Question Paper Code : 52964

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019.

Seventh Semester

Electrical and Electronics Engineering

EE 6701 — HIGH VOLTAGE ENGINEERING

(Regulation 2013)

(Common to PTEE 6701 — High Voltage Engineering for B.E. (Part-Time)
Fifth Semester – Electrical and Electronics Engineering – Regulation 2014)

Time : Three hours   Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define the term 'Isokeraunic level'.

2. Draw the equivalent circuit of a surge diverter.

3. What is 'Burst corona'?

4. State the properties of a composite dielectrics.

5. A tesla coil has a primary winding rated for 10 kV with 2 μF capacitance on primary side and 1 nF capacitance on secondary side. If the energy efficiency is 5%, determine the output voltage.

6. Show the types of impulse current waveforms.

7. Give the advantages of a Generating voltmeter.

8. List the advantages of digital techniques in high voltage measurements.

9. Write the standard atmospheric conditions for HV testing as per Indian Standard.

10. What is meant by 'Insulation coordination'?

PART B — (5 × 13 = 65 marks)

11. (a) (i) Describe the mechanism of lightning strokes inducing high over voltage on transmission lines. (8)

    (ii) What are the sources of switching surges? (5)

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 lattice diagram and obtain the value of the voltage at the receiving end after a long time. Take the attenuation factor $\alpha = 0.8$. (13)

12. (a) (i) Derive the Townsend's current growth equation in uniform gaseous dielectric field. (6)

    (ii) Discuss the phenomenon of thermal breakdown in solid dielectrics. (7)

Or

(b) (i) What are the different mechanisms of breakdown in vacuum? Explain any one mechanism in detail. (7)

    (ii) Explain the Suspended particle mechanism of breakdown in commercial liquid dielectrics. (6)

13. (a) Explain with neat circuit the generation of high DC voltages using an n-stage Cockroft-Walton circuit. Derive an expression for the total ripple content in the output voltage. (8+5)

Or

(b) (i) Explain the working principle of parallel resonant transformer. (6)

    (ii) Explain the working principle of cascaded transformers for producing very high a.c. voltages. (7)

14. (a) (i) Write short notes on Mixed R-C potential dividers. (6)

    (ii) Explain the operation of peak reading voltmeters for impulse voltages. (7)

Or

(b) Explain with neat diagram how a sphere gap can be used to measure the peak value of voltages. What are the parameters and factors that influence such voltage measurements? (8+5)

15. (a) Explain the various tests conducted on isolators and circuit breakers. (13)

Or

(b) Explain the method of impulse testing of high voltage transformers. What is the procedure adopted for locating the failure? (13)

PART C — (1 × 15 = 15 marks)

16. (a) Explain with neat diagram the principle of operation, advantages, limitations and applications of Van de Graff generator. (15)

Or

(b) A ten-stage impulse generator has 0.250 μF condensers. The wave front and wave tail resistances are 75 Ω and 2600 Ω respectively. If the load capacitance is 2.5 nF, determine the wave front and wave tail times of the impulse wave. (15)

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