

Course No.	Course Name	L-T-P -Credits	Year of Introduction
EE369	High Voltage Engineering	3-0-0-3	2016
Prerequisite: Nil			
Course Objectives			
<ul style="list-style-type: none"> To understand generation and measurement techniques of high voltage DC, AC and impulse voltages To understand various types of testing techniques used in power equipments and design of high voltage lab and the grounding of impulse testing laboratories. 			
Syllabus :			
Generation of HVDC, HVAC and impulse wave forms,-measurement techniques-non destructive testing techniques- testing of power equipments, design of testing lab and grounding of laboratories			
Expected outcome.			
<ul style="list-style-type: none"> The students will know several of methods of generating different test voltages, testing methods used in power equipments and design of high voltage laboratories. 			
Text Book:			
<ul style="list-style-type: none"> C.L Wadhwa <i>High voltage Engineering</i>, New age international (P) ltd, 2007 			
References:			
<ol style="list-style-type: none"> Dieter Kind, Kurt Feser, "High voltage test techniques", SBA Electrical Engineering Series, New Delhi, 1999. Kuffel, E., Zaengl, W.S. and Kuffel J., "High Voltage Engineering Fundamentals", Elsevier India P Ltd, 2005 Naidu M.S. and Kamaraju V., "High voltage Engineering", Tata McGraw Hill Publishing Company Ltd., New Delhi, 2004. 			
Course Plan			
Module	Contents	Hours	Sem. Exam Marks
I	Generation and transmission of electric energy – voltage stress – testing voltages-AC to DC conversion – rectifier circuits – cascaded circuits – voltage multiplier circuits – Cockroft-Walton circuits – voltage regulation – ripple factor – Van de-Graaff generator.	7	20%
II	Generation of high AC voltages-Testing transformer – single unit testing transformer, cascaded transformer – equivalent circuit of cascaded transformer – generation of high frequency AC voltages-series resonance circuit – resonant transformer – voltage regulation.	7	20%
FIRST INTERNAL EXAMINATION			
III	Generation of impulse voltages-Marx generator – Impulse voltage generator circuit –analysis of various impulse voltage generator circuits - multistage impulse generator circuits – Switching impulse generator circuits – impulse current generator circuits	7	15%
IV	Peak voltage measurements by sphere gaps – Electrostatic voltmeter – generating voltmeters and field sensors – Chubb-Fortescue method	7	15%

	- voltage dividers and impulse voltage measurements- measurement of impulse currents		
SECOND INTERNAL EXAMINATION			
V	Objectives of high voltage testing, Classification of testing methods- self restoration and non-self restoration systems-standards and specifications, Measurement of dielectric constant and loss factor, Partial discharge measurements-Basic partial discharge(PD) circuit – PD currents- PD quantities - Corona and RIV measurements	7	15%
VI	Testing of insulators, bushings, air break switches, isolators, circuit breakers, power transformers, surge diverters, cables -testing methodology. Classification of high voltage laboratories, Voltage and power rating of test equipment, Layout of high voltage laboratories, Grounding of impulse testing laboratories.	10	15%
END SEMESTER EXAM			

QUESTION PAPER PATTERN:

Maximum Marks: 100

Exam Duration: 3Hours.

Part A: 8 compulsory questions.

One question from each module of Module I - IV; and two each from Module V & VI.

Student has to answer all questions. (8 x 5)=40

Part B: 3 questions uniformly covering Modules I & II. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.

Part C: 3 questions uniformly covering Modules III & IV. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.

Part D: 3 questions uniformly covering Modules V & VI. Student has to answer any 2 from the 3 questions: (2 x 10) =20. Each question can have maximum of 4 sub questions (a,b,c,d), if needed.