

<b>4<sup>th</sup> Semester</b>	<b>REE4D003</b>	<b>Electrical and Electronics Measurement</b>	<b>L-T-P 3-0-0</b>	<b>3 CREDITS</b>
------------------------------------	-----------------	---	------------------------	------------------

**Module- I [09 Hrs]**

Measurement and Error: Definition, Accuracy and Precision, Significant Figures, Types of Errors. Standards of Measurement: Classification of Standards, Electrical Standards, IEEE Standards. Types of measuring instrument: Ammeter and Voltmeter: Derivation for Deflecting Torque of; PMMC, MI (attraction and repulsion types), Electro Dynamometer and Induction type Ammeters and Voltmeters. Energy meters and watt meter.: Construction, Theory and Principle of operation of Electro-Dynamometer and Induction type wattmeter, compensation, creep, error, testing, Single Phase and Poly phase Induction type Watt-hour meters. Frequency Meters: Vibrating reed type, electrical resonance type, Power Factor Meters. Measuring instruments: Absolute and secondary instrument, indicating and recording instrument.

**Module-II [12 Hrs]**

Measurement of Resistance, Inductance and Capacitance:  
Resistance: Measurement of Low Resistance by Kelvin’s Double Bridge, Measurement of Medium Resistance, Measurement of High Resistance, Measurement of Resistance of Insulating Materials, Portable Resistance Testing set (Megohm meter), Measurement of Insulation Resistance when Power is ON, Measurement of Resistance of Earth Connections.  
Inductance: Measurement of Self Inductance by Ammeter and Voltmeter, and AC Bridges (Maxwell’s, Hay’s, & Anderson Bridge), Measurement of Mutual Inductance by Felici’s Method, and as Self Inductance.  
Capacitance: Measurement of Capacitance by Ammeter and Voltmeter, and AC Bridges (Owen’s, Schering & Wien’s Bridge), Screening of Bridge Components and Wagner Earthing Device.  
Transducer: Strain Gauges, Thermistors, Thermocouples, Linear Variable Differential Transformer (LVDT), Capacitive Transducers, Piezo-Electric transducers, Optical Transducer, Torque meters, inductive torque transducers, electric tachometers, photo-electric tachometers, Hall Effect Transducer

**MODULE- III [10 Hrs]**

Galvanometer: Construction, Theory and Principle of operation of D’Arsonval, Vibration (Moving Magnet & Moving Coil types), and Ballistic Galvanometer, Influence of Resistance on Damping, Logarithmic decrement, Calibration of Galvanometers, Galvanometer Constants, Measurement of Flux and Magnetic Field by using Galvanometers.  
Potentiometer: Construction, Theory and Principle of operation of DC Potentiometers (Crompton, Vernier, Constant Resistance, & Deflection Potentiometer), and AC Potentiometers (Drysdale-Tinsley & Gall-Tinsley Potentiometer).  
pH- Meter, volt ratio boxes and other auxiliary apparatus.

**MODULE- IV [08 Hrs]**

Current Transformer and Potential Transformer : Construction, Theory, Characteristics and Testing of CTs and PTs.  
Electronic Instruments for Measuring Basic Parameters: Amplified DC Meters, AC Voltmeters using Rectifiers, True RMS Voltmeter, Considerations for choosing an Analog Voltmeter, Digital Voltmeters (Block Diagrams only), Q-meter

**MODULE- V [06 Hrs]**

Oscilloscope: Block Diagrams, Delay Line, Multiple Trace, Oscilloscope Probes, Oscilloscope Techniques, Introduction to Analog and Digital Storage Oscilloscopes, Measurement of Frequency, Phase Angle, and Time Delay using Oscilloscope.

**Books:**

- Electrical Measurements and Measuring Instruments – Golding & Widdis – 5th Edition, Reem Publication.
- Modern Electronic Instrumentation and Measurement Techniques – Helfrick & Cooper – Pearson Education.
- A Course in Electrical and Electronic Measurements and Instrumentation – A K Sawhney – Dhanpat Rai & Co.
- Electronic Instrumentation – H C Kalsi – 2nd Edition, Tata McGraw Hill.
- Electronic Measurement and Instrumentation – Oliver & Cage – Tata McGraw Hill.