

GUJARAT TECHNOLOGICAL UNIVERSITY**BE - SEMESTER- VI EXAMINATION – SUMMER 2020****Subject Code: 2160904****Date: 27/10/2020****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.

MARKS

- Q.1**
- (a) Discuss the various mechanisms of vacuum breakdown. **03**
- (b) What is Paschen's law? Explicate minimum voltage for breakdown under a given 'p-d' condition **04**
- (c) Define first ionization and second ionization coefficients of Townsend's theory. Derive expression for current growth equation and state criteria for breakdown. **07**

- Q.2**
- (a) Explain the phenomena of electrical conduction in liquid. How does it defer from the gases? **03**
- (b) Discuss the effect of the following parameters on the breakdown of liquids **04**
1. Hydrostatic pressure
 2. Solid impurities
 3. Moisture content in oil.
- (c) List the various mechanism of liquid dielectric used in high voltage engineering. Explain stressed oil Volume theory in detail. **07**

OR

- (c) In experiment for determining the breakdown strength of transformer oil, the following observations were made. Determine the power law dependence between the gap spacing and the applied voltage of the oil.

Gap spacing (mm)	4	6	10	12
Breakdown voltage(KV)	90	140	210	225

- Q.3**
- (a) List out the generation of HVDC. Explain half wave and full wave rectifier circuit for generation HVDC. **03**
- (b) List the method used for generation of High Voltage AC. Explain HVAC generation using resonant transformer. **04**
- (c) An impulse generator has 8 stages with each condenser rated for 0.16 μ F and 125 KV. The value of load capacitor is 1000 pF. Find for the series resistance and damping resistance needed to produce 1.2 /50 μ s Impulse wave. What is the maximum output voltage of the generator, if the charging voltage is 120 KV **07**

OR

- Q.3**
- (a) Explain front and tail times of an impulse wave with neat sketch. **03**
- (b) What is trigatron gap? Explain its function and operation. **04**
- (c) Describe the method used for generation of multi level high voltage impulse generation with neat diagram. **07**
- Q.4**
- (a) Compare the relative advantages of following methods for measurement of HVDC. **03**

1. Series resistance micrometer. **www.FirstRanker.com** **www.FirstRanker.com**
2. Potential divider with electrostatic voltmeter.
- (b) Discuss the different methods of measuring of high voltage d.c. What are the limitations of each method? **04**
- (c) Explain the sphere gap method for measurement of peak value of voltages. List and explain parameters affecting the measurement. **07**
- OR**
- Q.4** (a) Explain treeing and tracking related to solid breakdown. **03**
- (b) List out the Difference between Uniform field and Non-uniform field. **04**
- (c) Explain High voltage Schering bridge for $\tan \delta$ and capacitance measurement of Insulators. **07**
- Q.5** (a) What is surge arrester? How it used as shunt protective device **03**
- (b) Draw & confer Equivalent circuit of partial discharge. **04**
- (c) Explain the different theory for charge formation in clouds. **07**
- OR**
- Q.5** (a) List out the common test facilities available in High Voltage Lab. Explain safety measures required for High Voltage Laboratory. **03**
- (b) Discuss power frequency tests of insulator **04**
- (c) Explicate insulation coordination and statistical approach to it. **07**

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