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Seventh Semester B.E. Degree Examination, May/June 2010
High Voltage Engineering

Time: 3 hrs.

Max. Marks:100

**Note: Answer any FIVE full questions, selecting
at least TWO questions from each part.**

PART – A

- 1 a. Explain, why transmitting of power at high voltage in economical? (05 Marks)
b. Explain the need for generation of high voltages in the laboratory. Mention its applications. (05 Marks)
c. Define Townsend's first and second ionization coefficients. Derive an expression for the current growth in a gas discharge due to secondary mechanism. (10 Marks)
- 2 a. State and explain Paschen's law. (05 Marks)
b. Explain the bubble theory and Electro-convection breakdown in liquid dielectrics. (10 Marks)
c. Derive the criterion for breakdown in electro negative gases. (05 Marks)
- 3 a. Explain clearly the electromechanical and avalanche breakdown in solid dielectrics. (10 Marks)
b. A solid specimen of 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. (04 Marks)
c. What is a Tesla coil? Explain, how are damped high frequency oscillations are obtained from this coil? (06 Marks)
- 4 a. Why a Cock-croft Walton circuit in preferred for voltage multiplier circuit? Explain its working with three-stage schematic diagram. (10 Marks)
b. With a neat diagram, explain the two stage cascade transformer connection for producing very high AC voltages. Mention its advantages and disadvantages. (10 Marks)

PART – B

- 5 a. Define the front and tail time of an impulse voltage wave. What are its tolerances allowed as per the specifications? (04 Marks)
b. Explain how high impulse voltages are generated in a laboratory using MARX circuit. (08 Marks)
c. An impulse generator has eight stages with each capacitor rated for 0.16 micro farad and 125 KV. The load capacitor available is 1000 pico farad. Find the series resistance and the damping resistance needed to produce 1.2/50 micro-second impulse wave. What is the maximum output voltage of the generator, if the charging voltage is 120 KV? (08 Marks)
- 6 a. Explain the principle and construction of an electrostatic voltmeter for very high voltages. List out its merits and demerits. (10 Marks)
b. Explain clearly the factors influencing the spark over voltage of sphere-gaps. (10 Marks)
- 7 a. Draw and explain a simplified equivalent circuit of a resistance potential divider and discuss its step-response. (10 Marks)
b. With a neat diagram, explain how a fault in a long cable can be detected and located using partial discharge technique. (10 Marks)
- 8 a. Explain with a neat diagram, the procedure for impulse testing of power transformer. (10 Marks)
b. Write short notes on : i) Klydeno graph ii) Corona discharges. (10 Marks)

