



B.E./B.Tech (Full Time) DEGREE END SEMESTER EXAMINATIONS, APR/MAY 2011

ELECTRICAL AND ELECTRONICS ENGINEERING

SEVENTH SEMESTER – (REGULATIONS 2004)

EE473 – PROTECTION AND SWITCHGEAR

Time:3 hrs

Max Marks:100

Answer ALL Questions

Part A – (10×2=20)

1. Mention the advantage of method of symmetrical components
2. Write the formula for short circuit kVA for three phase circuit.
3. What do you mean by a protective relay?
4. Explain briefly about time-setting multiplier.
5. What is the use of earth fault relay?
6. Which is the most serious fault on alternator?
7. Explain the term, recovery voltage
8. What is meant by current chopping?
9. Distinguish between bulk oil circuit breaker and low oil circuit breaker
10. Explain the short time rating of a circuit breaker.

Part B – (5×16=80)

11. (i) Derive an expression for fault current for double line to ground fault by symmetrical components method. (10)
- (ii) The per unit values of positive, negative and zero sequence reactances of a network at fault are 0.08, 0.07 and 0.05. Determine the fault current if the fault is double line to ground. (6)
12. a. Describe the construction and principle of operation of an induction type directional overcurrent relay. (16)

OR

- b. Explain the working principle of various distance relays. (16)
13. a.(i) Describe earth fault protection for transformers. (8)
- (ii) A three phase transformer of 220/11kV line volts is connected in star/delta. The protective transformers on 220 V side have a current ratio of 600/5. What would be the

CT ratio on 11 kV side? (8)

OR

b.(i) Describe modified differential protection scheme for alternators (8)

(ii) A 10 MVA, 6.6 kV three phase star-connected alternator is protected by Merz-Price circulating current system. If the ratio of the current transformers is 1000/5, the minimum operating current for the relay is 0.75A and the neutral point earthing resistance is 6 ohms, calculate the percentage of each of the stator windings which is unprotected against earth faults when the machine is operating at normal voltage and the minimum resistance to provide protection for 90% of the stator winding. (8)

14.a. Describe different methods of arc extinction (16)

OR

b.(i) Derive the relation for RRRV (8)

(ii) Explain how arc is initiated and sustained in a circuit breaker when the circuit breaker contacts break. (8)

15.a. Explain the constructional details and operation of a vacuum circuit breaker. State its advantages and disadvantages. (16)

OR

b. Discuss the construction and operating principle of SF₆ circuit breaker with its merits and demerits. (16)