

University of Mumbai

Examinations Commencing from 17th May 2022 to 4th June 2022

Program: BE Electrical Engineering

Curriculum Scheme: Rev2019(C- SCHEME)

Examination: Summer 2022/TE/Semester VI

Course Code: EEDO6013 and Course Name: High Voltage Engineering

Time: 2 hour 30 minutes

Max. Marks: 80

| Q1. | Choose the correct option for following questions. All the Questions are compulsory and carry equal marks |
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| 1. | Most suitable numerical method to solve electrostatic field problems is |
| Option A: | Laplace equation method |
| Option B: | Charge simulation method |
| Option C: | Finite difference method |
| Option D: | Resistance analog method |
| 2. | C- tan (δ) test on electric bushings is done using |
| Option A: | Impulse generators |
| Option B: | HV Schering bridge |
| Option C: | Power frequency cascaded transformer |
| Option D: | Resonant transformer |
| 3. | Electrical conduction in gases was first studied in 1905 by |
| Option A: | Loeb |
| Option B: | Maxwell |
| Option C: | Townsend |
| Option D: | Hertz |
| 4. | Generally _____ are avoided in construction of impulse measuring voltage dividers because they _____ : |
| Option A: | Capacitors, might possess stray capacitance |
| Option B: | Inductors, can induce stray capacitance |
| Option C: | Capacitors, carry capacitive impedance |
| Option D: | Inductors, are very expensive |
| 5. | Dielectric constant of mineral oils is about |
| Option A: | 1.5 to 2.0 |
| Option B: | 2.2 to 2.4 |
| Option C: | 3.0 to 3.5 |
| Option D: | 1.008 |
| 6. | Tesla coil is used for |
| Option A: | generation of rectangular voltages |
| Option B: | generation of very high voltages |
| Option C: | generation of sinusoidal output voltages |
| Option D: | generation of high frequency ac voltages |
| 7. | Thermal classification of insulating materials is done for |
| Option A: | Solids |
| Option B: | Liquids |
| Option C: | Gases |

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| Option D: | Composite insulation |
| 8. | The value of charging voltage used in a medium size impulse generator is |
| Option A: | 10 to 50 kV |
| Option B: | 50 to 100 kV |
| Option C: | 500 kV |
| Option D: | 1000 kV |
| 9. | The spark over voltages of a spark gap depends on the air density which varies with the change in _____. |
| Option A: | Temperature only |
| Option B: | Temperature and pressure |
| Option C: | Pressure only |
| Option D: | Pressure and water vapour |
| 10. | Which of the following type of high voltage testing laboratory, meant for engineering colleges and universities to open facilities of regular teaching and training and HV testing for the clients? |
| Option A: | Small size laboratory |
| Option B: | Medium size laboratory |
| Option C: | Large size laboratory |
| Option D: | UHV laboratory |

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| Q2 (20 Marks Each) | Solve any Four out of Six | 5 marks each |
| A | Describe, with a neat sketch, the working of a trigatron gap? | |
| B | What is "Cascaded Transformer"? Explain why Cascading is necessary? | |
| C | Why is grounding very important in a high voltage laboratory? Describe two typical grounding systems used. | |
| D | What is partial discharge? Differentiate between Internal and External Discharges? | |
| E | Discuss the various factors which affect the breakdown of gases. | |
| F | Explain Cavitation and Bubble theory of breakdown in liquid dielectrics. | |

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| Q3 (20 Marks Each) | Solve any Two Questions out of Three | 10 marks each |
| A | Explain the term "Ionization". With reference to breakdown in gases, discuss the following ionization processes. 1. Ionization by Collision. 2. Photo- Ionization. 3. Secondary Ionization. | |
| B | What is Paschen's Law? How to account for the minimum voltage for breakdown under a given "p x d" condition? | |
| C | Describe, with a neat sketch, the working of a Van-de-Graaff Generator. What are the factors that limit the maximum voltage obtained? | |

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| Q4. (20 Marks Each) | | |
| A | Solve any Two | 5 marks each |

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| i. | Discuss following terms with reference to multistage impulse generator: <ol style="list-style-type: none"> 1. Nominal Voltage 2. Stage Capacitance 3. Nominal Energy 4. Number of Stages |
| ii. | Write a short note on Intrinsic electromechanical and chemical breakdown in solid insulation system. |
| iii. | Explain principle of operation of capacitance divider for measurement of high AC voltages? |
| B | Solve any One 10 marks each |
| i. | Describe, with a neat sketch, the principle and construction of an Electrostatic Voltmeter for very high voltages? What are its merits and demerits for high voltage A.C. measurements? |
| ii. | What are the different power frequency tests done on Insulators? Mention the procedure for testing. |