

HIGH VOLTAGE ENGINEERING

Course Code	20EE4501D	Year	III	Semester(s)	I
Course Category	Professional Elective-I	Branch	EEE	Course Type	Theory
Credits	3	L-T-P	3-0-0	Prerequisites	-
Continuous Internal Evaluation:	30	Semester End Evaluation:	70	Total Marks:	100

Course Outcomes	
Upon successful completion of the course, the student will be able to	
CO1	Understand the basic concepts of high voltages in power system. (L2)
CO2	Apply the knowledge of conduction and breakdown in different types of dielectrics. (L3)
CO3	Identify various methods for generation and measurement of high voltages and currents in power system. (L3)
CO4	Analyze the generation and measurement of high voltages and currents in high voltage engineering. (L4)
CO5	Identify different techniques used for high voltage testing of electrical apparatus. (L3)
CO6	Ability to understand the concepts of high voltage engineering and submit a report.

Contribution of Course Outcomes towards achievement of Program Outcomes & Strength of correlations (3:High, 2: Medium, 1:Low)														
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1														
CO2	3							2					2	2
CO3	3				2							2	3	2
CO4		3				1	2						3	2
CO5	3										1	2	2	2
CO6									3	3			2	2

SYLLABUS		
Unit No.	Contents	Mapped CO
I	Conduction and Breakdown in Dielectrics: Gases as insulating media, collision process, Ionization process, Townsend's criteria of breakdown in gases. Liquid as insulator, Conduction and Breakdown in pure liquids, Conduction and Breakdown in commercial liquids. Breakdown in solid dielectrics: Intrinsic breakdown, Electromechanical breakdown and Thermal breakdown.	CO 1 CO 2 CO 6

II	Generation of High Voltages and Currents: Generation of high DC Voltages: Voltage doubler circuits, Voltage multiplier circuits and Van de graaff generators. Generation of high AC Voltages: Cascade transformers and Tesla coil arrangement. Generation of impulse voltages: Multistage impulse generators—Marx circuit. Generation of impulse currents, Tripping and control of impulse generators.	CO 1 CO 3 CO 4 CO 6
III	Measurement of High Voltages: Measurement of high DC voltages: General concepts of high voltage measurements, Series resistance microammeter, Resistance potential divider, Generating Volt meters. Measurement of high AC and Impulse voltages: Series impedance ammeters, Capacitance potential dividers, Capacitance voltage transformers, Electrostatic voltmeters, Sphere gaps, Peak-Reading voltmeters for impulse voltages.	CO 1 CO 3 CO 4 CO 6
IV	Measurement of High Currents: Measurement of high direct currents, Measurement of high alternating currents and Measurement of Impulse currents.	CO 1 CO 3 CO 4 CO 6
V	High Voltage Testing of Electrical Apparatus: Testing of Insulators and Bushings, Testing of Isolators and Circuit breakers, Testing of Cables, Testing of Transformers and Testing of Surge arrestors.	CO 1 CO 5 CO 6

Learning Resources

Text Books

1. M.S. Naidu, V.Kamaraju, “High Voltage Engineering” McGraw Hill, Fifth Edition, 2017.
2. E. Kuffel, W.S. Zaengl, J. Kuffel, “High Voltage Engineering Fundamentals” Elsevier, Second Edition, 2000

Reference Books

1. Wadhwa C.L.”, High Voltage Engineering, New Age International, Third Edition, 2012.
2. Ravindra Arora, Bharat Singh Rajpurohit, “Fundamentals of High-Voltage Engineering” Wiley India, 2019.

Web Links

1. <https://nptel.ac.in/courses/108104048>
2. <https://bharatsrajpuohit.weebly.com/high-voltage-engineering-course.html>