ELECTRICAL MEASUREMENTS AND INSTRUMENTATION LABORATORY

VI Semester: EEE

Course Code	Category	Hours / Week			Credit	Maximum Marks		
		L	T	P	C	CIA	SEE	Total
AEEB25	Core	-	-	2	1	30	70	100
Contact Classes: Nil	Tutorial Classes: Nil	Practical Classes: 24				Total Classes: 24		

I. COURSE OVERVIEW:

The objective of this laboratory course is to learn about the electrical measurement methods, operational principles with suitable software and hardware. It provides an opportunity for the students to identify and calibrate the various electrical instruments for obtaining errors. The lab emphasizes on the practical skills to design and realize the use of instruments for different electrical applications.

II. OBJECTIVES:

The course should enable the students to:

- **I** The calibration and testing methods of different electrical measuring instruments usedfor the measurement of voltage, current, power, energy.
- **II** The different transducers for measurement of physical quantities like pressure,temperature, level.
- **III** The simulation models in Labview to measure passive electrical parameters.

III. COURES OUTCOMES:

After successful completion of the course, students should be able to:

CO 1	**Make use of** transducers like thermocouple, thermistorand resistancetemperature detector for measuring temperature.	Apply
CO 2	**Choose** appropriate transducers for the measurement of strain, pressure, position and level.	Apply
CO 3	**Examine** the errors in measuring instrument by calibrating voltmeter, ammeter, LPF wattmeter, single phase energy meter,dynamometer power factor meter.	Analyze
CO 4	**Develop** Lab view programs for displaying electrical waveforms andLissajous patterns.	Analyze
CO 5	**Build** simulation models in digital environment forthe measurement ofpassive parameters like inductance, capacitance and resistance.	Apply
CO 6	**Analyze** the quantities like turns ratio, reactive power, errors associated with current transformer for reducing the errors in measuring instruments.	Analyze

LIST OF EXPERIMENTS

Expt. 1	**SENSING OF TEMPERATURE AND SPEED**
Measurement of temperature using transducers like thermocouple, thermistors and resistance temperature detector with signal conditioning; speed measurement using proximity sensor.	
Expt. 2	**MEASUREMENT OF RESISTANCE**
Measurement of low resistance using Kelvin's double bridge	

Expt. 3	**MEASUREMENT OF STRAIN AND PRESSURE**
Measurement of strain using strain gauge and measurement of pressure using differential pressure transducer.	
Expt. 4	**MEASUREMENT OF POSITION AND LEVEL**
Measurement of position using encoders and measurement of level using capacitive transducer.	
Expt. 5	**PHANTOM LOADING ON LPF WATTMETER**
Calibration of electrodynamometer type LPF wattmeter using phantom loading	
Expt. 6	**CALIBRATION OF SINGLE PHASE ENERGY METER AND POWER FACTOR METER**
Calibration of single phase energy meter using resistive load and dynamometer power factor meter.	
Expt. 7	**MEASUREMENT OF TURNS RATIO AND APPLICATIONS OF CTs**
Measurement of turns ratio using AC bridge; the extension of range of wattmeter to measure three phase power using two CTs and one single phase wattmeter.	
Expt. 8	**MEASUREMENT OF REACTIVE POWER**
Measurement of reactive power using one single phase wattmeter.	
Expt. 9	**CT TESTING USING MUTUAL INDUCTOR MEASUREMENT OF % RATIO ERROR AND PHASE ANGLE OF GIVEN CT BY NULL METHOD**
Measurement of % ratio error and phase angle of given ct by null method.	
Expt. 10	**CROMPTON DC POTENTIOMETER**
Calibration of PMMC ammeter and PMMC voltmeter.	
Expt. 11	**ANALYSIS OF WAVE FORMS, FREQUENCY AND THD USING DIGITAL SIMULATION**
Measurement and display of voltage, current wave forms, frequency Lissajeous patterns and THD using LabVIEW.	
Expt. 12	**MEASUREMENT OF THREE PHASE POWER**
Measurement of three phase power with single wattmeter and two numbers of current transformer.	
Expt. 13	**WORKING OF STATIC ENERGY METER USING DIGITAL SIMULATION**
Measurement of energy using static energy meter and verification with LabVIEW.	
Expt. 14	**MEASUREMENT OF PASSIVE PARAMETERS USING DIGITAL SIMULATION**
Inductance measurement using Anderson bridge and capacitance measurement using Schering bridge and verification with LabVIEW.	

Reference Books:

1. https://www.bookpump.com/bwp/pdf-b/2335004b.pdf.
2. https://www.books.google.co.in › Technology & Engineering › Sensors
3. https://www.bambang.lecturer.pens.ac.id/rekayasa%20sensor%20aktuator/sensors%20&%20Trans.
4. https://www.sae.org/images/books/toc_pdfs/BELS036.pdf

Web References:

1. https://www.gnindia.dronacharya.info/EEEDept/Downloads/Labmanuals/EMI_Lab.pdf
2. https://www.scribd.com/doc/25086994/electrical-measurements-lab

Course Home Page:

SOFTWARE AND HARDWARE REQUIREMENTS FOR A BATCH OF 36 STUDENTS:

SOFTWARE: MATLAB R2015a and LabVIEW

HARDWARE: Desktop Computers (04 nos)