Register No: ……

B.E. DEGREE EXAMINATIONS: APRIL/MAY 2011

Sixth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U07EE603: Protection and Switchgear

Time: Three Hours **Maximum Marks: 100**

Answer All Questions:-

PART A (10 x 1 = 10 Marks)

1. For a fault at the terminals of a synchronous generator, a fault current is maximum for a

(a) 3Phase fault (b) Line-to- ground fault (c) line-to-line fault

2. Zone of protections is fixed by the location of _____

(a) location of circuit breaker (b) location of CT (c) location of PT

3. In an Electromechanical relay, the controlling torque is developed by

(a) Controlling spring (b) Restraining Coil (c) Brake magnet.

4. Distance relay is applied for the protection of

(a) Short transmission line (b) Medium transmission Line (c) Long transmission Line.

5. If the fault current is 2000A, the relay setting is 50% and CT ratio is 400:5, then PSM will be

(a) 25 (b) 15 (c) 50 (d) 10

6. Restricted Earth Fault protection gives _____ of winding protection against Stator Earth fault.

(a) 80-85% (b) 70-75% (c) 90-95%

7. The rate of rise of Re striking voltage depends upon the

(a) type of CB (b) inductance of the system only

(c) Capacitance of the system only (d) Inductance and Capacitance of the system

8. Resistance switch is normally employed in

a) All breakers. b) Bulk oil breakers c) Minimum oil breakers d) Air blast circuit breakers

9. When Voltages are high and current to be interrupted is low, the breaker preferred is

a) Air Blast CB b) Oil CB c) Vacuum CB d) any of these.

10. The current chopping tendency is minimized by using the SF_6 gas at relatively

a) high pressure and low velocity b) high pressure and high velocity

c) Low pressure and low velocity d) Low pressure and high velocity

PART B (10 x 2 = 20 Marks)

11. What are symmetrical components?
12. Differentiate protection system and protection scheme?
13. How directional characteristic is incorporated in the over current relays?
14. Mention any two advantages of static relays compared to electromechanical relay.
15. What are the possible failures in the rotor circuit of an alternator?
16. What is phase comparator? Where it is used?
17. Define RRRV.
18. Mention any two methods how the capacitive currents are interrupted in the circuit breaker.
19. Mention any two specifications of the CB selection.
20. Mention any two properties of SF_6 Gas.

PART C (5 x 14 = 70 Marks)

21. a) (i) List the causes of faults in different equipments in a sample system (7)

(ii) A 3 phase 11kV,25 MVA alternator with X_{g0}=0.05 p.u, X_1=0.15 p.u and X_2=0.15 p.u is grounded through a reactance of 0.3 ohms. Calculate the line current for SLG fault. (7)

(OR)

b) (i) Draw the protective zone diagram for a sample power system network and explain its rules.

(ii) List the various qualities of protective relaying. Discuss in detail.

22. a) Discuss in detail with neat sketch, the construction and working of Non directional induction disc relays

(OR)

b) Explain the principle of operation of

(a) Circulating current differential protection

(b) Balanced voltage differential protection

23. a) (i) Draw the diagram of connections of the Merz Prize circulating current system for the protection of a 1000 kVA, 11kV/400volts delta/star, 3 phase transformer with the star point connected to ground and mark on the diagram the turns ratio of the CTs for a nominal 5A secondary current.

(ii) What is the need for bus-bar protection? How bus bar protection scheme is stabilized? (7)

(OR)

b) With the neat diagram discuss about the function of static distance relay.

24. a) (i) Explain about the arc interruption methods used in circuit breakers.

(ii) A circuit breaker is rated at 1200 amps, 1500 MVA, 33kV, 3 second, 3 phase oil circuit breaker. What are its rated current, breaking current, making current and short time rating?

(OR)

b) (i) Explain the term restriking voltage. Derive an expression for the same in terms of system voltage, inductance and capacitance across a circuit breaker, when a three phase fault occurs.

(ii) Explain current chopping in circuit breakers and, how it can be minimized?

25. a) With the help of neat sketch, explain the construction of typical EHV airblast circuit breaker.

(OR)

b) What is the difference between direct testing and indirect testing? What are the procedures of indirect testing? Describe about (a) unit testing (b) Synthetic testing.

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