

GUJARAT TECHNOLOGICAL UNIVERSITY

B.E. SEMESTER : VIII

ELECTRICAL & ELECTRONICS ENGINEERING

Subject Name: **HIGH VOLTAGE ENGINEERING**

Sr. No.	Course Contents	Total Hrs
1.	Breakdown in Gases: Mechanisms of breakdown in gases, various related ionization processes. Townsends and Streamer theories. Paschen's law, Breakdown in Non-uniform fields. Effect of wave shape of impressed voltage on the breakdown strength. Breakdown of sphere gap and rod gap.	6
2.	Breakdown in Liquid and Solids: Mechanisms of breakdown in liquids, suspended particle, suspended water, cavitations and bubble and electronic breakdown theories. Mechanisms of breakdown in solids; intrinsic electro-mechanical, erosion, surface, thermal and streamer, Relation between electric strength of solids and time, intrinsic breakdown strength.	6
3.	Impulse Generator: Specifications of an impulse voltage wave, standard impulse, reasons for adopting the particular shape, Analysis and control of simple circuit of impulse generator. Multistage impulse generator (Marks circuit) circuit-working, earthing and tripling. Techniques to observe wave front on C.R.O.	6
4.	Generation of High Voltage: Methods of generation of power frequency high voltage cascade transformers and resonance methods, Generation of high voltage D.C., voltage stabilization. Tesla coil.	6
5.	Measurement of High Voltage Potential dividers-resistive, capacitive and mixed dividers for high voltage. Sphere gap; construction, mounting, effect of nearby earthed objects, humidity and atmospheric conditions, effect of irradiation and polarity, Electrostatic voltmeter; principle and classification, constructional details of an absolute electrostatic voltmeter. Oscilloscopes and their applications in high voltage measurement.	8
6.	High Voltage Testing Measurement of insulation resistance of cables. Wet and dry flashover test of insulators. Testing of insulators in simulated polluted conditions. Testing of transformers and rotating machines. Measurement of break-down strength of oil. Basic techniques of non-destructive testing of insulators; measurement of loss angle, High Voltage Schering bridge, and partial discharge measurement techniques.	8
7.	Over Voltage and Insulation Coordination Lighting, Switching and temporary over voltages, BIL, SIL, methods of insulation coordination.	4

Text Books:

1. Naidu, M.S. and Kamaraju, V., "High Voltage Engineering", Tata McGraw-Hill Education, 2009.
2. Wadhwa, C.L., "High Voltage Engineering", New Age International, 2007.

Reference Books:

1. Ravindra Arora, Wolfgang Mosch, "High Voltage and Electrical Insulation Engineering", John Wiley & Sons, 2011.
2. Subir Ray, "An Introduction to High Voltage Engineering", PHI Learning Pvt. Ltd., 2004.
3. "Electrical Transmission and Distribution Reference Book", Westinghouse Electric Corporation, IBH-Oxford, 1964.
4. Warne, D.F. "Advances in high voltage engineering", IET, 2004.
5. Hugh McLaren Ryan, "High voltage engineering and testing", IET, 2001.