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10EE73

Seventh Semester B.E. Degree Examination, Dec.2014/Jan.2015
High Voltage Engineering

Time: 3 hrs.　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks:100

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

PART – A

1　a. Explain the advantages of transimitivity power at higher voltages and mention the highest transmission voltages of AC + DC in India at present. **(07 Marks)**

　b. Define Townsend first and second ionization coefficient. Derive an expression for the current growth in gas discharge considering secondary emission. **(08 Marks)**

　c. In an experiment in a certain gas it was found that steady state current 5.5×10^{-8}A at 8kV at a distance of 0.4cm between the electrodes. Keeping the field constant and reducing the distance to 0.1cm results in a current of 5.5×10^{-9}A. Calculate the Townsend's primary ionization coefficient 'α' neglect secondary ionization effects. **(05 Marks)**

2　a. State and explain Pascheris law with necessary diagram. **(06 Marks)**

　b. What is meant by time lag and define both the types of time lags with the help of a diagram. **(06 Marks)**

　c. Explain clearly the electromechanical breakdown in solid dielectric and suspended particle theory in liquid dielectric. **(08 Marks)**

3　a. What are the limitations of Townsend theory and explain clearly the Streamer's mechanism of breakdown in gases. **(08 Marks)**

　b. What is meant by corona discharge? Explain the breakdown in electro negative gases. **(07 Marks)**

　c. Explain in detail what is meant by electro convection breakdown in transformer. **(05 Marks)**

4　a. Explain the working principle of a cascaded transformer with a neat sketch. **(07 Marks)**

　b. With neat sketch, explain the construction and working of a series resonant circuit. **(06 Marks)**

　c. A Cockroft-Waltar type multiplier has eight stages with capacitances equal to 0.15μF. The supply transference secondary voltage is 125kV (peak) at a frequency of 50Hz. If the load current is 5mA, find: i) % age ripple; ii) regulation and iii) The optimum number of stages to obtain maximum output voltage. **(07 Marks)**

PART – B

5　a. Explain how impulse voltages are generated in laboratory using MARX circuit. **(07 Marks)**

　b. An impulse generator has eight stages with each capacitor rated for 0.16μF and 125kV. The load capacitor available is 5000pF. Find the series resistance and damping resistance needed to produce 1.2/50μs impulse wave. What is the maximum output voltage of the generator, if the charging voltage is 120kV? **(07 Marks)**

　c. With the help of a neat sketch, explain the working of impulse current generator. **(06 Marks)**

6 a. With a neat sketch, explain the construction and working principle of electrostatic voltmeter. Bring out the advantages and disadvantages. **(08 Marks)**

b. Explain the working principle of generating voltmeter with a neat sketch. **(06 Marks)**

c. Discuss in detail the factors affecting the measurement of high voltage using sphere gap. **(06 Marks)**

7 a. With the help of a neat sketch, explain the construction and principle of H.V. schering bridge used for dielectric loss angle measurements. Derive the expressions used. **(07 Marks)**

b. What is meant by partial discharge? Explain the measurement of partial discharge with a neat sketch. **(07 Marks)**

c. Explain how peak value of high voltage AC is measured using Chubb-Fortescue method. **(06 Marks)**

8 a. Explain with a neat diagram, the procedure for impulse testing of power transformer. **(08 Marks)**

b. Write short notes on:
   i) Testing of cables and insulated.
   ii) Voltage double circuit.
   iii) Trigatron gap.
   iv) Lightning and switching impulse voltage definitions with tolerances. **(12 Marks)**

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