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Question Paper Code : 10587

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

Seventh Semester

Electrical and Electronics Engineering

EE 8701 – HIGH VOLTAGE ENGINEERING

(Regulations 2017)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — ($10 \times 2 = 20$ marks)

1. What are switching surges?
2. Define corona and mention its effect on power systems.
3. Define Townsend's first ionization coefficient.
4. Mention two properties of insulating materials.
5. What is the function of a Marx generator?
6. Name two methods of generating high AC voltages.
7. What is a sphere gap?
8. List the types of resistive shunts used for impulse current measurements.
9. Mention the various tests connected on bushing.
10. Write the significance of insulation coordination.

PART B — ($5 \times 13 = 65$ marks)

11. (a) Describe in detail how protective devices are used to safeguard power system equipment.

Or

- (b) Derive the expression with relevant terms and notations, the velocity of propagation of travelling waves on a transmission line.

12. (a) Discuss the various theories that describe the breakdown mechanisms in pure and commercial liquid dielectrics.

Or

- (b) Illustrate the importance of the various theories that explain breakdown in pure and Commercial liquid dielectrics.
13. (a) Elaborate on the working of the Cockcroft – Walton voltage multiplier circuit for generation of high DC voltages with a neat diagram.

Or

- (b) Explain the significance of ripple and regulation in voltage multiplier circuits with appropriate expressions. How are the ripple and regulation minimized?
14. (a) Discuss the working principle of a capacitance voltage transformer and explain how it is used in high voltage measurement.

Or

- (b) A generating voltmeter is to be designed to measure DC voltages ranging from 30 kV to 300 kV. If the indicating meter can read a minimum current of $3 \mu\text{A}$ and a maximum current of $36 \mu\text{A}$, determine the required capacitance of the generating voltmeter.
15. (a) Describe about the tests conducted on isolators and circuit Breakers with its limitation.

Or

- (b) Explain in detail, the various tests to be performed on cables as per IS 10810 standards and elaborate each test in detail.

PART C — ($1 \times 15 = 15$ marks)

16. (a) Analyze why the high intrinsic strength of solid dielectrics is not fully achieved in practical applications. Explain in detail any one breakdown mechanism in solid dielectrics.

Or

- (b) Calculate the peak current and determine the wave shape of the output current of an impulse generator. The total capacitance of the generator is $47 \mu\text{F}$, the charging voltage is 300 kV, the circuit inductance is 1.8 mH, and the dynamic resistance of the test object is 0.08Ω .