

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VI (OLD) - EXAMINATION – SUMMER 2018

Subject Code:160904

Date:05/05/2018

Subject Name:High Voltage Engineering

Time:10:30 AM to 01:00 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) Explain streamer theory of breakdown in gases. **07**
(b) A ten stage Cockroft-Walton circuit has all capacitors of $0.06 \mu\text{F}$. 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) Percentage voltage regulation (ii) Percentage ripple (iii) Optimum number of stages for maximum output voltage (iv) Maximum output voltage. **07**
- Q.2** (a) Define Townsend's first and second ionization coefficients. Obtain current growth equation due to first and second ionization. **07**
(b) Draw & explain Marx circuit and modified Marx circuit of multistage impulse generator. Discuss differences between these two. **07**
- OR**
- (b) Describe the working of a Van de Graff generator with a neat sketch. **07**
- Q.3** (a) What are "Treeing" and "Tracking"? Explain and compare the two processes in solid dielectrics. **07**
(b) Explain corona discharges, due to non-uniform field, in detail. **07**
- OR**
- Q.3** (a) List out the theories for breakdown in Liquids. Explain Cavitation and bubble theory in detail. **07**
(b) Define and explain the following terms with necessary figure: **07**
i) Statistical time lag, ii) formative time lag, iii) total time.
- Q.4** (a) Explain how a sphere gap can be used to measure the peak value of voltages. What are the parameters and factors that influence such voltage measurement? **07**
(b) Describe the principle of rotating vane type generating voltmeter with schematic diagram. List out advantages and disadvantages of Generating Voltmeter. **07**
- OR**
- Q.4** (a) Explain capacitance voltage transformer with its basic structure, schematic representation and equivalent circuit. **07**
(b) Explain with neat diagram the principle of operation of an electrostatic voltmeter. Discuss its advantages and limitations for high voltage measurement. **07**
- Q.5** (a) Draw and Explain the layout of H.V. voltage laboratory. What are the precautions to be taken for the safety? **07**
(b) Explain liquid insulation purification system with neat diagram. **07**
- OR**
- Q.5** (a) Explain the lightning mechanism including leader and return stroke with appropriate figures. **07**
(b) What is non-destructive testing of materials? Explain the partial discharge measurement method with suitable diagrams. **07**
