

POWER SYSTEMS LABORATORY

II Semester: EPS								
Course Code	Category	Hours / Week			Credit	Maximum Marks		
BPSC24	Core	L	T	P	C	CIA	SEE	Total
		-	-	4	2	30	70	100
Contact Classes: Nil		Tutorial Classes: Nil		Practical Classes: 36			Total Classes: 36	

I. COURSE OVERVIEW:

The main objective of the course is to provide an overview of the principles of basic protection circuits such as earth tester, different type of relays, breakdown strength of air gap, soil resistivity, millivolt drop test. It will also help students to formulate different type of protection scheme.

II. COURSE OBJECTIVES:

The students will try to learn:

- I. Parameters, surge impedance loading and reactive power compensation of transmission lines
- II. Concept of various transmission line protection schemes.
- III. How Simulate and study feeder protection and generator protection circuits.

III. COURSE OUTCOMES:

After successful completion of the course, students will be able to:		
CO 1	Determine earth resistance by using crank type earth tester.	Analyze
CO 2	Explain the concept of electrical integrity of connections and contacts in a circuit breaker using milli-volt drop test.	Analyze
CO 3	Apply the concept of soil resistivity as function of salinity and time.	Apply
CO 4	Analyze internal fault protection of single-phase transformer using Merz price protection.	Analyze
CO 5	Examine the alternator during over voltage, under voltage, over and under frequency by using respective relays.	Analyze

IV LIST OF EXPERIMENTS

EXPERIMENT –I: EARTH TESTER

Determination of earth resistance by using crank type earth tester.

EXPERIMENT –II: MILLI VOLT DROP TEST

Measurement of contact resistances of different combinations of test objects.

EXPERIMENT –III: SOIL RESISTIVITY

Measurement of soil resistivity as a function of salinity and time.

EXPERIMENT –IV: MICROPROCESSOR BASED OVER CURRENT RELAY

Determination of performance characteristics of microprocessor based over current relay.

EXPERIMENT –V: ELECTROMECHANICAL OVER CURRENT RELAY

Determination of performance characteristics of electromechanical over current relay.

EXPERIMENT –VI: BREAKDOWN STRENGTH OF AIR BY HORN GAP

Determination of breakdown voltage of air using horn gap apparatus at atmospheric conditions.

EXPERIMENT –VII: POWER ANGLE CHARACTERISTICS OF SYNCHRONOUS MACHINE

Study the power angle characteristics of synchronous machine by synchronizing to the grid.

EXPERIMENT –VIII: MERZ PRICE PROTECTION IN SINGLE PHASE TRANSFORMER

Study the Merz price protection of single-phase transformer and determine the characteristics of percentage biased relay.

EXPERIMENT –IX: DIFFERENTIAL PROTECTION SCHEME IN SYNCHRONOUS GENERATOR

Study of differential protection in three phase ac generator.

EXPERIMENT –X: NEGATIVE SEQUENCE PROTECTION IN ALTERNATOR

Study the numerical type negative sequence protection in a given alternator.

EXPERIMENT –XI: OVER FREQUENCY AND UNDER FREQUENCY PROTECTION

Study the generator protection during over and under frequency cases with suitable relays.

EXPERIMENT –XII: PERFORMANCE OF ALTERNATOR AGAINST INTERNAL FAULTS

Study the performance of synchronous machine and its protection scheme during internal faults.

V. Reference Books:

1. Paithankar, S RBhide, “Fundamentals of Power System Protection”, PHI, 1st Edition, 2003.
2. CLWadhwa, “Electrical Power Systems”, New Age international (P) Limited, 6th Edition, 2010.
3. VK Mehta, “Principles of power systems”, S Chand Publications, 4th Edition, 2009.

VI. Web References:

1. <https://www.ee.iitkgp.ac.in>
2. <https://www.citchennai.edu.in>
3. <https://www.iare.ac.in>
4. <https://www.deltaww.com>