

**JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY GURAJADA VIZIANAGARAM****IV B. Tech I Semester Advanced Supplementary Examinations March 2025****HIGH VOLTAGE ENGINEERING**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any **FIVE** Questions **ONE** Question from **Each unit**

All Questions Carry Equal Marks

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**UNIT-I**

1. a) Describe the following Ionization processes: [4M+3M]  
(i) Ionization by Collision  
(ii) Photo Ionization  
b) Illustrate Townsend's Current Growth Equation? [7M]  
(OR)
2. a) Explain the process of breakdown in Gases by Streamer Theory with neat sketch. [7M]  
b) Describe the Paschen's Law of Equation's and plot their related graphs. [7M]

**UNIT-II**

3. a) Classify Liquid Dielectrics and Explain. [7M]  
b) Discuss the following breakdown mechanism's in Commercial Liquids: [3M+4M]  
(i) Suspended Particle Theory  
(ii) Cultivation and the Bubble Theory  
(OR)
4. a) Explain Avalanche or Streamer Breakdown Phenomenon with neat sketch. [7M]  
b) A solid specimen of dielectric has a dielectric constant of 4.2, and  $\tan \delta = 0.001$  at a frequency of 50 Hz. If it is subjected to an alternating field of 50 kV/cm, calculate the heat generated in the specimen due to the dielectric loss. [7M]

**UNIT-III**

5. a) Explain the operation of Voltage Doubler circuit with neat circuit diagram and waveforms. [7M]  
b) Derive the expressions for voltage ripple and regulation in a voltage multiplier circuit. [7M]  
(OR)
6. a) Describe with a neat sketch the working of a Van de Graaff generator. What are the factors that limit the maximum voltage obtained? [7M]  
b) Explain different methods for generation of high frequency AC voltages. [7M]

**UNIT-IV**

7. a) Explain Standard Impulse Waveshape with its neat graph. [7M]  
b) Sketch the Marx circuit arrangement for multistage impulse generators and explain how the basic arrangement is modified to accommodate the wave time control resistances. [7M]

(OR)

8. a) Analyze the series RLC type Impulse Generator Circuit. [7M]  
b) Explain tripping and control of impulse generators. [7M]

**UNIT-V**

9. a) Explain the principle of operation of Generating Voltmeters with their relative advantages and limitations. [7M]  
b) Explain the construction and principle of operation of an electrostatic voltmeter for very high voltages and list their merits and demerits for high voltage A.C. measurements. [7M]

(OR)

10. a) Explain the different methods of measuring high impulse currents with their relative merits and demerits. [7M]  
b) Explain how a sphere gap can be used to measure the peak value of voltages and mention the parameters and factors that influence such voltage measurement. [7M]

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