

Seat No.: _____

Enrolment No. _____

GUJARAT TECHNOLOGICAL UNIVERSITY
BE – SEMESTER – VI (OLD).EXAMINATION – WINTER 2016

Subject Code: 160904

Date: 26/10/2016

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 Townsend's first and second ionization coefficient. derive expression for the same. **07**
- (b)** Explain the various theories that explain breakdown in commercial liquid dielectrics. **07**
- Q.2 (a)** Explain Paschen's law with appropriate graphical diagram. Explain significance of existence of minimum sparking potential in paschen's curve. **07**
- (b)** Explain various theories of breakdown in solids in brief. **07**
- OR**
- (b)** Explain corona discharges. What are the different factors affecting corona loss. How corona loss can be eliminated? **07**
- Q.3 (a)** What is the significance of partial discharges and how are they detected under power frequency operating condition? **07**
- (b)** Explain streamer theory of breakdown in gases. **07**
- OR**
- Q.3 (a)** Explain breakdown and filtration tests for liquid dielectric. **07**
- (b)** List out physical and chemical properties of mineral oil. What are the alternative liquid dielectrics used worldwide as replacement of mineral oil? Give their merits and demerits. **07**
- Q.4 (a)** Explain Cockcroft Walton circuit for HVDC generation with neat diagram. **07**
- (b)** A 10 stage cockraft-Walton circuit has all capacitors of $0.06 \mu\text{F}$. The secondary voltage of the supply transformer is 100KV at a frequency of 150 Hz. If the load current is 1 mA, Determine **07**
(1) voltage regulation (2) The ripple (3) The optimum number of stages for maximum output voltage. (4) The Maximum output voltage.
- OR**
- Q.4 (a)** Draw & explain Marx circuit and modified Marx circuit of multistage impulse generator. Discuss differences between these two. **07**
- (b)** Explain impulse testing of power transformer with a neat diagram. **07**
- Q.5 (a)** Give details about electrostatic voltmeter with neat diagram. Also state the governing equation for it. **07**
- (b)** How a sphere-gap can be used to measure high voltage? Explain the factors affecting such measurements? **07**
- OR**
- Q.5 (a)** Explain potential dividers for impulse voltage measurement by CRO. Suggest arrangement to minimize errors. **07**
- (b)** Discuss measurement of dielectric constant and loss tangent of capacitor. **07**
