



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal - 500 043, Hyderabad, Telangana

COURSE CONTENT

POWER SYSTEMS LABORATORY								
II Semester: EPS								
Course Code	Category	Hours/Week			Credits	Maximum Marks		
BPSD24	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			
Prerequisite: - Electrical Power Systems								

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 should be able to:

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| CO 1 | Determine earth resistance by using crank type earth tester. |
| CO 2 | Explain the concept of electrical integrity of connections and contacts in acircuit breaker using milli-volt drop test. |
| CO 3 | Apply the concept of soil resistivity as function of salinity and time. |
| CO 4 | Analyze internal fault protection of single-phase transformer using merzprice protection. |
| CO 5 | Examine the alternator during over voltage, under voltage, over and underfrequency by using respective relays. |

IV. LIST OF EXPERIMENTS

WEEK –1: EARTH TESTER

Determination of earth resistance by using crank type earth tester.

WEEK –2: MILLI VOLT DROP TEST

Measurement of contact resistances of different combinations of test objects.

WEEK –3: SOIL RESISTIVITY

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

WEEK –4: MICROPROCESSOR BASED OVER CURRENT RELAY

Determination of performance characteristics of microprocessor based over current relay.

WEEK –5: ELECTROMECHANICAL OVER CURRENT RELAY

Determination of performance characteristics of electromechanical over current relay.

WEEK –6: BREAKDOWN STRENGTH OF AIR BY HORN GAP

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

WEEK 7: POWER ANGLE CHARACTERISTICS OF SYNCHRONOUS MACHINE

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

WEEK –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.

WEEK –9: DIFFERENTIAL PROTECTION SCHEME IN SYNCHRONOUS GENERATOR

Study of differential protection in three phase ac generator.

WEEK –10: NEGATIVE SEQUENCE PROTECTION IN ALTERNATOR

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

WEEK –11: OVER FREQUENCY AND UNDER FREQUENCY PROTECTION

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

WEEK –12: PERFORMANCE OF ALTERNATOR AGAINST INTERNAL FAULTS

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

WEEK –13: CHARACTERISTICS OF IDMT OVER CURRENT RELAY.

To study the Operation of a Non- Directional (I D M T relay) and plot the inverse time current characteristics

WEEK –14: TESTING OF STRING INSULATOR

Determine string efficiency of suspension insulator with and without guard ring.

V. TEXT 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.