R09

Time: 3hours   Max. Marks: 60

Answer any five questions
All questions carry equal marks
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1.a)   Define Townsend's first and second ionization coefficients. How is the condition for breakdown obtained in a Townsend discharge?
  b)   What is Paschen's law? How do you account for the minimum voltage for breakdown under a given 'p x d' condition?

2.a)   What are commercial liquid dielectrics, and how are they different from pure liquid dielectrics?
  b)   Explain the various theories that explain breakdown in commercial liquid dielectrics.

3.a)   Give the Marx circuit arrangement for multistage impulse generation. How is the basic arrangement modified to accommodate the wave time control resistances?
  b)   An impulse generator has eight stages with each condenser rated for 0.16 µF and 125 kV. The load capacitor available is 1000 pF. Find the series resistance and the damping resistance needed to produce 1.2/50µs impulse wave. What is the maximum output voltage of the generator, if the charging voltage is 120 kV?

4.a)   What is capacitance voltage transformer? Explain with phasor diagram how a tuned capacitance voltage transformer can be used for voltage measurements in power systems.
  b)   Explain the principle and construction of an electrostatic voltmeter for very high voltages. What are its merits and demerits for high-voltage ac measurements?

5.a)   Explain the method of impulse testing of high voltage transformers. What is the procedure adopted for locating the failure?
  b)   Explain the importance of RIV measurements for EHV power apparatus.

6.a)   Define 'surge impedance' of a line. Obtain the expressions for voltage and current waves at a junction or transition point.
  b)   A transmission line of 500-Ω surge impedance is connected to a cable of 60 Ω surge impedance at the other end. If a surge of 500 kV travels along the line to the junction point. Find the voltage build-up at the junction?

7.a)   Write short notes on
       i) Rod gaps used as protective devices
       ii)Ground wires for protection of overhead lines
  b)   What is meant by insulation co-ordination? How are the protective devices chosen for optimal insulation level in a power system?

8.a)   Discuss the advantages and disadvantages of GIS
  b)   Describe the various components used in GIS.

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