Seventh Semester B.E. Degree Examination, Dec.2018/Jan.2019

High Voltage Engineering

Time: 3 hrs.   Max. Marks:100

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

PART – A

1 a. Discuss the important applications of high voltages. (06 Marks)
   b. Explain the need for generating high voltages in the laboratory. (06 Marks)
   c. What is electrostatic precipitator? Explain the operating principle of electrostatic precipitator and electrostatic painting. (08 Marks)

2 a. Define townsends first and second ionization coefficient. Derive Townsend's current in air gap considering secondary ionization process. (08 Marks)
   b. State and explain Paschen's law with necessary diagram. (06 Marks)
   c. Explain breakdown mechanism in electronegative gases. (06 Marks)

3 a. List the important properties of liquid dielectrics. (04 Marks)
   b. Explain cavitation and bubble mechanism of breakdown in liquid dielectrics. (06 Marks)
   c. Explain the following breakdown mechanism in solid dielectrics:
     i) Avalanch breakdown
     ii) Thermal breakdown (10 Marks)

4 a. What is the necessity of cascade connection? With neat schematic diagram, explain cascade connection of transformers for generation of high voltages ac. (06 Marks)
   b. What is Tesla coil? How are damped high frequency oscillations obtained from Tesla coil? (06 Marks)
   c. A ten stage Cockroft-Walton circuit has all capacitors of 0.055 μF the secondary voltage of the supply is 125 KV at a frequency of 200 Hz. If the load current is 2 mA, determine:
     i) The voltage regulation
     ii) The % ripple
     iii) The optimum number of stages for maximum output voltage
     iv) The maximum output voltage (08 Marks)

PART – B

5 a. Explain Marx circuit arrangement for multistage impulse generator. (07 Marks)
   b. An 8-stage impulse generator has 0.12 μF capacitors rated for 167 KV. What is the maximum discharge energy? If it has to produce a 1/50 μsec waveform across a load capacitor of 15000 PF, find the values of wave front and wave tail resistances. (06 Marks)
   c. What is trigatron gap? Explain its function and operation. (07 Marks)

6 a. Explain with schematic diagrams, construction and working principle of generating voltmeter. (08 Marks)
   b. Explain how peak value of high voltage AC is measured using Chubb and Fortescue method. (06 Marks)
   c. Discuss the factors affecting the measurement of high voltage using sphere gap. (06 Marks)

7 a. With the help of a neat schematic diagram describe how dielectric loss and capacitance of an insulator can be measured using a high voltage Schering bridge. **(08 Marks)**

b. Define partial discharge. Explain how it is measured using straight detection method. **(06 Marks)**

c. With the help of equivalent circuit describe resistance voltage divider for measurement of fast rising voltages. **(06 Marks)**

8 a. What are the various power frequency and impulse tests done on insulator? Describe the procedure for impulse tests. **(08 Marks)**

b. Write short notes on the following:
   i) High voltage tests on cables
   ii) Impulse current generator
   iii) Rogowski coils **(12 Marks)**

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