

**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2021****Subject Code:3170917****Date:15/12/2021****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.
4. Simple and non-programmable scientific calculators are allowed.

- Q.1** (a) What are the commercial liquids? **03**  
 (b) Differentiate between Marx & modified Marx circuit for multistage impulse generators with circuit. **04**  
 (c) Explain breakdown in solid due to Treeing and Tracking. **07**
- Q.2** (a) Explain time lags for breakdown of gas. **03**  
 (b) Explain purification test cell system related to liquids. **04**  
 (c) Explain Voltage Multiplier Circuit for generation of High Voltage. **07**

**OR**

- (c) Describe the working of a Van de Graff generator with a neat sketch. **07**
- Q.3** (a) Explain breakdown test for Transformer oil. **03**  
 (b) Discuss Hall effect in Hall generator. **04**  
 (c) Explain how a sphere gap can be used to measure the peak value of voltages and also explain factor influence such a voltage measurement? **07**

**OR**

- Q.3** (a) Explain front and tail times of an impulse wave with neat sketch. **03**  
 (b) How Potential Divider method used for measurement of high voltage DC with its limitations. **04**  
 (c) Explain with neat diagram the principle of operation of an electrostatic voltmeter and its limitations for high voltage measurements. **07**
- Q.4** (a) List out the causes of over voltage in power system. **03**  
 (b) How are switching impulse generated in Laboratory, Explain in brief **04**  
 (c) An impulse generator has 8 stages with each condenser rated for 0.16 $\mu$ F and 150 KV. The load capacitor available is 1000pF. Find the series resistance and the damping resistance needed to produced 1.2/50  $\mu$ s impulse wave. **07**

**OR**

- Q.4** (a) Draw block diagram of Digital PD Analyser. **03**  
 (b) Explain corona discharge in brief. **04**  
 (c) Explain with neat sketches the mechanism of lightning discharge. **07**
- Q.5** (a) List out the common test facilities available in High Voltage Lab. **03**  
 (b) What is insulation co-ordination? **04**  
 (c) What is Finite Element Method? Brief it for solving the field problems **07**

**OR**

- Q.5** (a) What is partial Discharges? **03**  
 (b) Discuss High voltage Schering Bridge in brief. **04**  
 (c) Explain high voltage test on Insulator. **07**

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**GUJARAT TECHNOLOGICAL UNIVERSITY****BE - SEMESTER-VII (NEW) EXAMINATION – SUMMER 2022****Subject Code:3170917****Date:08/06/2022****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.

		<b>MARKS</b>
<b>Q.1</b>	(a) Which gases are generally observed while performing dissolved gas analysis of transformer oil?	<b>03</b>
	(b) Draw and explore the Duval's triangle	<b>04</b>
	(c) What is the present-day technique to monitor the mechanical integrity of big size power transformer? Discuss in detail.	<b>07</b>
<b>Q.2</b>	(a) Sketch the graph for Breakdown voltage-PD curve for gaseous insulating media with proper indications and nomenclature on X and Y axis	<b>03</b>
	(b) What will be standard breakdown strength of air for small gaps (1 mm) and large gaps (20 cm) under uniform field conditions and standard atmospheric conditions?	<b>04</b>
	(c) Compare the breakdown mechanisms (Townsend's & Streamer Theory) for gaseous insulating medium	<b>07</b>
	<b>OR</b>	
	(c) Explain any one numerical technique in detail with relevant equations (Charge simulation, Finite element, Finite difference, or Boundary element)	<b>07</b>
<b>Q.3</b>	(a) Enlist the breakdown mechanisms for solid dielectric	<b>03</b>
	(b) What is thermal breakdown in solid dielectric?	<b>04</b>
	(c) How is the purification and breakdown test of liquid dielectric carried out?	<b>07</b>
	<b>OR</b>	
<b>Q.3</b>	(a) A cascade transformer has four stages. What should be the power rating of the first (bottom most) transformer if the power rating of the last (Topmost) transformer is 'P'.	<b>03</b>
	(b) Find out advantages and disadvantages of Resonant transformer	<b>04</b>
	(c) Elucidate a generator which converts mechanical energy into electrostatic energy with relevant sketches? How is such generator fitted in laboratory?	<b>07</b>
<b>Q.4</b>	(a) Enlist the techniques (at least three for each) for HVAC and HVDC generation	<b>03</b>
	(b) Compare high voltage testing transformer with power transformer	<b>04</b>
	(c) Sketch and explain Cockcroft Walton circuit for five stage (200 kV × 5 = 1000 kV) high voltage DC generation.	<b>07</b>

**OR**

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|------------|-----|--|-----------|
| <b>Q.4</b> | (a) | Represent the Chhub and Fortescue circuit  | <b>03</b> |
|            | (b) | Enlist a table for High voltage measurement techniques for DC Voltages, AC voltages (Power frequency) and Impulse voltages       | <b>04</b> |
|            | (c) | Sketch and explore generating voltmeter in detail  | <b>07</b> |
| <b>Q.5</b> | (a) | What is the function of lightning arrester and how it serves the purpose?  | <b>03</b> |
|            | (b) | What are the components of lightning strike? Give a sketch of it.  | <b>04</b> |
|            | (c) | What is meant by insulation co-ordination? How are the protective devices chosen for optimal insulation level in a power system? | <b>07</b> |
| <b>OR</b>  |     |  |           |
| <b>Q.5</b> | (a) | How to measure radio interference?   | <b>03</b> |
|            | (b) | Enlist the high voltage test on cables. Describe any one in brief  | <b>04</b> |
|            | (c) | Enlist the high voltage tests to be performed on power transformer and explain any one in detail with relevant sketch            | <b>07</b> |

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