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Time: 3 hrs.

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, $42+8=50$, will be treated as malpractice.

Fifth Semester B.E. Degree Examination, June/July 2025
High Voltage Engineering

Max. Marks: 100

*Note: Answer any FIVE full questions, choosing ONE full question from each module.***Module-1**

1 a. Define Townsend's first and second ionization coefficients. Derive an expression for the average current in the air gap $I = I_0 e^{\alpha d}$. (10 Marks)
b. With neat sketch, explain the streamer theory of breakdown in air at atmospheric pressure. (10 Marks)

OR

2 a. List the various theories of breakdown in liquid dielectrics and explain suspended particle theory in liquid dielectrics. (10 Marks)
b. List the various theories of breakdown in solid dielectrics and explain thermal breakdown mechanism in solid dielectrics. (10 Marks)

Module-2

3 a. With neat circuit diagram, explain working of Cockcroft-Walton type DC voltage multiplier and derive expression for ripple voltage. (10 Marks)
b. A 12 stage impulse generator has $0.126 \mu\text{F}$ capacitors. The wave-front and wave-tail resistances connected are 800 ohms and 5000 ohms respectively. If the load capacitor is 1000 pF , find the front and tail times of the impulse wave produced. (10 Marks)

OR

4 a. With neat sketch, explain the construction and working of Marx generator. (10 Marks)
b. With neat diagram, explain how cascaded transformer generates high voltage AC. (10 Marks)

Module-3

5 a. With neat sketch, explain the principle of operation of generating voltmeter. (10 Marks)
b. What are the factors influencing the spark over voltage of sphere gap? Explain any two factors. (10 Marks)

OR

6 a. Discuss in brief the method of measuring HVAC by Chubb-Fortescue method and what are its advantages over other methods. (10 Marks)
b. With a neat sketch, explain the working of Rogowski coil for high impulse current measurement. (10 Marks)

Module-4

7 a. Explain the different theories of charge formation in clouds. (10 Marks)
b. What are the causes for switching and power frequency over voltages? How are they controlled in power system? (10 Marks)

OR

8 a. What is meant by insulation co-ordination? Explain the principles of insulation co-ordination on EHV and UHV systems. (10 Marks)
b. What is surge arrester? Explain its function as a shunt protective device. (10 Marks)

Module-5

9 a. What is partial discharge? With a neat circuit diagram, explain the balanced detection method using schering bridge. (10 Marks)
b. With a schematic diagram, explain the method of measuring dielectric loss at power frequency using high voltage schering bridge. (10 Marks)

OR

10 a. Explain briefly the various tests to be carried out on bushings. (10 Marks)
b. Describe various tests to be carried out on circuit breaker. (10 Marks)

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