

(18/05/19 (AM))

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B.E. (Full Time.) DEGREE END SEMESTER ARREAR EXAMINATIONS, April/May 2019  
COLLEGE OF ENGINEERING, GUINDY CAMPUS, ANNA UNIVERSITY, CHENNAI  
ELECTRICAL AND ELECTRONICS ENGINEERING BRANCH

Seventh Semester

EE 8702 Protection and Switchgear (R-2012)

Time: 3 Hours

Max. Marks: 100

Answer ALL questions

PART – A (10 x 2 = 20 Marks)

1. What are the harmful effects of short circuit faults on the power system?
2. Enlist the advantages of neutral grounding.
3. What is the difference between a fuse and a relay?
4. What are the fundamental requirements of protective relaying?
5. What factors govern choosing pilot –wire installations?
6. What is the importance of bus-bar protection?
7. Enlist the advantages of static relays.
8. Give the block diagram of a static over current relay.
9. Define making capacity and short-time rating of circuit breaker.
10. How an arc is produced between the contacts of a circuit breaker?



Part – B (5 x 16 = 80 marks)

11. (i) Obtain the expressions for fault current in a Line-Line fault using symmetrical components method. (8)  
(ii) With case studies explain the different types of grounding a power system. (8)
12. (a) Derive the universal torque equation and explain in detail the directional over current relay. (16)

(OR)

- (b) (i) Explain the current differential relay in detail. (8)  
(ii) Explain the types of distance relays in detail. (8)

13. (a) Explain in detail the different types of faults and protection schemes in a transformer. (16)

(OR)

(b) (i) Explain the modified differential protection for alternators. (6)

(ii) A 10 MVA, 6.6kV, 3-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  $6\Omega$ , calculate

(i) the percentage of each of the stator windings which is unprotected against earth faults when the machine is operating at normal voltage.

(ii) the minimum resistance to provide protection for 90% of the stator winding. (10)

14. (a) (i) Explain how mho relay can be synchronized using cosine type phase comparator. (8)

(ii) Explain the duality theorem in case of amplitude and phase comparators. (8)

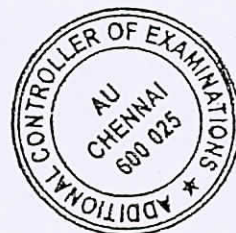
(OR)

(b) (i) Explain how Mann Morrison method is an effective numerical protection of transformers. (16)

15. (a) Explain current chopping and capacitive current breaking in detail. (8+8)

(OR)

(b) Explain the principle of operation and types of air circuit breaker with relative merits and demerits. (16)



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