N 1049

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2004.

Sixth Semester

Electrical and Electronics Engineering

EE 338 — PROTECTION AND SWITCH GEAR

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define selectivity of protective relaying.

2. What are the advantages of percentage differential relay over a simple differential relay?

3. What is the secondary positive sequence impedance seen by the distance relay for a 50 mile, 138 kV transmission line provided with 600/5 star connected CTs and 138000/115 star connected PTs. Assume the impedance of transmission line is 0.8 Ω/mile.

4. What is the use of Line Traps in carrier current relaying?

5. What are the two factors on which RRRV depends upon?

6. What is the prospective voltage e across the stray capacitance of 0.0023 μF, when the instantaneous current chopped by circuit breaker is 7 A. The value of the inductance in the circuit is 35.2 H?

7. What is the advantage of cross–jet explosion pot in oil circuit breaker?

8. A circuit breaker is rated at 1200 A, 1500 MVA, 33 kV, 3 sec, 3 phase. What are its rated breaking current and making current?

9. What do you understand by shielding angle in overvoltage protection? What may be its approximate value?

10. Give atleast two merits of a resistance grounded system.

11. A three phase alternator has the line voltage of 11 kV. The generator is connected to a circuit breaker. The inductive reactance upto the circuit breaker is 5 ohm per phase. The distributed capacitance upto circuit breaker between phase and neutral is 0.001 μ F. Determine, peak restriking voltage across the CB, frequency of restriking voltage transients, average rate of restriking voltage upto peak restriking voltage, maximum RRRV. (16)

12. (a) (i) Explain back up protection. (4)

    (ii) Explain with the aid of neat diagram, the principle of operation of an induction type overcurrent relay. Explain IDMT characteristics and how they are obtained in an induction type relay. (12)

Or

   (b) Write short notes on :

      (i) Buchholz relay

      (ii) Translay relay. (8 + 8)

13. (a) (i) Explain the differential protection of Delta/Star power transformer. (6)

    (ii) A 3 phase, 10 MVA, 6.6 kV alternator supplies a load of 8 MVA at 0.8 pf and is being protected through Merz–Price circulating current system and its relays are so set that they do not operate until the out of balance current occurs at 20% of full load current. Calculate the value of earth resistance to be provided in order to ensure that only 10% of alternator winding remains unprotected. Assume alternator reactance of 10%. Neglect resistance of the alternator. (10)

Or

   (b) (i) Explain clearly how ring main feeders are protected by graded time lag directional relays. (8)

    (ii) Describe the carrier current phase comparison relaying. (8)

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14. (a) (i) Discuss about resistance switching of circuit breaker. (6)

(ii) Derive an expression for restriking voltage when R is infinity. (10)

Or

(b) (i) Enumerate the advantages of air blast circuit breaker for high voltages. (8)

(ii) With neat sketch, explain the principles of axial blast air circuit breaker. (8)

15. (a) Describe solid grounding and resistance grounding for earthing the neutral point of generator. (8 + 8)

Or

(b) Explain with neat diagram the principle and operation of thyrite lightning arrester. What property of thyrite makes it most suitable as a lightning arrester? (12 + 4)

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