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Question Paper Code : 10585

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2025.

Sixth Semester

Electrical and Electronics Engineering

EE 8602 – PROTECTION AND SWITCHGEAR

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. Write the consequences of faults occur in power system.
2. What are the essential qualities of protection?
3. List the basic requirements of protective relay.
4. Give the principle of negative sequence relay.
5. Why secondary of the current transformer should not be left opened?
6. List the common faults that occur in a generator.
7. Show the duality between amplitude and phase comparators.
8. Write the protection strategies used for transmission lines to prevent faults.
9. What are the factors to be considered while selecting a circuit breaker?
10. Compare key differences in AC and DC circuit breakers.

PART B — (5 × 13 = 65 marks)

11. (a) (i) Discuss the various protective mechanisms used in power systems. (8)
- (ii) The four identical alternators are connected in parallel. Each machine is rated 25 MVA, 11 kV and has a sub transient reactance of 16% on its rating. Compute the short circuit MVA when three-phase fault occurs at one of the outgoing feeders. (5)

Or

- (b) How are different grounding methods implemented? Explain each method in detail and show a neat diagram. (13)
12. (a) Describe the basic working principle of a relay and derive the fundamental equation for torque. (13)

Or

- (b) Explain the various inverse-time characteristics of overcurrent relays in detail, and describe how these characteristics are practically realized in an electromagnetic relay. (13)
13. (a) Discuss the working principle, construction, and various types of current transformers. (13)

Or

- (b) (i) Describe the Merz-Price circulating current scheme of protection used for power transformer. (9)
- (ii) Show the protective scheme employed for bus-bars. (4)
14. (a) Discuss the working mechanism and construction features of a static overcurrent relay. (13)

Or

- (b) How are distance relays implemented using static comparators? Discuss in detail. (13)
15. (a) State the Slepian theory for arc interruption. What are the methods of arc extinction? Describe them in detail. (13)

Or

- (b) Explain the construction and working principle of an SF₆ circuit breaker. Also, discuss its advantages and disadvantages. (13)

PART C — ($1 \times 15 = 15$ marks)

16. (a) (i) Explain how does the integration of numerical relays with SCADA systems to enhance the efficiency of the system monitoring and control? (10)
- (ii) A three-phase transformer of 220/11000 V(line) is connected in star-delta. The protective transformers on 220V side. Has a current ratio of 600/5. Calculate the current transformer ratio on 11000V side. (5)

Or

- (b) Derive the characteristics equations for the phase comparator and amplitude comparator. (15)
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