



B.E/B.TECH DEGREE EXAMINATIONS: APRIL /MAY 2024

(Regulation 2018)

Fifth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U18EEE0003: High Voltage Engineering

COURSE OUTCOMES

CO1: Understand the causes and effects of over voltages and protection of power system against over voltages.

CO2: Understand the different breakdown mechanisms in Gases, liquids and solids.

CO3: Understanding the principle of generation of high DC, AC and impulse voltages.

CO4: Understanding of the various measurement techniques of high voltages and high currents.

CO5: Understanding the testing of high voltage electrical power apparatus.

Time: Three Hours

Maximum Marks: 100

Answer all the Questions:-

PART A (10 x 2 = 20 Marks)

(Answer not more than 40 words)

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| 1. Compare lightning over voltage and switching over voltages. | CO1 | [K ₂] |
| 2. Infer the over voltage protection schemes. | CO1 | [K ₂] |
| 3. List the physical conditions governing ionization mechanism in gases dielectrics. | CO2 | [K ₂] |
| 4. State Streamer theory. | CO2 | [K ₁] |
| 5. Summarize the advantages of high frequency transformers. | CO3 | [K ₂] |
| 6. Draw a circuit diagram of simple voltage doublers. | CO3 | [K ₂] |
| 7. Give the usage of digital techniques in HV measurements. | CO4 | [K ₂] |
| 8. Where the high voltage DC measurement techniques used? | CO4 | [K ₂] |
| 9. What are tests conducted on insulators? | CO5 | [K ₂] |
| 10. Differentiate type test with routine test. | CO5 | [K ₂] |

Answer any FIVE Questions:-

PART B (5 x 16 = 80 Marks)

(Answer not more than 400 words)

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|---|---|-----|-------------------|
| 11. a) Infer how rod gaps are used as protective devices? | 8 | CO1 | [K ₂] |
| b) Summarize about the Ground wires for protection of overhead lines. | 8 | CO1 | [K ₂] |

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|-----|---|----|-----|-------------------|
| 12. | Define Townsend's first and second ionization coefficients. How is the condition for breakdown obtained in a Townsend discharge? | 16 | CO2 | [K ₂] |
| 13. | a) What are the essential parts of impulse current generator? | 8 | CO3 | [K ₂] |
| | b) A Cockcroft-Walton type voltage multiplier has eight stages with capacitances, all equal to 0.06 μF. The supply transformer secondary voltage is 100 KV at a frequency of 150 Hz. If the load current to be supplied is 1 mA, find (a) the percentage ripple, (b) the regulation, (c) the optimum number of stages for minimum regulation or voltage drop, (d) the maximum output voltage. | 8 | CO3 | [K ₃] |
| 14. | Explain how a sphere gap can be used to measure the peak value of voltages. What are the parameters and factors that influence such voltage measurement? | 16 | CO4 | [K ₂] |
| 15. | Explain the principle and construction of an electrostatic voltmeter for high voltages. What are its merits and demerits for high voltage A.C measurement? | 16 | CO4 | [K ₂] |
| 16. | a) What are the different power frequency tests done on insulators? Mention the procedure for testing. | 10 | CO5 | [K ₂] |
| | b) Mention the different electrical tests done on isolators and circuit breakers. | 6 | CO5 | [K ₂] |
