

## UEI403: ELECTRICAL AND ELECTRONIC MEASUREMENTS

<b>L</b>	<b>T</b>	<b>P</b>	<b>Cr</b>
<b>3</b>	<b>1</b>	<b>2</b>	<b>4.5</b>

**Course Objectives:** To understand concepts of various electrical and electronic measuring instruments.

**Electrical Standards:** Standards of e.m.f. and resistance, Frequency dependence of resistance, Inductance and Capacitance, Time and frequency standards.

**Electromechanical Indicating Instruments:** PMMC galvanometer, Ohmmeter, Electrodynamometer, Moving iron meter, Rectifier and thermo-instruments, Comparison of various types of indicating instruments.

**Power and Energy Measurement:** Electrodynamometer type of wattmeter and power factor meter, Power in poly phase system: two wattmeter method, Single-phase induction and Electronic energy meters.

**Instrument Transformers:** Current and Voltage transformers, Constructional features, Ratio and Phase angle errors.

**Magnetic Measurements:** Determination of B-H curve and hysteresis loop, Measurement of iron losses with Llyod Fisher square.

**Bridge Measurements:** AC bridges: Applications and conditions for balance, Maxwell's bridge, Hay's bridge, Schering bridge, Wien's bridge, De Sauty's bridge, Insulation testing, Ground resistance measurement, Varley and Murray loop test.

**Electronic Instruments:** Electronic multimeter, Digital voltmeters, General characteristics ramp type voltmeter, Quantization error, Digital frequency meter/Timer, Q meter and its applications, Distortion meter, Wavemeter and Spectrum Analyzer, Block diagram and Applications of oscilloscopes, Storage type digital oscilloscopes.

### **Laboratory Work:**

Experiments around sensitivity of wheat stone bridge, Comparison of various types of indicating instruments, Single-phase induction type energy meter, AC bridges, Measurement of iron losses with Llyod Fisher square, Storage type digital oscilloscopes.

**Project:** Development of power supplies using transformers.

**Course Learning Outcomes (CLO):** After the completion of the course the students will be able to:

1. compare various electromechanical indicating instruments,
2. measure power and energy
3. design various AC bridges
4. analyze various waveform with the help of storage oscilloscope

### **Text Book:**

1. *Golding, E.W., and Widdis, F.C., Electrical Measurements and Measuring Instruments, Pitman (2003).*
2. *Helfrick, A.D., and Cooper, W.D., Modern Electronic Instrumentation and Measurement Techniques, Prentice Hall of India (2007).*

### **Reference Books:**

1. *Kalsi, H.S., Electronic Instrumentation, Tata McGraw-Hill (2007).*
2. *Nakra, B.C., Chaudhry, K.K., Instrumentation Measurement and Analysis, Tata McGraw-Hill (2003).*

### **Evaluation Scheme:**

S.NO.	Evaluation Elements	Weightage
1	MST	25
2	EST	35
3	Sessional (May include Assignments//Quizzes/Lab Evaluations)	40