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Question Paper Code : 11299

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2026.

Seventh Semester

Electrical and Electronics Engineering

EE3701 — HIGH VOLTAGE ENGINEERING

(Regulations 2021)

Time : Three hours

Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Isokeraunic level.
2. List the techniques to be adopted for controlling switching over voltages.
3. State Paschen's law.
4. Write any one theory proposed to explain the breakdown in Solid dielectrics.
5. Give the Marx circuit arrangement for multistage impulse generators.
6. Why are capacitive voltage dividers preferred for AC high voltage measurements?
7. Differentiate between type test and routine test.
8. Give the Indian standard reference atmospheric conditions for high voltage testing.
9. Name the electrostatic principle used in laser printing or photocopying.
10. How sandpaper is manufactured using electrostatics?

PART B — (5 × 13 = 65 marks)

11. (a) Explain various causes of power frequency over voltages in power systems and its control techniques.

Or

- (b) Develop wave equation of travelling waves in transmission line and also discuss the Behavior of travelling waves in open circuited transmission lines.

12. (a) (i) Summarize the phenomenon of corona discharge and breakdown mechanism in non-uniform fields. (6)
- (ii) Briefly explain breakdown mechanisms in solid dielectrics. (7)

Or

- (b) (i) Explain the various theories that explain breakdown in commercial liquid dielectrics. (6)
- (ii) Explain clearly various processes which explain electric breakdown in vacuum. (7)

13. (a) (i) Describe with a neat sketch the working of a Van de Graaff generator. (6)
- (ii) Explain one method of controlled tripping of impulse generators. (7)

Or

- (b) (i) Describe the generating voltmeter used for measuring high DC voltages. (6)
- (ii) Explain how a sphere gap can be used to measure the peak value of voltages. (7)

14. (a) (i) Explain the partial discharge tests on high-voltage cables. How is a fault in the insulation located in this test? (6)
- (ii) Explain the method of impulse testing of high voltage transformers. What is the procedure adopted for locating the failure? (7)

Or

- (b) Explain the different aspects of insulation design and insulation co-ordination adopted for EHV systems.

15. (a) Explain in detail the principle, construction, and working of an Electrostatic Precipitator (ESP) with a neat sketch. Discuss its applications in pollution control.

Or

- (b) Describe the principle and process of electrostatic painting and coating. List its advantages over conventional painting.

PART C — ($1 \times 15 = 15$ marks)

16. (a) (i) A long transmission line is energized by a unit-step voltage 1.0 V at the sending end and is open circuited at the receiving end. Construct the Bewley lattice diagram and obtain the value of the voltage at the receiving end after a long time.

Take the attenuation factor $\alpha = 0.8$. (10)

- (ii) In an experiment in a certain gas it was found that the steady state current is 5.5×10^{-8} A at 8 kV at a distance of 0.4 cm between the plane electrodes. Keeping the field constant and reducing the distance to 0.1 cm results in a current of 5.5×10^{-9} A. Calculate Townsends primary ionization coefficient α . (5)

Or

- (b) (i) An impulse generator has eight stages with each condenser rated for 0.16 μ F and 125 kV. The load capacitor available is 1000 pF. Find the series resistance and the damping resistance needed to produce 1.2/50 μ s impulse wave. What is the maximum output voltage of the generator, if the charging voltage is 120 kV? (10)

- (ii) A generating voltmeter has to be designed so that it can have a range from 20 to 200 kV dc. If the indicating meter reads a minimum current of 2 μ A and maximum current of 25 μ A, what should the capacitance of the generating voltmeter be? (5)

