Sixth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Switchgear and Protection

Time: 3 hrs.

Max. Marks:100

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

PART – A

1 a. Explain the role of isolating switch in a power system. **(06 Marks)**
   b. With the help of waveform, explain cutoff characteristic of fuse. Also define the term fusing factor. **(06 Marks)**
   c. With the help of diagram, explain the construction and working of HRC fuse. **(08 Marks)**

2 a. Discuss the recovery rate theory and energy balance theory of arc interruption in AC circuit breaker. **(06 Marks)**
   b. Explain the current chopping phenomenon in circuit breaker. **(06 Marks)**
   c. In a 220 KV system, the reactance and capacitance upto the location of circuit breaker is 8Ω and $0.025\mu F$ respectively. A resistance of 600Ω is connected across the contacts of the circuit breaker. Determine i) Natural frequency of oscillation ii) Damped frequency of oscillation iii) Critical value of resistance, which will give no transient oscillation. **(08 Marks)**

3 a. Explain the construction and working of air break circuit breaker with the help of neat diagram. **(10 Marks)**
   b. Explain various properties of SF_6 gas. **(10 Marks)**

4 a. Explain following tests performed on circuit breaker :
      i) Unit test   ii) Synthetic test   iii) Substitution test   iv) Compensation test
      v) Capacitance test. **(10 Marks)**
   b. With neat figure, explain the working of :
      i) Rod gap arrestor   ii) Expulsion type arrestor. **(10 Marks)**

PART – B

5 a. With a neat sketch, explain different zones of protection in power system. **(06 Marks)**
   b. Explain various methods of backup protection. **(06 Marks)**
   c. Explain essential qualities of protective relaying. **(08 Marks)**

6 a. Explain the working of percentage differential relay. **(06 Marks)**
   b. Explain three stepped distance protection of transmission line. **(08 Marks)**
   c. Write a short note on microprocessor based over current relay. **(06 Marks)**

7 a. With the help of neat diagram, explain Merz –Price protection of star connected alternator stator windings. Mention its advantages. **(10 Marks)**
   b. A 11KV, 3 – phase Alternator has full load rated current of 200A. Reactance of armature winding is 15%. The differential protection system is set to operate on earth fault currents of more than 200A. Find the neutral earthing resistance. which gives earth fault protection to 90% of stator winding. **(06 Marks)**

c. Write a short note on Unbalanced loading of alternator and its effects. **(04 Marks)**

8 a. List the various abnormal operating conditions and how induction motor is protected agains these **(06 Marks)**

b. What is Phase reversal? What are its effects? How it is prevented? **(06 Marks)**

c. A 3 – phase, 11 KV/33 KV, Y - Δ connected power transformer is protected by differentia protection. The CTs on LV side have a current ratio of 400/5. What must be the ratio of CTs on HV side? Draw the connection diagram of how CTs are connected on both the sides o the transformer. **(08 Marks)**

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