

Seventh Semester B.E Degree Examination, Dec. 07 / Jan. 08
High Voltage Engineering

Time: 3 hrs.

Max. Marks:100

Note : Answer any FIVE full questions.

- 1
 - a. Define Townsend's first and second ionization co-efficients. State the condition for breakdown in Townsend's discharge. (06 Marks)
 - b. Explain the streamer theory of breakdown in air at atmospheric pressure. (08 Marks)
 - c. Derive and explain Paschen's law. (06 Marks)
- 2
 - a. Explain any two theories that explain breakdown in commercial liquid dielectrics. (08 Marks)
 - b. How does the "Internal discharge" phenomena leads to breakdown in solid dielectrics? (06 Marks)
 - c. A solid dielectric specimen of dielectric constant of 4.0 has an internal void of thickness 1mm. The specimen is 1cm thick and is subjected to a voltage of 80 kV (rms). If the void is filled with air and if the breakdown strength of air can be taken as 3kV (peak)/cm, find the voltage at which an internal discharge can occur. (06 Marks)
- 3
 - a. Derive expressions for ripple and voltage drop in cascaded voltage multiplier circuit. (10 Marks)
 - b. Explain two different schemes for cascade connection of transformers for producing very high ac voltage at 50 Hz. (10 Marks)
- 4
 - a. Define an impulse wave and show that the output voltage of impulse generation circuit is double exponential in nature. (10 Marks)
 - b. An impulse generator has eight stages with each condenser rated for $1.6\mu\text{F}$ and 125 kV. The load capacitor available is 1000 PF. Find the series resistance and the damping resistance needed to produce $1.2/50\mu\text{s}$ impulse waves. What is the maximum output voltage of the generator, if the charging voltage is 120 kV? (10 Marks)
- 5
 - a. Explain with neat sketch principle of operation, construction and working of electrostatic voltmeter. State its advantages and disadvantages. (10 Marks)
 - b. Explain how a sphere gap can be used to measure the peak value of voltages. What are the parameters that influence such voltage measurements? (10 Marks)
- 6
 - a. Give the schematic arrangement of an impulse potential divider with an oscilloscope connected for measuring impulse voltages. (10 Marks)
 - b. Explain any two methods of high current measurements with their relative merits and demerits. (10 Marks)
- 7
 - a. What are partial discharges and how they are detected under power frequency operating conditions? (09 Marks)
 - b. Define the following : i) Disruptive discharge voltage ii) withstand voltage iii) Fifty percent flash over voltage iv) Creeping distance. (04 Marks)
 - c. Explain the method of impulse testing of high voltage transformers. What is the procedure adopted for locating the failure. (07 Marks)
- 8 Write short notes on:
 - a. Necessity, advantages and disadvantages of transmitting the power at high voltages.
 - b. Breakdown in electronegative gases.
 - c. Resonant transformer.
 - d. Impulse current generation. (20 Marks)