Reg. No. : ☐☐☐☐☐☐☐☐☐☐☐☐☐

Question Paper Code : 51018

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 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. Mention the differences between primary and back up protection.

2. List out the merits of neutral grounding.

3. Give the purpose of plug setting.

4. Write the torque equation of the universal relay.

5. What are the possible that may occur in an alternator?

6. Illustrate different protections given to the bus bars.

7. Distinguish between static relays with electromagnetic relays.

8. State the advantages of numerical relays.

9. Strike a comparison between recovery voltage and restriking voltage.

10. How arc is quenched in a circuit breaker?

PART B — (5 × 13 = 65 marks)

11. (a) Describe the different faults occurring in power system. Also discuss about causes and effects of faults in power system.

Or

(b) Explain clearly about the zones of protection in power system.

12. (a) Explain the construction and operating principle of impedance type distance relay with R-X diagram.

Or

(b) With neat diagram, describe the construction and principle of operation of negative sequence relay.

13. (a) Describe the construction and working of buchholz relay. Mention its merits and demerits.

Or

(b) Discuss about the different types of protection schemes employed for transmission lines.

14. (a) Discuss in detail about the synthesis of reactance relay using static phase comparator.

Or

(b) Explain the operation of numerical over current relay with the neat block diagram.

15. (a) Explain current chopping with necessary diagrams.

Or

(b) With neat figure, explain the construction and working of SF$_6$ circuit breaker. State the advantages, disadvantages and applications of SF$_6$ breaker. (8+5)

PART C — (1 × 15 = 15 marks)

16. (a) In 132 kV transmission system, the phase to ground capacitance is 0.01 µF the inductance being 6 H.

(i) Calculate the voltage appearing across the pole of a circuit breaker if a magnetizing current of 10A is interrupted.

(ii) Find the value of resistance to be used across contact space to eliminate the striking voltage transient.

(iii) Determine frequency of natural oscillations and damped frequency of oscillations.

Or

(b) An OCB is rated as three phase, 1500A, 2000 MVA, 33 kV, 3 seconds. Determine

(i) the breaking current and making current

(ii) short time current

(iii) Rated normal current

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