**20EE31E2-HIGH VOLTAGE ENGINEERING**

**(EEE)**

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| **Course Category:** | Professional Elective | **Credits:** | 3 |
| **Course Type:** | Theory | **Lecture-Tutorial-Practical:** | 3-0-0 |
| **Pre-requisite:** | Electrical Measurements | **Sessional Evaluation:**  **Univ. Exam Evaluation:**  **Total Marks:** | 40  60  100 |

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| **Course Objectives:** | Students undergoing this course are expected to learn : | |
| 1. The different types of high voltage generation.  2. About different types of impulse voltage and current generation.  3.About different methods of high voltages and currents  4. The high voltage testing methods and propose suitable testing  instruments.  5. About different insulation parameters.  6.The detailed analysis of breakdown occurs in gaseous, liquids  and solid dielectric. | |
| After completing the course the student will able to: | |
| **Course Outcomes:** | **CO1** | Understand different types of high voltage generation. |
| **CO2** | Demonstrate different types of impulse voltage and current generation |
| **CO3** | Explore different methods of high voltages and currents. |
| **CO4** | Explain high voltage testing methods and propose Suitable testing instruments. |
| **CO5** | Design different insulation parameters. |
| **CO6** | Enumerate the behaviour of gas, liquid and solids when they are used as insulation. |
| **Course Content:** | **UNIT –I**  **Generation of high voltages:** Half wave rectifier circuit, cockroft-walton voltage multiplier circuit, electrostatic generator, generation of high A.C voltages by cascaded transformer, series resonant circuit.  **UNIT-II**  **Generation of impulse voltages and currents:** Definitions, impulse voltage generator circuits-single stage generator circuits, multiple impulse generator circuits, triggering and synchronization of the impulse generator, impulse current generator.  **UNIT-III**  **Measurement of high voltages and currents**: Introduction, sphere gap, uniform field spark gap, rod gap, electrostatic voltmeter, Chubb-Fortescue method, measurement of high D.C, A.C and impulse currents.  **UNIT-IV**  **High voltage testing of electrical equipment:** Testing of overhead line insulator, testing of cables, testing of bushings, testing of power capacitor, testing of power transformer, testing of circuit breaker.  **UNIT-V**  **Non-destructive insulation techniques:** Measurement of resistivity, measurement of dielectric constant and loss factor, high voltage Schering bridge measurement of large capacitances, partial discharges.  **UNIT-VI**  **Breakdown mechanism:** Gases, liquid and solid insulating materials, mechanism of breakdown of gases, townsend’s first ionization coefficient, townsend’s second ionization coefficient, townsend’s breakdown mechanism, paschen’s law, principles of breakdown of solid and liquid dielectrics **.** | |
| **Text books**  **&**  **Reference books:** | **Text books:**  1.“High voltage engineering”, by C.L.Wadhwa, New Age International  publishers  2.“High voltage engineering”, by M. S.Naidu&Kamaraju, 3rd Edition,  Tata Mc-Graw- Hill Publishers.  **Reference books:**  1.“High voltage Engineering Fundamentals”, by E.Kuffel & W.S.Zaengl,  Second Edition, Newens publishers.  2. “An introduction to high voltage Engineering”, by Subir Ray, PHI  Learning Pvt. Ltd | |
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