	College of Engineering and Technology
	Department of Electrical Engineering
	Lesson Plan

COURSE CODE: EE-423
COURSE NAME: High Voltage Engineering
INSTRUCTOR: Engr. M. Qamar ud Din
CREDIT HOURS: Theory = 0
Practical = 1
Total = 1
CONTACT HOURS: Theory = 0
Practical = 45
Total = 45

RELEVANT PROGRAM LEARNING OUTCOMES (PLOs):


The course is designed so that students achieve following PLOs:

- | | | | |
|------------------------------------|---|-----------------------------------|---|
| 1 Engineering Knowledge: | √ | 7 Environment and Sustainability: | |
| 2 Problem Analysis: | √ | 8 Ethics: | |
| 3 Design/Development of Solutions: | | 9 Individual and Team Work: | √ |
| 4 Investigation: | √ | 10 Communication: | √ |
| 5 Modern Tool Usage: | | 11 Project Management: | |
| 6 The Engineer and Society: | | 12 Lifelong Learning: | |

COURSE LEARNING OUTCOMES:

Upon successful completion of the course, the student will be able to:


No.	Domain	Description	PLOs
CLO-1	Affective A-1	To recognize the usage of control desk, testing transformer, safety precautions and analytical system tool.	1
CLO-2	Psychomotor P-3	Assemble and examine high voltage, impulse voltage generation and measurement performance	4
CLO-3	Psychomotor P-4	Express knowledge and analysis of disruptive discharge voltages	2

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CLO-4	Valuing A-3	Write lab notes, effective communication and the design & analysis of the given problem, to perform in the laboratory environment as individual & team.	9,10
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LIST OF EXPERIMENTS:

Lab	Title	CLO
1	Generation and measurement of AC voltage.	1,4
2	Generation and measurement of AC voltage through oscilloscope.	1,4
3	Generation and measurement of AC voltage through sphere gaps.	1,4
4	Understand Generation and measurement of DC voltage.	1,4
5	Generation and measurement of DC voltage.	2,4
6	Voltage doubler circuit.	2,4
7	Polarity effect and insulation screen.	2,4
8	Generation and measurement of impulse voltage.	2,4
9	Generation and measurement of impulse voltage using trigger sphere gap.	2,4
10	Disruptive discharge voltage tests with alternating current.	3,4
11	Disruptive discharge voltage tests with direct current.	3,4
12	Lighting impulse disruptive discharge test.	3,4
13	Insulation test for transformer oil.	3,4

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Mapping of CLO's to PLO's

Course outcomes	Program learning outcomes (PLO's)											
	1	2	3	4	5	6	7	8	9	10	11	12
CLO-1	√											
CLO-2				√								
CLO-3		√										
CLO-4									√	√		

Assessment Rubrics

Performance	5 Exceeds Expectations	4 Meet Expectations	3 Satisfactory	2-1 Doesn't meet expectations
Realization of experiment	Used time well in lab and focused attention on the experiment. Routinely provides useful ideas when participating in the group and in classroom discussion. A definite leader who contributes a lot of effort.	Used time pretty well. Stayed focused on the experiment most of the time. Usually provides useful ideas when participating in the group and in classroom discussions. A strong group member who tries hard.	Did the lab but did not appear very interested. Sometimes provides useful ideas when participating in the group and in classroom discussion. A satisfactory group member who does what is required.	Participation was minimal OR student was hostile about participating. Rarely provides useful ideas when participating in the group and in classroom discussion. May refuse to participate.
Data collection & data analysis	Actively looks for and suggests solutions to problems. (Individual). Complete and error free connections done neatly using appropriate sized wires, easy to comprehend for the instructor. (Group).	Refine solutions suggested by others. (Individual) Complete and error free connections done. No neatness in the circuit and / or difficult to comprehend for the instructor. (Group)	Does not suggest or refine solutions, but is willing to try out solutions suggested by others. (Individual) Few mistakes in connections. But neatly done, easy to comprehend for the instructor. (Group)	Does not try to solve problems or help others solve problems. Let's others do the work. (Individual) Many mistakes in connections, no neatness in the circuit and/or difficult to comprehend for the instructor. (Group)
Conducting experiment	Student is well prepared with the theoretical knowledge related to the	Student is averagely prepared with the theoretical knowledge. (Individual) Experiment is run step by step and flawlessly according to the	Below average theoretical knowledge. (Individual) Not following the instructions mentioned on lab manual, but still	Poor level of theoretical knowledge. (Individual) Not able to run the experiment and/or incorrect readings.




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	<p>experiment. (Individual) Experiment is run step by step and flawlessly according to the procedure provided on the lab manual. Correct reading set. (Group)</p>	<p>procedure provided on the lab manual. Correct reading set. (Group)</p>	<p>manages to run the experiment anyway and/or semi correct readings set. (Group)</p>	
Team Work	<p>Professional looking and accurate representation of the data in tables and/or graphs. Tables are labelled and titled. The calculations are done properly, following the standard rules of error measurements and significant figures. Scientific notations & prefixes are used and units are properly mentioned. Analysis are made neatly and accurately. The relationship between the variables is discussed and trends/patterns logically analyzed.</p>	<p>Accurately representation of the data in tables and/or graphs. Tables are labelled and titled. The calculations are done with a few mistakes and/or following the standard rules of error measurements and significant figures. Scientific notations & prefixes are used and units are properly mentioned. Analysis is made accurately. The relationship between the variables is discussed and trends/patterns logically analyzed.</p>	<p>Accurate representation of the data in written form, but no tables are presented. The calculations are done with a few mistakes. Improper or no use of scientific notations, prefixes and units. Analysis is made very poorly. The relationship between the variables is discussed but no patterns, trends or predictions are made based on the data.</p>	<p>Data are not shown Or are inaccurate. No or very poor calculations are done. The graphs are not made. The relationship between the variables is not discussed.</p>
Laboratory safety rules	<p>Precautions includes all the major and critical precautions for the experimental setup.</p>	<p>Precautions includes some of the major and critical precautions for the experimental setup.</p>	<p>Precautions includes common/general experiment setup precautions.</p>	<p>No precautions were included in the report.</p>

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Assessment Criteria:

Lab reports/performance	60%
Assessment	20%
Viva	20%
Total	100%

Written By (Lab Adviser)	Name with Sign	Engr. Muhammad Qamar ud Din
	Date	
Approved By (Instructor)	Name with Sign	Engr. Hafiz Ghulam Murtaza Qamar
	Date	
Reviewed BY (HOD)	Name with Sign	Dr. Ateeq-ur-Rehman Shaheen
	Date	