POWER SYSTEM PROTECTION LABORATORY

VII Semester: EEE

Course Code	Category	Hours / Expt			Credits	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEE112	Core	-	-	3	2	30	70	100
Contact Classes: 45	Tutorial Classes: Nil	Practical Classes: 45				Total Classes: 45		

COURSE OBJECTIVES:

The course should enable the students to:

I. Understand the importance of protection and plotting the characteristics of MCB and Fuse
II. Determine the parameters, surge impedance loading and reactive power compensation of transmission lines
III. Understand the concept of Ferranti effect of a transmission lines
IV. Calculate positive, negative and zero sequence impedances of synchronous machine

COURSE OUTCOMES (COs):

CO 1: Understand the importance of protection and plotting the characteristics of MCB and Fuse

CO 2: Determine the transmission line parameters, surge impedance loading and reactive power compensation of transmission lines

CO 3: Understand the concept of Ferranti effect of a transmission lines

CO 4: Calculate positive, negative and zero sequence impedances of alternator.

CO 5: Determine string efficiency in a sting of insulators

COURSE LEARNING OUTCOMES (CLOs):

The students should enable to:

1. Examine the functioning of miniature circuit breaker(MCB).
2. Understand internal circuit of high rupturing capacity and tripping of bimetallic thermal overload protection.
3. Record of ABCD Parameters of transmission line.
4. Analyze Ferranti effect in a transmission line.
5. Calculate surge impedence loading(SIL) of a transmission line.
6. Explain the concept of shunt compensation to counteract the voltage rise on no load and zero regulation at different loads in a transmission line.
7. Understand the concept of voltage improvement by reactive power control using tap changing transformer
8. Determine the performance of a transmission line by calculating its efficiency and regulation.
9. Understand the working principle of impedance relay and its effect during faults in a transmission line.
10. Understand the working principle of over current relay and its effect during faults in a transmission line.
11. Analyze earth fault detection methods and various earth fault protection schemes
12. Analyze various protection schemes in radial feeder under various fault conditions
13. Calculate positive, negative and zero sequence impedances of synchronous machine by using direct

method and fault analysis method 14. Determine of string efficiency in a string of insulators.
LIST OF EXPERIMENTS

Expt-1	**CHARACTERISTICS OF AN MCB**
Plotting the Characteristics of Miniature Circuit Breaker (MCB).	
Expt-2	**CHARACTERISTICS OF FUSE AND THERMAL OVERLOAD PROTECTION**
Study of characteristics of High Rupturing Capacity (HRC) fuse and tripping of bimetallic thermal overload protection and its characteristics.	
Expt-3	**ABCD PARAMETERS OF TRANSMISSION LINE**
Measurement of ABCD parameters of a transmission line	
Expt-4	**FERRANTI EFFECT IN A TRANSMISSION LINE**
Study of Ferranti effect in a the transmission line	
Expt-5	**SURGE IMPEDANCE LOADING**
Study of Surge Impedance Loading (SIL) of a transmission line.	
Expt-6	**EFFECT OF SHUNT COMPENSATION**
Determine shunt compensation to counteract the voltage rise on no load and zero regulation at different loads in a transmission line.	
Expt-7	**VOLTAGE PROFILE IMPROVEMENT USING TAP CHANGING TRANSFORMER**
Study of voltage improvement by reactive power control using tap changing transformer.	
Expt-8	**EFFICINCY AND REGULATION OF A TRANSMISSION LINE**
Determine the performance of a transmission line by calculating its efficiency and regulation.	
Expt-9	**PERFORMANCE OF IMPEDANCE RELAY**
Study the working principle of impedance relay and its effect during faults in a transmission line.	
Expt-10	**PERFORMANCE OF OVER CURRENT RELAY**
Study the working principle of over current relay and its effect during faults in a transmission line.	
Expt-11	**EARTH FAULT PROTECTION**
Study of earth fault detection methods and various earth fault protection schemes.	
Expt-12	**FEEDER PROTECTION**
Study the various protection schemes in radial feeder under various fault conditions.	
Expt-13	**MEASURMENT OF SEQUENCE IMPEDANCES OF SYNCHRONOUS MACHINE**

Measurement of positive, negative and zero sequence impedances of synchronous machine by using direct method and fault analysis method.	
Expt-14	**STRING EFFICIENCY OF INSULATORS**
Determination of string efficiency in a string of insulators.	

Text Books:

1	Paithankar, S R Bhide, "Fundamentals of Power System Protection", PHI, 1st Edition, 2003.
2	C L Wadhwa, "Electrical Power Systems", New Age international (P) Limited, 6rd Edition, 2010.
3	VK Mehta, "Principles of power systems", S Chand Publications, 4th Edition, 2009.

References:

1	Badri Ram and D N Vishwakarma, "Power system Protection and Switchgear ", Tata McGraw-Hill Publication company limited 1st Edition,1995.
2	TS Madhava Rao, "Power system Protection static relay", Tata McGraw-Hill Publishing Company limited, 2nd Edition, 1989.