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10EE62

Sixth Semester B.E. Degree Examination, June/July 2019

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. Explain with a neat sketch, the construction and working of a HRC fuse. Also explain its properties and characteristics. **(08 Marks)**
   b. Discuss the Recovery Rate Theory and Energy balance theory of ARC interruption in a circuit Breaker. **(08 Marks)**
   c. Explain the difference between isolating switch and load break switch. **(04 Marks)**

2 a. Derive an expression for Restriking Voltage and Rate of Rise of Restriking Voltage (RRRV). **(07 Marks)**
   b. A 50 Hz generator has an emf to neutral is 7.5 KV (rms). The reactance of the generator and the connected system is 4Ω and the distributed capacitance to neutral is 0.01 µF with negligible resistance:
   i) Maximum voltage across the circuit breaker contacts
   ii) Frequency of oscillation
   iii) RRRV average up to first peak of oscillations. **(06 Marks)**
   c. Explain the phenomenon of current chopping and capacitive current in the circuit breaker. **(07 Marks)**

3 a. Explain the construction and working of minimum oil circuit breaker. **(07 Marks)**
   b. Explain the working of Air Break Circuit breaker. **(06 Marks)**
   c. With a neat sketch explain the construction and working of Puffer type SF_6 Breaker. **(07 Marks)**

4 a. Explain the construction, working, advantages and disadvantages of vacuum circuit breakers. **(08 Marks)**
   b. Write explanatory note on:
   i) Direct testing of CB
   ii) Synthetic testing
   iii) Rating of circuit breaker **(12 Marks)**

PART – B

5 a. What do you mean by Protective Relaying? Discuss the desirable requirements of Protective Relaying. **(08 Marks)**
   b. With a neat sketch, explain the construction and working of directional over current relay. **(12 Marks)**

6 a. Derive an expression for the torque produced by an Induction type relay. **(06 Marks)**
   b. Explain with neat sketch the working of Buchholz's relay. **(06 Marks)**
   c. Explain with a neat sketch, the construction and operating characteristics of percentage differential relay protection. **(08 Marks)**

7   a. Draw and explain the Merz-Price Protection of Star and Delta connected Alternator Stator windings. State its advantages.   (10 Marks)
    b. Discuss the important Faults on Alternator.   (04 Marks)
    c. A 5000 KVA, 6.6 KV, Star connected alternator has $X_S = 2 \ \Omega$ per phase and $0.5 \ \Omega$ resistance. It is protected by Merz-Price balanced current system which operates when the out of balance current exceeds 30% of the load current. Determine what proportion of alternator winding is unprotected if the star point is earthed through a resistor of $6.5 \ \Omega$?
                                                                                            (06 Marks)

8   a. Explain with block diagram of a microprocessor based over current relay.   (06 Marks)
    b. Explain with circuit, Restricted Earth-Fault protection in a transformer.   (06 Marks)
    c. What do you mean by phase fault and ground fault in 3 phase induction motor? How the motors are protected against such faults?   (08 Marks)

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