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NEW SCHEME

Sixth Semester B.E. Degree Examination, July 2007
Electrical and Electronics Engineering
Switch Gear and Protection

Time: 3 hrs.]

[Max. Marks:100

Note : Answer any FIVE full questions.

- 1 a. Discuss the Recovery rate theory and energy balance theory of Arc interruption in a Circuit Breaker. (06 Marks)
- b. Derive an expression for Restriking voltage and R R R V. (06 Marks)
- c. A 50 Hz generator has emf to neutral 7.5 KV (rms). The reactance of generator and the connected system is 4Ω and distributed capacitance to neutral is $0.01\mu F$ with resistance negligible. Find, i) Maximum voltage across the circuit breaker contacts. ii) Frequency of oscillation, f_n iii) R R R V average upto first peak of oscillations. (08 Marks)
- 2 a. With a neat sketch describe the working principle of an axial air blast type circuit breaker. (10 Marks)
- b. Describe the working principle of SF6 circuit breaker. What are its advantages over other types of circuit breakers? For what voltage range is it recommended?(10 Marks)
- 3 a. Explain the differences between fuse and a circuit breaker. (05 Marks)
- b. Describe the construction and working principles of an H.R.C. fuse. (05 Marks)
- c. What are the considerations in selecting a fuse for :
 i) Transformer protection ii) Motor protection iii) Capacitor protection
 iv) Heaters v) Lighting loads. (10 Marks)
- 4 a. Explain in brief the basic requirements of protective relaying. (12 Marks)
- b. The current ratings of an over current relay is 5A. It has a PSM = 2, TSM = 0.3, CT ratio = 400/5, fault current = 4000 A. Determine the time of operations of the relay assuming normal IDMT characteristics.
 At TSM = 1, the operating time at various PSM :

(08 Marks)

PSM	2	4	5	8	10	20
Operating time in secs	10	5	4	3	2.8	2.4

- 5 a. With a neat diagram, explain the working principle and operating characteristics of a percentage biased differential relay. (10 Marks)
- b. Explain the differential scheme of bus bar protection. What are the draw backs of this scheme and how can you overcome them? (10 Marks)

- 6 a. Explain the construction, working, torque equation of reactance relay. (10 Marks)
b. Explain the full scheme of protecting a transmission line using an Impedance relay. (10 Marks)
- 7 a. Explain the working of gas operated Buchholz relay used for the protection of a transformer. State its limitations and advantages. (10 Marks)
b. A 3 phase power transformer having a line voltage ratio of 400v to 33kv is connected in Y - Δ . The CTs on 400v side have current ratio 1000/5. What must be the C.T. ratio on 33 kv side? (10 Marks)
- 8 Write short notes on :
a. Testing of circuit breakers.
b. Principles of power system protection.
c. Carrier aided distance protection.
d. Protection against inter - turn faults. (20 Marks)
