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Question Paper Code	12161
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B.E. / B.Tech. - DEGREE EXAMINATIONS, NOV / DEC 2023

Sixth Semester

Electrical and Electronics Engineering

20EEEL602 - HIGH VOLTAGE ENGINEERING

(Regulations 2020)

Duration: 3 Hours

Max. Marks: 100

PART - A (10 × 2 = 20 Marks)

Answer ALL Questions

- | | <i>Marks,
K-Level, CO</i> |
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| 1. What are the different types of over voltages? | 2,K1,CO1 |
| 2. Define thunderstorm days. | 2,K1,CO1 |
| 3. State Paschen's Law. | 2,K1,CO2 |
| 4. What are electronegative gases? | 2,K1,CO2 |
| 5. What is 'Trigatron gap'? | 2,K1,CO3 |
| 6. Define the front and tail times of impulse wave. | 2,K1,CO3 |
| 7. Mention the techniques used in impulse current measurements. | 2,K1,CO4 |
| 8. List some advantages of Faraday generator. | 2,K1,CO4 |
| 9. What is the necessity of high voltage testing? | 2,K1,CO5 |
| 10. List few International and Indian standards related to high voltage testing of electrical power apparatus. | 2,K1,CO5 |

PART - B (5 × 13 = 65 Marks)

Answer ALL Questions

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| 11. a) Explain the different theories of charge formation in clouds. | 13,K2,CO1 |
| OR | |
| b) Explain in detail about the causes of switching and power frequency over voltages. How are they controlled in power system? | 13,K2,CO1 |
| 12. a) Explain the Townsends criterion for a breakdown in gases. Also derive the current growth equation due to primary and secondary ionization process. | 13,K2,CO2 |
| OR | |
| b) Summarize the different mechanism of vacuum breakdown in detail. | 13,K2,CO2 |
| 13. a) Outline the working of a Van De Graff generator with a neat sketch. | 13,K2,CO3 |

OR

K1 – Remember; K2 – Understand; K3 – Apply; K4 – Analyze; K5 – Evaluate; K6 – Create

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- b) Show the Marx circuit arrangement for multistage impulse generators. How is the basic arrangement modified to accommodate the wave time control resistances? *13,K2,CO3*

14. a) Explain the principle and construction of an electrostatic voltmeter for measuring very high AC voltages. What are its merits and demerits? *13,K2,CO4*

OR

- b) Explain with a neat diagram how a sphere gap can be used to measure the peak value of voltages. List the factors that influence the sphere gap measurement. *13,K2,CO4*

15. a) Explain in detail the various test conducted on Insulators. *13,K2,CO5*

OR

- b) Explain the method of impulse testing of high voltage transformers and the procedure adopted for locating the failure. *13,K2,CO5*

PART - C (1 × 15 = 15 Marks)

16. a) A ten stage Cockraft-Walton circuit has all capacitors of 0.06 μF . The secondary voltage of the supply transformer is 100 kV at a frequency of 150 Hz. If the load current is 1 mA, determine (i) voltage regulation (ii) the ripple (iii) the optimum number of stages for maximum output voltage (iv) the maximum output voltage. *15,K2,CO3*

OR

- b) A Rogowski coil is to be designed to measure impulse currents of 10 kA having a rate of change of current of 10^{10}A/s . The current is read by a VTVM as a potential drop across the integrating circuit connected to the secondary. Estimate the values of mutual inductance, resistance and capacitance to be connected, if the meter reading is to be 10V for full-scale deflection. *15,K2,CO4*