Course Name Electrical & Electronics Measurements

Course Code EE302

Course Credit 3

Contact Hour 42

Prerequisite Basic Electrical Engineering (EE101)

Course Objective

The objectives of this course is understand the internal structure of all instruments that are used in measuring parameters related to electronics and also difference between analogue meters and digital meters and their performance characteristics.

Course Outcome

On completion of the course students will be able to

1. Understand about different instruments that are used for measurement purpose.
2. Analyze the Performance characteristics of each instrument.
3. Understand about different types of signal generators and recorders.
4. Understand how different physical parameters and there co-relation with measuring Instrument.
5. Internal and general repairing of instruments and problem solving capacity.

CO Mapping with departmental POs

H: High, M: Medium, L: Low

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
CO 1	H						L		M			
CO 2		H										
CO 3	H		H							M		
CO 4												
CO 5		H					M					

Course Content

Module-I: Introduction **4L**

Method of measurement, Measurement system, Classification of instruments, Definition of accuracy, Precision, Resolution, Speed of response, Error in measurement, Classification of errors, loading effect due to shunt and series connected instruments.

Module-II: Analog meters **6L**

General features, Construction, Principle of operation and torque equation of Moving coil, Moving iron, Electrodynamometer, Induction instruments.

Principle of operation of the Electrostatic, Thermoelectric, Rectifier type instruments, Extension of instrument ranges and multipliers.

Module-III: Instrument transformer **4L**

Disadvantage of shunt and multipliers, Advantage of Instrument transformers, Principle of operation of Current & Potential transformer, errors.

Module-IV: Measurement of Power **3L**

Principle of operation of Electrodynamic & Induction type wattmeter. Wattmeter errors.

Module-V: Measurement of resistance **4L**

Measurement of medium, low and high resistances, Megger.

Module-VII: Measurement of Energy **3L**

Construction, theory and application of AC energy meter, testing of energy meters.

Module-VIII: Potentiometer **4L**

Principle of operation and application of Crompton's DC potentiometer, Polar and Co-ordinate type AC potentiometer. Application.

Module-IX: AC Bridges **4L**

Measurement of Inductance, Capacitance and frequency by AC bridges.

Module-X: Cathode ray oscilloscope (CRO) **3L**

Measurement of voltage, current, frequency & phase by oscilloscope. Frequency limitation of CRO. Sampling and storage oscilloscope, Double beam CRO.

Module-XI: Electronic Instruments **4L**

Advantages of digital meter over analog meters, Digital voltmeter, Resolution and sensitivity of digital meters, Digital multimeter, Digital frequency meter, Signal generator.

Module-XII: Sensors & Transducers **3L**

• Introduction to sensors & Transducers, Strain gauge, LVDT, Temperature transducers, Flow measurement using magnetic flow measurement.

Text Books:

1. A course in Electrical & Electronic Measurements & Instrumentation, A.K. Sawhney, Dhanpat Rai & sons.
1. Electrical Measurement & Measuring Instruments, E.W. Golding & F.C. Wides, Wheeler Publishing.
2. Electronic Instruments, H.S. Kalsi, Tata Mc-Graw hill, 2nd Edition.

Reference Books:

1. Sensors & Transducers, D. Patranabis, PHI, 2nd edition.
2. Digital Instrumentation, A.J. Bouwens, Tata Mc-Graw hill.
3. Modern Electronic instrumentation & Measuring instruments, A.D. Heltric & W.C. Copper, Wheeler Publication.
4. Instrument transducers, H.K.P. Neubert, Oxford University press.