Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 41039

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2024.

Sixth Semester

Electrical and Electronics Engineering

EE 3601 – PROTECTION AND SWITCHGEAR

(Regulations 2021)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the causes of faults in a power system?

2. What is the need for earthing?

3. Classify the different types of electromagnetic relays.

4. What is the function of under frequency relay?

5. List the common faults that occur in a generator.

6. What are the protection methods used for transmission line?

7. Mention the advantages of static relays.

8. List the functions of numerical relays.

9. Define the term "rate of rise of recovery voltage".

10. Write the disadvantages of an air blast circuit breaker.

PART B — (5 × 13 = 65 marks)

11. (a) Explain different types of protection schemes with suitable diagrams.

Or

(b) Explain in detail about the different methods for neutral grounding with suitable diagram.

12. (a) Outline the construction details and principle of operation of induction type directional over current relay.

Or

(b) Formulate the torque equation of mho relay from universal torque equation and explain its characteristics with R-X diagram.

13. (a) Discuss in detail about the protection of generator using differential and biased differential protection scheme.

Or

(b) Describe the types of protective schemes employed for the protection of Busbar.

14. (a) Discuss the synthesis of various distance relays using static comparators.

Or

(b) Illustrate the operation of numerical transformer differential protection with neat block diagram.

15. (a) Explain the construction, working principle, operation and application of Vacuum circuit breakers.

Or

(b) Describe the constructional details of SF6 circuit breaker and its operation. Give its advantages and disadvantages.

PART C — (1 × 15 = 15 marks)

16. (a) A star connected 3 phase, 12 MVA, 11 KV alternator has a phase reactance of 10%. It is protected by Merz – price circulating current scheme which is set to operate for fault current not less than 200A. Calculate the value of earthing resistance to be provided in order to ensure that only 15% of the alternator winding remains unprotected.

Or

(b) A 50 Hz, 11 KV, 3 phase alternator with earthed neutral has a reactance of 5 ohms per phase and is connected to bus bar through a CB. The distributed capacitance up to CB between phase and neutral is 0.01 μf. Determine

(i) Peak restriking voltage across the contacts of the breaker. (6)

(ii) Frequency of oscillation. (5)

(iii) The average rate of rise of re striking voltage up to the first peak. (4)