

Course Title	Power System Protection
Course Code	EE5312
No. of Credit Hrs (Lecture + Tutorial + Lab)	3 (2+0+1)
No. of Contact Hrs (Lecture + Tutorial + Lab)	4 (2+0+2)
Level-Year	9/10 – 5
Prerequisite (if any)	EE4403

1) Course Objectives:

This is the main course for the power system protection to understand the principle of protective schemes and various faults in the power system scenario. To examine protection of power system with various protection relays. To study the various types of the circuit breakers, the arc quenching phenomena and the protection against over voltages. Identify instrument transformers for protection applications. Plan an accurately synchronized overcurrent protection system for radial distribution. Design protection schemes employing pilot protection with differential and distance relays

2) Expected Learning Outcomes

The student gains knowledge on principles of operation of the different types of relays, circuit breakers and fuses in power system protection and the appropriate circuit for the protection of the various components of power system.

1. Apply mathematics, science, and engineering principles to analyze balanced and unbalanced power system faults. PLO1 [1]
2. Analyze relay types and their operating characteristics for power system protection. PLO1 [1]
3. Design and calculate protection settings for power lines, transformers, generators, and busbars. PLO2 [2]
4. Design and conduct experiments to evaluate the impact of current and voltage transformers on protection schemes. PLO3 [6]
5. Employ appropriate instruments and equipment in laboratory experiments related to system protection. PLO3 [6]
6. Communicate experimental results and technical findings effectively through structured reports. PLO8 [3]
7. Recognize and demonstrate safe laboratory practices and professional responsibility when working with protection systems. PLO6 [4]

3) Course Contents:

1. General principles of protection.
2. Types of relays and construction of over current relays.
3. Instrument transformers. Fuses and Circuit breakers.
4. Over-current relay settings. Directional relays.
5. Protection of lines and distance protection Differential protection.
6. Protection of transformers. Protection of motors. Protection of generators.

4) Lab Contents:

1. Study & Characteristics of an MCBs
2. Characteristics of fuse and thermal overload protection.
3. Performance of impedance and over current relays
4. To study the characteristics of Distance Relay
5. String efficiency of insulators.
6. To study the different types of faults on transmission line

5) Teaching Methods:

- Lectures and Discussion

- Videos
- Self-learning
- Laboratory demonstrations

6) Mode of Evaluation: Course Assessment Methods

- Quizzes , Assignment, Homeworks, Reports, Presentations etc.
- Lab Work
- Mid Exam
- Final Exam

Evaluation

No	Assessment Activities *	Percentage
1.	Assignments/Quizzes/HomeWorks/Mini-Projects/Presentations/Reports+Quizzes	15%
2.	Mid Exam	25%
3.	Lab/Tutorial (Lab Exam)	10%
4.	Lab/Tutorial (Lab Reports)	10%
5.	Final Exam	40%

7) Textbook(s):

1. Badri Ram, Vishwakarma D N., "Power System Protection and Switchgear" Tata McGraw Hill Publishing House Limited
2. Electrical Power System Protection 2nd Edition by C. Christopoulos (Author), A. Wright (Author), Kluwer Academic Publisher
3. J.D. Glover & M Sarma, "Power system analysis and Design", 3rd edition, PWS Publishing, 2002.

8) References:

1. Paithankar Y. G., Bhide S. R., "Fundamentals of Power System Protection" Prentice Hall of India Limited 2nd Edition, 2010.
2. Wadhwa, C.L., "Electrical Power Systems", New Age International Publishers Limited, 2006,,6th Edition, 2010.