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**PRESIDENCY UNIVERSITY**

**Bengaluru**

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| **Ph.D. Course Work End Term Examinations –JAN-FEB 2025** |
| **Date:** 30 – 01- 2025 **Time:**09:30 am – 12:30 pm |

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| **School:** SOE | **Program:** Ph.D. | |
| **Course Code:** EEE822 | **Course Name:** High Voltage Engineering | |
| **Semester**: | **Max Marks**:100 | **Weightage**:50% |

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| **CO - Levels** | **CO1** | **CO2** | **CO3** | **CO4** | **CO5** |
| **Marks** | **20** | **10** | **20** | **30** | **20** |

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Do not write anything on the question paper other than roll number.*

**Part A**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Answer ALL the Questions. Each question carries 10 marks. 6Q x 10M=60Marks** | | | | |
| **1** | Understanding the breakdown mechanism of commercial insulation liquids is crucial for the design and maintenance of high voltage equipment, ensuring reliability and longevity of the electrical systems. Identify various breakdowns that can happen in commercial liquid insulators | **10 Marks** | **L3** | **CO1** |
| **2** | In an experiment in a certain gas it was found that the steady state current is 5.5 x 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 5.5 x 10-9 A. Calculate (i) Townsend’s primary ionization coefficient α (ii) if the breakdown occurred when the gap distance was increased to 0.9 cm, compute the value of γ? | **10 Marks** | **L3** | **CO1** |
| **3** | Explain the principle, construction and operation of Capacitance Voltage Transformers (CVTs). | **10 Marks** | **L2** | **CO2** |
| **4** | Two spherical electrodes with a diameter of 25 cm each are used to measure a high voltage. The distance between the spheres is set to 1 cm. Given that the breakdown voltage of air at standard atmospheric conditions (20°C, 101.3 kPa) is approximately 30 kV/cm, calculate the breakdown voltage for this sphere gap setup. Assume standard atmospheric conditions. Identify the factors affect the breakdown voltage of a sphere gap? | **10 Marks** | **L3** | **CO3** |
| **5** | Describe the mathematical modeling of void impurities in dielectrics. Explain how this modeling helps in understanding the behavior of partial discharge | **10 Marks** | **L3** | **CO3** |
| **6** | Explain the procedure for power frequency high-voltage testing of insulators and its importance for assessing insulation performance? | **10 Marks** | **L2** | **CO4** |

**Part B**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Answer the Questions. Each question carries 20 marks 2Q x 20 = 40 Marks** | | | | | |
| **7.** |  | Examine the procedure and importance of power frequency testing for high-voltage insulators, bushings, and transformers. Include the test setup, method, and interpretation of results. Highlight the role of this test in assessing the insulation quality of electrical equipment. | **20 Marks** | **L4** | **CO4** |
|  | | | | | |
| **8.** |  | Analyze the causes of over voltages due to switching surges, system faults, and other abnormal conditions. Provide examples of how these over voltages affect power system equipment and methods to mitigate them. | **20 Marks** | **L4** | **CO5** |

**\*\*\*\*\* BEST WISHES \*\*\*\*\***