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Question Paper Code : 90528

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2022.

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 × 2 = 20 marks)

1. Define corona critical disruptive voltage.

2. What are the methods employed for protection of overhead lines against lightning?

3. What is mean free path?

4. Why should the electrode surface not have sharp points?

5. Name the methods used to generate high voltage DC.

6. Differentiate impulse voltage and switching surge.

7. What is the use of Rogowski coil?

8. What are the advantages of electrostatic voltmeter?

9. Define creepage distance.

10. Why is the impulse test important for power transformer?

PART B — (5 × 13 = 65 marks)

11. (a) (i) How is the lightning modeled mathematically? (5)

(ii) Explain the methods of switching surge formation in detail. (8)

Or

(b) (i) Explain the procedure to draw Bewley Lattice Diagram for a two Substations system. (8)

(ii) Explain briefly about expulsion type arrester. (5)

12. (a) Explain the mechanisms involved in composite and vaccum dielectric breakdown.

Or

(b) Describe the Townsend's theory involved in gaseous breakdown and derive the breakdown criteria.

13. (a) Describe the construction and operation of vande graff generator from the first principle with neat sketch and also give the limitations.

Or

(b) Design and explain the cock craft Walton multiplier circuit for high DC voltage generation and derive the expression for optimum number of stages.

14. (a) Explain the measurement of high voltage using generating voltmeters and give the factors affecting the measurement.

Or

(b) With neat diagram, discuss the operation of CVT and resistive shunts deployed for measurements.

15. (a) Describe the various tests conducted on circuit breakers.

Or

(b) Explain the tests conducted on bushings and power cables.

PART C — (1 × 15 = 15 marks)

16. (a) (i) With suitable diagram show that the deflecting torque of an electrostatic voltmeter is proportional to the product of the square of the applied voltage and the rate of change of capacitance. (8)

(ii) Analyse with suitable diagrams, why a potential divider connected at the output of an impulse generator needs to be matched to the cable connecting it to an oscilloscope and how matching may generally be achieved. (7)

Or

(b) (i) Analyse the construction and operation of triggering and control setup used for impulse generator. (9)

(ii) An impulse generator has 8 stages with each condenser rated for 0.16 μF and 125 KV. The load capacitor available is 1000 pF. Find the series resistance and damping resistance needed to produce 1.2/50 μs impulse wave. What is the Maximum output voltage of the generator, if the charging voltage is 120 KV? (6)