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10EE62

Sixth Semester B.E. Degree Examination, Dec.2019/Jan.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. Write a short note on Energy Management of Power System. (04 Marks)  
b. Define i) Fuse ii) Rated current of fuse iii) Fusing current iv) Fusing factor. (08 Marks)  
c. Explain the construction and working of a HRC fuse with a neat sketch. List the advantages and disadvantages. (08 Marks)
- 2 a. What is Resistance Switching? Derive an expression for critical resistance by analyzing the resistance switching in the circuit breaker. Also write the equation for frequency of damper oscillation. (10 Marks)  
b. For A132 KV system, the reactance and capacitance upto the location of the circuit breaker is  $3\Omega$  &  $0.015\mu\text{F}$  respectively. Calculate.  
i) Frequency of transient oscillation.  
ii) Maximum value of RV across the contacts of circuit breaker.  
iii) Maximum value of rate of rise of RV (Restricting Voltage). (06 Marks)  
c. Write a short note on Recovery Rate Theory. (04 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 diagram, describe the working principle of vacuum C.B.(circuit breaker) for which range IT is recommended. (10 Marks)
- 4 a. With a neat sketch, explain the construction and working of non puffer type  $\text{SF}_6$  breaker. (10 Marks)  
b. Explain Expulsion type lightning arrester and write its advantages and disadvantages. (10 Marks)

**PART - B**

- 5 a. Define Relay. What are the essential qualities of protective relay and explain the classification of protective relay. (10 Marks)  
b. Explain with the help of neat diagram, the construction and working of non directional induction type over current relay. Draw and explain its time – current characteristics. (10 Marks)
- 6 a. Explain the principle of three stepped distance protection of transmission line. (10 Marks)  
b. With a neat sketch, explain the construction and working of Buchholz's relay. (10 Marks)
- 7 a. Write a short note on :  
i) 100 percent stator earth fault protection.  
ii) Loss of field protection in an alternator. (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.

- b. A neutral point of a 11KV alternator is earthed through a resistance of  $12\Omega$ , the relay is set to operate when there is out of balance current of 0.8A. The CTs have a ratio of 2000/5. What percentage of the 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 a basic circuit diagram, explain Harmonic Restraint Relay Protection for Transformer. (10 Marks)
- b. Draw and explain the Ground Fault Protection of Induction Motor. (10 Marks)

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