

Reg. No. :

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

Question Paper Code : 70567

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2023.

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 Isokeraunic level and flashover.
2. List out various methods of protection against over voltages.
3. What is the effect of corona on transmission lines?
4. State Paschen's Law.
5. What is the principle of operation of a resonant transformer?
6. Define the front and tail times of an impulse wave.
7. Why are capacitance voltage dividers preferred for high ac voltage measurements?
8. How the stray effect is reduced in resistive shunt type of measurement?
9. How rod gaps used as protective devices?
10. Define 'surge impedance' of a line.

PART B — (5 × 13 = 65 marks)

11. (a) Explain the importance of switching over voltages in EHV power systems. How is protection against over voltages achieved? (13)

Or

- (b) (i) What are the different methods employed for lightning protection of overhead lines? (8)
- (ii) Give the mathematical models for lightning discharges and explain them. (5)

12. (a) Discuss the various mechanisms of vacuum breakdown. (13)

Or

(b) Explain the phenomenon of corona discharge and breakdown mechanism in non uniform fields. (13)

13. (a) Why is a Cockcroft-Walton circuit preferred for voltage multiplier circuits? Explain its working with a schematic diagram. (13)

Or

(b) Give the Marx circuit arrangement for multistage impulse generators. How is the basic arrangement modified to accommodate the wave time control resistances? (13)

14. (a) (i) Describe the generating voltmeter used for measuring high dc voltages. (7)

(ii) Explain the principle and construction of an electrostatic voltmeter for very high voltages. (6)

Or

(b) Give the schematic arrangement of an impulse potential divider with an oscilloscope connected for measuring impulse voltages. Explain the arrangement used to minimize errors. (13)

15. (a) With suitable illustrations, explain how insulation level is chosen for various equipment in a 230/132 kV sub-station. (13)

Or

(b) (i) Explain the method of impulse testing of high voltage transformers. (7)

(ii) What are the different power frequency tests done on insulators? Mention the procedure for testing. (6)

PART C — (1 × 15 = 15 marks)

16. (a) (i) A 12-stage impulse generator has 0.126 μ F capacitors. The wave-front and the wave-tail resistances connected are 800 ohms and 5,000 ohms respectively. If the load capacitor is 1,000 pF, find the front and tail times of the impulse wave produced. (5)

(ii) Describe the mechanism of short-term breakdown of composite insulation. (10)

Or

(b) Explain how a sphere gap can be used to measure the peak value of voltages. What are the parameters and factors that influence such voltage measurement? (15)