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**Question Paper Code : 51511**

**B.E./B. Tech. DEGREE EXAMINATION, MAY/JUNE 2016**

**Sixth Semester**

**Electrical and Electronics Engineering**

**EE 2353/EE 63/10133 EE 603 – HIGH VOLTAGE ENGINEERING**

**(Regulations 2008/2010)**

**(Common to PTEE 2353/10133 EE 603 – High Voltage Engineering for B.E. (Part-Time)  
Fifth Semester – Electrical and Electronics Engineering Regulations 2009/2010)**

**Time : Three Hours**

**Maximum : 100 Marks**

**Answer ALL questions.**

**PART – A (10 × 2 = 20 Marks)**

1. What are the causes for switching surges ?
2. What are the protective devices used to protect power system equipments against lightning ?
3. State Townsend's breakdown criterion.
4. Give the electrical properties that are essential in determining the dielectric performance of a liquid dielectric.
5. What is the need for HVDC generation ?
6. What is a 'Trigatron gap' ? What are its function ?
7. Draw the schematic diagram of a Generating voltmeter.
8. What are the advantages of digital techniques in high voltage measurements ?

9. Define 'Disruptive Discharge Voltage'.
10. Give the Indian Standard reference atmospheric conditions for high voltage testing.

**PART - B (5 × 16 = 80 Marks)**

11. (a) (i) Give the mathematical models for lightning discharges and explain them. (8)
- (ii) What are the causes for power frequency over voltages ? How are they controlled in power systems ? (8)

**OR**

- (b) A long transmission line is energized by a unit step voltage 1 V at the sending end and is open circuited at the receiving end. Construct the Bewley's lattice diagram and obtain the value of the voltage at the receiving end after a long time. Take the attenuation factor  $\alpha = 0.8$ . (16)

12. (a) (i) Explain the Streamer theory of breakdown in gases. (8)
- (ii) Describe any two mechanisms of Vacuum breakdown. (8)

**OR**

- (b) (i) Explain the various theories of breakdown in commercial liquid dielectrics. (10)
- (ii) State and explain the properties of composite dielectrics. (6)

13. (a) Describe, with a neat diagram, the working principle of the following high voltage producing apparatus : (10 + 6)
- (i) Van de Graaff generator
- (ii) Resonant transformer

**OR**

(b) (i) An impulse generator has eight stages with each condenser rated for  $0.16 \mu\text{F}$  and  $125 \text{ kV}$ . The load capacitor available is  $1000 \text{ pF}$ . Find the series resistance and the damping resistance needed to produce  $1.2/50 \mu\text{s}$  impulse wave. What is the maximum output voltage of the generator, if the charging voltage is  $120 \text{ kV}$  ? (12)

(ii) What are the essential parts of an impulse current generator ? (4)

14. (a) Explain the principle and construction of an electrostatic voltmeter for very high voltages. What are its merits and demerits for high voltage AC measurements ? (10 + 6)

**OR**

(b) Draw the calibrated low ohmic shunt and its equivalent circuit for high impulse current measurements. Explain the different types of resistive shunts with their characteristics and limitations. (4 + 12)

15. (a) With neat diagram, explain the method of impulse testing of high voltage transformers. What is the procedure adopted for locating the failure ? (10 + 6)

**OR**

(b) What is meant by Insulation Coordination ? Explain how the protective devices are chosen for optimum insulation level in a power system. (4 + 12)