

EE-454L: Power System Protection Laboratory

CLOs	Description	Domain	Taxonomy	PLOs, Levels
CLO1	Demonstrate the characteristics and operation of relaying equipment(A)	Psychomotor	Level 3 Precision	PLO1 Engg. Knowledge
CLO2	Implement various relaying schemes for the protection of power system equipment(A).	Psychomotor	Level 2 Manipulation	PLO1 Engg. Knowledge
CLO3	Practice appropriate professional and ethical standards for producing self-motivated graduates(P)	Affective	Level 2 Responding	PLO8 Engg. Ethics
CLO4	Demonstrate the operation and coordination of relaying schemes by using modern simulation tools	Psychomotor	Level 3 Precision	PLO5 Modern Tool Usage

List of Experiment of Power System Protection

NO	Topic	CLOs
1	Symmetrical and Unsymmetrical Fault analysis in Power world Simulator	CLO 3&4
2	Modelling of Over Current Relay in MATLAB/Simulink for Transmission Line protection	CLO3&4
3	Error Correction of Single-Phase Voltage transformer.	CLO 1,2,3
4	Error Correction of Single-Phase Current transformers	CLO 1,2,3
5	Parameter setting of Under Voltage & Over Voltage Time Relay	CLO 1,2&3
6	Parameter setting of Definite Time Overcurrent Relay	CLO 1,2&3
7	Protection of HV Lines using Under Voltage and Overvoltage Relay	CLO1, 2&3
8	Parameter setting of Earth Overcurrent Relay for transmission line protection.	CLO 1,2&3
9	Parameter setting of Directional Earth/Overcurrent Fault Relay for Transmission Line Protection.	CLO 1,2&3
10	Modeling of Under Voltage & Over Voltage Time Relay in MATLAB/ Simulink for Transmission Lines protection.	CLO 3&4
11	Modeling of Differential Protection Relay in MATLAB/ Simulink for Transformer protection.	CLO 3&4
12	Modeling of Distance protection in MATLAB/ Simulink for Transmission lines protection.	CLO 3&4
13	Parameter setting of Earth Fault Warning Relay for transmission line protection.	CLO 1,2&3
14	Modeling of Frequency Relay in MATLAB/ Simulink for Generator line Protection.	CLO3&4

Assessment Rubrics of Power System Protection

Performance parameter	Meets Expectations (9-10)	Average performance (5-8)	Does not meet expectations (0-4)	Marks
Lab Performance (CLO1,2,3&4)	Selects relevant equipment to the experiment, carefully examines equipment and circuit components, and ensures smooth operation and process and perform simulation Accurately.	Needs guidance to select relevant equipment, examines equipment and circuit components and conduct the experiment with minor error need guidance to perform simulation.	Have no idea about appropriate equipment and circuit, and equipment operation is substantially wrong and no idea how to perform simulation	[30]
Lab Manual (CLO 2,4)	Submit the lab report (including tables, simulation procedure, observations/ graphs, summary) on due time.	Submit the complete report (including code, procedure, simulation, observations/ graphs) manual after due time.	Submit the incomplete lab manual after due time.	[30]
Quiz (CLO1,2 &4)	Knows the complete theory of the experiment and effectively explains/answer to the instructor.	Knows the complete theory of the experiment and explains it to the instructor with little hesitation.	Does not know the theory of the experiment and unable to explain it to the instructor.	[30]
Open Ended Lab (OEL) CLO4	Performs the assigned open-ended lab without guidance and instructions.	Performs the assigned open-ended lab tasks with minor errors.	Not able to interpret the open-ended lab tasks properly and unable to solve them.	[10]
Total				[100]

Open Ended Lab (OEL) Rubrics

Performance Parameter	Good (4-5)	Average (2.5-3.5)	Below average (0-2)	Marks
Understanding of the task	Have a complete knowledge about the assigned lab tasks.	Moderate understanding of the experiment.	Does not interpret the assigned tasks and unable to explain it.	[2]
Performance	Perfect execution, no bugs in the selection of Impedance value and simulation, completion of the tasks, accurate compilation.	Errors found in the compilation of impedance value and simulation.	Have no idea about impedance selection and simulation and the operation is substantially wrong.	[5]
Report	Submits a lab report on due time.	Submits incomplete lab report on due time.	Submits a copied lab report or submission after due time.	[3]
Total				[10]

Lab Performance Rubrics

PERFORMANCE	Good [4-5]	Average [3-2]	Below Average [2-0]
Understanding	Participate in lab and understand the topic carefully.	Participate in lab and but did not understand the topic carefully.	Does not participate in class.
Problem-solving: Calculations on hardware or simulation design are completed	Actively looks for and suggests solutions to problems. Take reading on hardware accurately and simulation design and results are accurate	Refines solutions suggested by others. Very good attempt to connect and take good readings but missing some results.	Does not try to solve problems or help others solve problems. Let's others do the work.
Participation/ work ethics	Used time well in lab and focused attention on the experiment. Outstanding job cleaning up working area, and equipment. Returned all materials appropriately and responsibly.	Used time pretty well. Stayed focused on the experiment most of the time. Good job on cleaning up working area and equipment. Returned all materials appropriately.	Participation was minimal OR student was hostile about participating. Did not clean up area or return materials. Refused to clean up.

Safety Measure for power system protection equipment

The following safety measure should be taken before start of experiment in lab

1. Check the grounding of equipment before turn on the supply for apparatus.
2. Check multiple grounding and neutral before the connection of apparatus.
3. Check the connection of different equipment either these are loose or not.
4. Fault should be removed in relay setting before taking the new reading from system.
5. To use screw properly for setting of manual relays.
6. To check the measuring device fuses if they are not working well.