

POWER SYSTEMS LABORATORY

II Semester: EPS								
Course Code	Category	Hours / Week			Credit	Maximum Marks		
BPSB20	Core	L	T	P	C	CIA	SEE	Total
		-	-	4	2	30	70	100
Contact Classes: Nil		Tutorial Classes: Nil		Practical Classes: 48		Total Classes: 48		
I. COURSEOVERVIEW:								
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 course should enable the students to:								
I. Determine the parameters, surge impedance loading and reactive power compensation of transmission lines.								
II. Understand the concept of various transmission line protection schemes.								
III. Simulate and study feeder protection and generator protection circuits.								
III. COURSEOUTCOMES:								
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	
CO 6	Determine earth resistance by using crank type earth tester.						Analyze	
IV.LIST OF EXPERIMENTS								
Expt. 1	EARTH TESTER							
Determination of earth resistance by using crank type earth tester.								
Expt. 2	MILLI VOLT DROP TEST							
Measurement of contact resistances of different combinations of test objects.								
Expt. 3	SOIL RESISTIVITY							
Measurement of soil resistivity as a function of salinity and time.								
Expt. 4	MICROPROCESSOR BASED OVER CURRENT RELAY							
Determination of performance characteristics of microprocessor based over current relay.								

Expt. 5	ELECTROMECHANICAL OVER CURRENT RELAY
Determination of performance characteristics of electromechanical over current relay.	
Expt. 6	BREAKDOWN STRENGTH OF AIR BY HORN GAP
Determination of breakdown voltage of air using horn gap apparatus at atmospheric conditions.	
Expt. 7	POWER ANGLE CHARACTERISTICS OF SYNCHRONOUS MACHINE
Study the power angle characteristics of synchronous machine by synchronizing to the grid.	
Expt. 8	MERZ PRICE PROTECTION IN SINGLE PHASE TRANSFORMER
Study the Merz price protection of single phase transformer and determine the characteristics of percentage biased relay.	
Expt. 9	DIFFERENTIAL PROTECTION SCHEME IN SYNCHRONOUS GENERATOR
Study of differential protection in three phase ac generator.	
Expt. 10	NEGATIVE SEQUENCE PROTECTION IN ALTERNATOR
Study the numerical type negative sequence protection in a given alternator.	
Expt. 11	OVER FREQUENCY AND UNDER FREQUENCY PROTECTION
Study the generator protection during over and under frequency cases with suitable relays.	
Expt. 12	PERFORMANCE OF ALTERNATOR AGAINST INTERNAL FAULTS
Study the performance of synchronous machine and its protection scheme during internal faults.	
Reference Books:	
<ol style="list-style-type: none"> 1. Paithankar, S RBhide, "Fundamentals of Power System Protection", PHI, 1stEdition, 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. 	
Web References:	
<ol style="list-style-type: none"> 1. https://www.ee.iitkgp.ac.in 2. https://www.citchennai.edu.in 3. https://www.iare.ac.in 4. https://www.deltaww.com 	