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10EE62

Sixth Semester B.E. Degree Examination, June/July 2017
Switch Gear 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. Draw the single line diagram to connect a CB, Isolator, Earthing switches and write the sequence of operation while opening and closing of a circuit. **(06 Marks)**

b. With neat sketch describe the working principle of a liquid fuse. **(06 Marks)**

c. Explain the cut-off characteristics and time – current characteristics of a fuse. **(08 Marks)**

2 a. Explain recovery rate theory related to current zero method of arc interruption. **(06 Marks)**

b. Derive an expression for restriking voltage and rate of rise of restriking voltage of circuit breaker. **(07 Marks)**

c. For a 132KV system, the reactance and capacitance upto the location of the circuit breaker is 3Ω and 0.015 μF respectively. Calculate the following :
i) The frequency of transient oscillation.
ii) Maximum value of restriking voltage across the contacts of the circuit breaker and
iii) Maximum value of rate of rise of restriking voltage. **(07 Marks)**

3 a. With a neat sketch, explain the operating principle of axial air blast circuit breaker. **(06 Marks)**

b. Sketch and explain the working principle of buffer type of sulphur hexa fluoride circuit breaker. **(06 Marks)**

c. Explain the procedure adopted in unit test and synthetic testing of circuit breaker. **(08 Marks)**

4 a. Explain the construction and working of a vacuum circuit breaker. **(10 Marks)**

b. What are the types of lightning strokes? Explain each of them. **(06 Marks)**

c. State the essential requirements of a surge diverters. **(04 Marks)**

PART – B

5 a. What is a relay? Define i) Pickup level ii) Burden iii) Chop out, with respective to relay. **(04 Marks)**

b. State and briefly explain the characteristics of good protective relying. **(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 inter turn 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 1A. The CT's 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. Describe the harmonic restraints relay use to protect the transformer. **(08 Marks)**

b. Explain single phasing in induction motors. How motor is protected from single phasing? **(08 Marks)**

c. List the various abnormal conditions against which large induction motor has to be protected. **(04 Marks)**

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