GUJARAT TECHNOLOGICAL UNIVERSITY
BE SEMESTER-VIII(OLD) EXAMINATION-WINTER 2017

Subject code: 180805   **Date: 10-11-2017**
Subject Name: High Voltage Engineering
Time: 02:30 pm to 05:00 pm   **Total Marks: 70**
Instructions:
      1. Attempt all questions.
      2. Make suitable assumptions wherever necessary.
      3. Figures to the right indicate full marks.

Q.1 **(a)** Describe with a neat sketch, the working of a Van de Graff generator. What are the factors that limit the maximum voltage obtained? **07**

    (b) Define the Townsend first & second ionization co-efficient. Also derive the equation for second ionization co-efficient $I = I_0 e^{\alpha d} / (1 - \gamma (e^{\alpha d} - 1))$. **07**

Q.2 **(a)** State and explain Paschen's law. How do you account for the minimum voltage for breakdown under a given pd condition? **07**

    (b) Explain the voltage multiplier circuits working with a schematic diagram. **07**

OR

    (b) A ten stage Cockraft-Walton circuit has all capacitors of 0.06 μF. The secondary voltage of the supply transformer is 100 kV at a frequency of 150 Hz. If the load current is 1 mA, determine (i) voltage regulation (ii) the ripple (iii) the optimum number of stages for maximum output voltage (iv)the maximum output voltage. **07**

Q.3 **(a)** Explain working of Marks Circuit. **07**
    (b) Explain liquid purification system with test cell. **07**

OR

Q.3 **(a)** Explain partial discharge in solid dielectrics. Discuss its effects on the dielectric strength with neat sketch. **07**

    (b) Draw & Explain how a sphere gap can be used to measure the peak value of voltage. What are the parameters and factors that influence such voltage measurement? **07**

Q.4 **(a)** Explain with neat diagram the principle of operation of an Electrostatics Voltmeter. Discuss its advantages and limitations for high voltage measurements. **07**

    (b) With help of neat sketch defines front time and tail time for the impulse wave. **07**

OR

Q.4 **(a)** What is the principle of operation of a resonant transformer? How is it advantages over the Cascade connected transformer? **07**

    (b) A 12-stage impulse generator has capacitors each rated at 0.3 μF, 150 kV. The capacitance of the test specimen is 400 pF. Determine the wave front and wave tail resistance to produce at 1.2/50 sec. impulse wave. Also determine the maximum output voltage if the charging voltage is 125 kV. **07**

Q.5 **(a)** What is meant by insulation co-ordination? How are the protective devices chosen for optimal insulation level in a power system? **07**

    (b) Explain high voltage Schering bridge for measurement of capacitance and tanδ of an insulator. **07**

OR

Q.5 **(a)** Discuss measurement of Dielectric Constant & Loss tangent of capacitor and also derive the equation for the same. **07**

    (b) Explain High voltage Test on insulator. **07**

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