Enrolment No./Seat No_____

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER–VII EXAMINATION – SUMMER 2025

Subject Code:3170917 Date:16-05-2025

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.**
4. **Simple and non-programmable scientific calculators are allowed.**

			Marks
Q.1	**(a)**	Define Townsend's first ionization coefficients. Obtain current growth equation due to first ionization.	**03**
	(b)	List advantages, disadvantages and applications of Van de Graff generator.	**04**
	(c)	Explain High voltage Schering bridge for tan δ and capacitance measurement of Insulators.	**07**
Q.2	**(a)**	Define the terms: Statistical time lag, formative time lag, total time.	**03**
	(b)	Explain treeing and tracking related to solid breakdown.	**04**
	(c)	Draw and explain Marx circuit and modified Marx circuit of multistage impulse generator.	**07**
		OR	
	(c)	List out the common test facilities available in High Voltage Lab.	**07**
Q.3	**(a)**	Explain equivalent circuit of partial discharge.	**03**
	(b)	What is Finite Element Method? Brief it for solving the field problems.	**04**
	(c)	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)**	Why is the breakdown strength higher in electronegative gases than in other gases?	**03**
	(b)	What are the commercial liquids? Explain purification test cell system related to liquids.	**04**
	(c)	A 10 stage Cockcroft-Walton circuit has all capacitors of.06 μF. The secondary voltage of the supply transformer is100 KV at a frequency of 150Hz.If the load current is 1mA, determine: (1) percentage voltage regulation. (2) The ripple (c) The optimum number of stages for maximum output voltage.	**07**
Q.4	**(a)**	Explain high voltage test on Insulator.	**03**
	(b)	Discuss the different methods of measuring high D.C. Voltages. What are the limitations.	**04**
	(c)	What is Paschen's Law? How do you account for the minimum voltage for breakdown under a given 'p x d' condition?	**07**
		OR	
Q.4	**(a)**	Discuss Hall effect in Hall generator.	**03**
	(b)	Explain Tesla coil with its circuit & Waveform.	**04**
	(c)	What is meant by insulation co-ordination? How are the protective devices chosen for optimal insulation level in a power system?	**07**

Q.5	**(a)**	What is surge arrester? Explain it's importance in power system.	**03**
	(b)	Explain with neat diagram the principle & construction of an electrostatic voltmeter.	**04**
	(c)	Explain corona discharge. What are different factor affecting Corona losses? How Corona loss can be eliminated?	**07**

OR

Q.5	**(a)**	Discuss power frequency tests of insulator.	**03**
	(b)	Discuss the method of balanced detection for locating partial discharges in electrical equipments.	**04**
	(c)	A 12 stage impulse generator has 0.126μF capacitors. The wave front and wave tail resistances connected are 800Ω and 5000Ω respectively. If the load capacitor is 1000pF, find the front and tail times of the impulse wave produced.	**07**