



10EE62

Sixth Semester B.E. Degree Examination, Aug./Sept.2020  
**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. State and derive the fuse law for a circular element. (06 Marks)  
b. Explain the cut – off characteristics and time – current characteristics of a fuse. (06 Marks)  
c. Draw and explain the working of liquid fuse. (08 Marks)
- 2 a. Explain i) Interruption of capacitive currents. (10 Marks)  
ii) Interruption of low magnetizing currents. (10 Marks)  
b. In a 220 KV system, the reactance and capacitance upto the location of circuit breaker is  $8\Omega$  and  $0.025 \mu\text{F}$ , respectively. A resistance of  $600\Omega$  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, one fourth of the natural frequency of oscillation. (10 Marks)
- 3 a. With a neat sketch, explain the construction and working of minimum oil circuit breaker. (10 Marks)  
b. With a neat sketch, explain the construction and working of  $\text{SF}_6$  breaker. (10 Marks)
- 4 a. With a neat sketch, explain the following synthetic testing : (10 Marks)  
i) Parallel Current Injection Method ii) Series Current Injection Method. (10 Marks)  
b. Describe the construction and principle of operation of i) Expulsion type lightning arrester (10 Marks)  
ii) Valve type lightning arrester. (10 Marks)

**PART - B**

- 5 a. What are the different classification of protective relays based on construction and actuating quantity. (10 Marks)  
b. Explain with the help of neat sketch, the construction and working of Directional Induction type over current relay. (10 Marks)
- 6 a. Explain the construction , working , torque equation and characteristics of i) Reactance relay ii) Mho relay. (10 Marks)  
b. Explain the working of gas operated Buchholz relay used for the protection of transformers. State its limitations and advantages. (10 Marks)
- 7 a. What are the abnormal running conditions may exist in a generator? What are the effects and how these effects can be minimized? (10 Marks)  
b. Draw and explain the Merz – price protection scheme for i) ( $\text{Y}$ ) star -  $\Delta$  transformer ii)  $\text{Y}$ -  $\text{Y}$  transformer. (10 Marks)
- 8 a. Briefly explain what are the methods to provide rotor earth fault protection. (10 Marks)  
b. A generator is protected by restricted earth fault protection. The generator ratings are 13.2 KV , 10 MVA. The percentage of winding protected against phase to ground fault is 85%. The relay setting is such that it trips for 20% out of balance. Calculate the resistance to be added in the neutral to ground connection. (10 Marks)

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Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.  
2. Any revealing of identification, appeal to evaluator and /or equations written eg,  $42+8=50$ , will be treated as malpractice.