

<b>Course Title</b>	<b>Electrical Measurement</b>
<b>Course Code</b>	EL424
<b>Course Credit</b>	Lecture : 03
	Practical : 01
	Tutorial : 00
	Total : 04

### Course Learning Objectives

At the end of this course students will be able to:

- **Apply** principles of potentiometer for calibrating electrical instruments and measuring different electrical parameters.
- **Measure** various electrical parameters with accuracy, precision and resolution
- **Identify** different type of errors and characteristics of measuring instrument
- **Evaluate** value of resistance, capacitance and inductance by various bridge circuits.
- **Analyze** the basic concept of instrument transformers.
- **Illustrate** the function and operation of various electromechanical instruments.

### Detailed Syllabus

Sr. No.	Name of chapter & Details	
<b>SECTION-I</b>		
<b>1</b>	<b>Standard of Measurements</b> S. I. system of measurement of absolute value of current and resistance, standard batteries, characteristics of instruments, definition of true value, accuracy, precision, error, types of errors sensitivity and resolution.	<b>05</b>
<b>2</b>	<b>Analog Electromechanical Instruments</b> Classification of analog instruments, principle of operation, operating forces, classification of meters, measure instrument methodology: measure of RMS, Average, etc. errors in ammeters and voltmeters, Galvanometer, permanent magnet moving coil, moving iron, dynamometer type, induction type, electrostatic type instruments..	<b>09</b>
<b>3</b>	<b>Instrument Transformers</b> Construction and principle of C.T. and P.T., Work error characteristics, Design consideration and testing, Applications of C.T & P.T.	<b>07</b>
<b>TOTAL</b>		<b>21</b>

**SECTION-II**

<b>4</b>	<b>Measurement of Resistance</b> Measurement of low resistance-Ammeter-Voltmeter method, Potentiometer method, Kelvin double bridge method, Ohm meter method, Measurement of medium resistance-Ammeter-Voltmeter method, Substitution method, Wheatstone bridge method, Ohm meter method & Measurement of high resistance- Direct deflection method, Loss of charge method, Meg ohm bridge, Megger, Measurement of volume and surface resistivity	<b>07</b>
<b>5</b>	<b>Potentiometers</b> Basic potentiometer circuit, Standardisation, Types of A.C. Potentiometer-Laboratory type(Crompton's)Potentiometer, Multiple-Range Potentiometer, Precision Type potentiometers, Volt-Ratio Box, A. C. potentiometer principle, standardizing of A.C. Potentiometers and use of transfer instruments Types of potentiometer, Drysdale polar potentiometer, Gall-Tinsely(Co-ordinate type)A.C. Potentiometer, Applications of A. C. and D. C. potentiometers.	<b>05</b>
<b>6</b>	<b>Measurement of Inductance and Capacitance</b> A. C. bridges for inductance measurement-Maxwell, Hays, Anderson and Owen bridges, capacitance measurement – De Sauty and Schering Bridge. Measurement of frequency by Wien's bridge.	<b>05</b>
<b>7</b>	<b>Magnetic Measurement</b> Determination of B. – H. Curve, A. C. magnetic testing, methods of measurement of iron losses, methods of measurement of air gap flux and field strength, Hibert magnetic standard.	<b>04</b>
<b>TOTAL</b>		<b>21</b>

**Instructional Method and Pedagogy**

- Laboratories will be conducted with the aid of multi-media projector, black board, OHP etc.
- Assignments based on course content will be given to the students at the end of each unit/topic and will be evaluated at regular interval.
- Surprise tests/Quizzes/Seminar/ will be conducted.

**Reference Books**

1. J. B. Gupta, "A Course in Electronic and Electrical Measurements & Instrumentation in SI Units" Kataria, 1996.
2. R. K. Rajput "Electrical Measurements and Measuring Instruments" S. Chand, 2008.

School of Engineering  
(Electrical Department)

List of Experiments

Subject Code: EL424

Subject Name: Electrical Measurement

Sr. No	Aim of experiment
1	Explain the uses of Multi-meter (DMM)
2	To <b>analyze</b> the unknown resistance using ammeter-voltmeter.
3	To <b>solve</b> the unknown resistance using substitution method.
4	To <b>sort</b> the value of unknown resistance by Wheatstone bridge.
5	To <b>examine</b> the low resistance by Kelvin`s double bridge methods.
6	To <b>investigate</b> the unknown inductance and its reactance with the help of Maxwell`s bridge.
7	To <b>investigate</b> the unknown capacitance and its reactance with the help of Desauty`s bridge.
8	To <b>examine</b> the Wien`s Bridge Oscillator and effect on output frequency with variation in RC combination
9	To <b>compare</b> the working of instrument transformers (CT&PT).
10	To <b>analyze</b> the BH Curve or Hysteresis Loop.
11	To <b>Solve</b> the unknown capacitance by schering bridge.
12	To <b>examine</b> the voltage by using laboratory type potentiometer
13	To <b>examine</b> the value of Insulation Resistance by Megger.
14	To <b>examine</b> the value of earth resistance by Earth Tester.
15	<b>Explain</b> the constructional details of Permanent Magnet Moving Coil and Moving Iron Instruments.