Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 51445

B.E./B.Tech. DEGREE EXAMINATION, MAY/JUNE 2014.

Sixth Semester

Electrical and Electronics Engineering

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

(Regulation 2008/2010)

(Common to PTEE 2353- High Voltage Engineering for B.E. (Part-Time) Fifth Semester-Electrical and Electronics Engineering-Regulation 2009)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Draw the mathematical model for lightning discharges.
2. Classify the lightning strokes.
3. What are the factors which affect breakdown of gaseous dielectrics?
4. What is meant by Penning Effect?
5. What are the advantages of series resonant circuit?
6. Mention the necessity of generating high dc voltage.
7. Give the procedure for dc and ac peak voltage measurement using sphere gap.
8. What are different types of resistive shunts used for impulse current measurements?
9. How is impulse voltage withstand test conducted?
10. Distinguish between flash over and puncture.

PART B — (5 × 16 = 80 marks)

11. (a) (i) Discuss the step by step procedure for constructing Bewley's Lattice Diagram with an example. (8)

(ii) Explain how are switching and power frequency over voltages controlled in power system. (8)

Or

(b) (i) Draw the cross-sectional view of a valve type lightning arrester and explain its operation with V-I characteristics . (8)

(ii) What are the requirements of a ground wire for protecting power conductors against direct lightning stroke? Explain how they are achieved in practice. (8)

12. (a) (i) Discuss the streamer theory of breakdown in gases. (8)

(ii) Explain the various mechanism of vacuum breakdown. (8)

Or

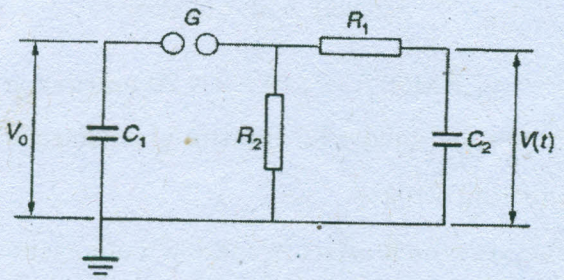
(b) Explain thermal breakdown mechanism in solid dielectrics. Derive an expression for critical thermal breakdown voltage (V_c) and critical electric field (E_c) for the same . State clearly the assumptions made. (16)

13. (a) (i) Explain the working of Cockroft-Walton voltage multiplier circuit under unloaded and loaded conditions. (8)

(ii) Derive an expression for total voltage drop and total ripple voltage of n-stage voltage multiplier circuit and hence deduce the condition for optimum number of stages. (8)

Or

(b) Give complete analysis of the given impulse circuit and derive the condition for physical realization of wavefront and wave tail resistances. (16)



14. (a) Describe the construction, principle of operation of a generating voltmeter and give its application and limitations. (16)

Or

(b) Discuss and compare the performance of resistance capacitance and mixed R- C potential dividers for measurement of impulse voltages. (16)

15. (a) (i) What are volt-time curves? Explain the procedure for constructing volt-time curves with neat sketch. Give its significance in power system studies. (10)

(ii) Explain the modern trends in the insulation design of EHV and UHV substations. (6)

Or

(b) Discuss the various tests carried out in a surge arrester at high voltage laboratories. (16)
