

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER-VIII • EXAMINATION – SUMMER 2013****Subject Code: 180805****Date: 09/05/2013****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) Define Townsend's first and second ionization co-efficient. In an experiment in certain gas it was found that the steady state current is 6.5×10^{-8} A, at 8kV at a distance of 0.4 cm between the plane electrodes keeping the field constant and reducing the distance to 0.1 cm results in a current of 6.5×10^{-9} A. Calculate Townsend's primary ionization coefficient α **07**
- (b) Explain the various theories that explain breakdown in commercial liquid dielectrics. **07**

- Q.2** (a) State and explain Paschen's law with the help of characteristics curve. **07**
- (b) Explain liquid purification system with test cell. **07**

OR

- (b) What do you understand by electronegative gases? Justify the statement that breakdown strength of electronegative gases is more than that of other insulating gases. **07**

- Q.3** (a) Explain the working of a five stage Cockcroft-Walton voltage multiplier circuit for generation of high d.c voltages. Draw the circuit diagram of the generator. **07**
- (b) Draw & 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**

OR

- Q.3** (a) What is Tesla coil? Draw the equivalent circuit and its output waveform also derive the equation of output voltage. **07**
- (b) Describe with a neat sketch the working of a Van de Graff generator. What are the factors that limit the maximum voltage obtained? **07**

- Q.4** (a) A 500kV Cockcroft Walton voltage multiplier circuit has the following circuit components: **07**
- No load output voltage = 500kV dc.
- Frequency = 150Hz.
- No. of stages = 22.
- Load Current = 2.5mA.
- Stage Capacitor = 1 μ F.
- Determine the magnitude of ripple voltage and d.c voltage drop under full load condition.

- (b) What is the principle of operation of a resonant transformer? How is it advantageous over the Cascade connected transformer? **07**

OR

- Q.4** (a) Explain principle & construction of Electro-Static Voltmeter. Discuss its merits & demerits. **07**

- (b) Explain high voltage Schering bridge for measurement of capacitance and $\tan\delta$ of an insulator. 07

- Q.5** (a) Explain the different electrical tests done on isolators and circuit breakers. 07
(b) A 12 stage impulse generator has $0.126 \mu\text{F}$ capacitors. The wave front and the wave tail resistances connected are 800 ohms and 5000 ohms respectively. If the load capacitor is 1000pF , find the front and tail times of the impulse wave produced. 07

OR

- 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) What is partial discharge? Explain partial discharge testing on cables. 07
