

## SKU-Instrumentation and Measurement

SKU-Instrumentation and Measurement explains in detailed different analog and digital instruments construction, working and their measurement techniques in a manner that is clearer, interesting, and easier to understand through innovative graphical user interface which is easy to learn and extremely efficient to use.

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### Definition

- Error in measurement is any deviation from the true value.

The diagram illustrates the relationship between True Value, Error, and Observed Value. On the left, there are two circular nodes: 'True Value' (top) and 'Error' (bottom). A plus sign (+) is positioned between them, and a minus sign (-) is positioned below the plus sign. An arrow points from these two nodes to a larger circular node on the right labeled 'Observed Value', indicating that the observed value is the result of the true value plus or minus the error.

### Topics covered in SKU- Instrumentation and Measurement:

#### Measurement and Error

**Topics Covered:** Measurement, Error, Types of errors, Accuracy and Precision, Sensitivity, Resolution, Permanent Magnet Moving Coil Instruments (Galvanometer), Electronic Voltmeter, AC Voltmeter with rectifier and amplifier combination Electronic multi-meters, DC Ammeters, AC current indicating instruments, AC probes, CROs, Single trace and dual beam, CROS.

#### Measurement of Different Instruments

**Topics Covered:** Measurement of inductance, Capacitance and Q of the coil: Maxwell's Bridge, Hay's Bridge, Wien's Bridge, Schering Bridge, Wagner earth detector, Impedance measurement by Q meter. Transducers: Classifications of Transducers, Strain Gauge, Displacement Transducers-Linear variable differential transducers (LVDT) and Rotary variable differential transducer (RVDT), Temperature measurements-Resistance Temperature Detector, Thermocouples, Thermistor, Photoelectric transducers, Photosensitive device, Optical Transducer-Photo emissive, Photo conductive, Photo voltaic, Photo diode, Photo transistor, Nuclear radiation detection instruments.

### Signal Generator

**Topics Covered:** Signal generator, Function generator, Sweep frequency generator, Pulse and square wave generator, Wave Analyzers, Harmonic Distortion Analyzer, Spectrum Analyzer, Heterodyne frequency meter, Frequency counter, Measurement errors, Automatics and computing counter, Beat frequency oscillator.

### DAC, ADC, Display Devices and Interfaces

**Topics Covered:** Digital instruments: Advantages of digital instruments over analog instruments, Digital-to-analog conversion (DAC) - Variable resistive type, R-2R ladder Type, Binary ladder, weighted converter using Op-amp and transistor, Practical DAC. Analog-to-digital Conversion (ADC) - Ramp technique, Dual slope integrating type, Integrating type (voltage to frequency), Successive approximations, Digital voltmeters and multi-meters, Resolution and sensitivity of digital meter, Displays (LED, LCD and seven segment etc.), (Instruments used in computer controlled instrumentation, RS232C and IEEE 488, GPIB electrical interface, Interfacing transducers to electronic control).

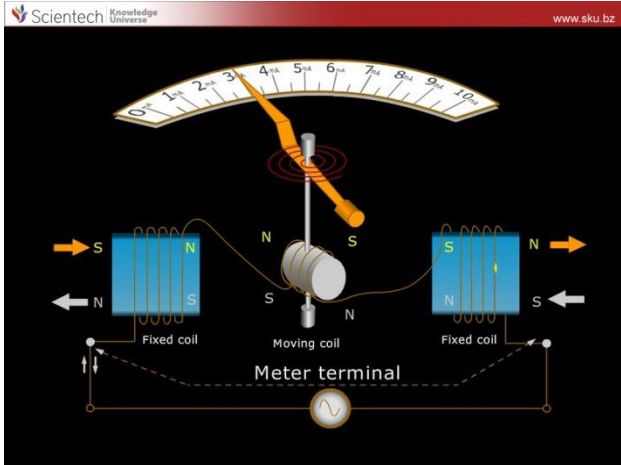
### Microwave Instruments and Power Measurement

**Topics Covered:** Microwave instruments, Scattering parameters, Transmission and reflection parameters, Network analyzer, Measurements uncertainty measurement with scalar and vector network, Analyzers microwave power measurement – sources and detectors, Fiber optic power measurement, Stabilized calibrated light sources end to end measurement of fiber losses, Optical time domain reflectometry.

### Print Shots of SKU- Instrumentation and Measurement:

**Accuracy**

- Accuracy is how close a measured value is to the true value.

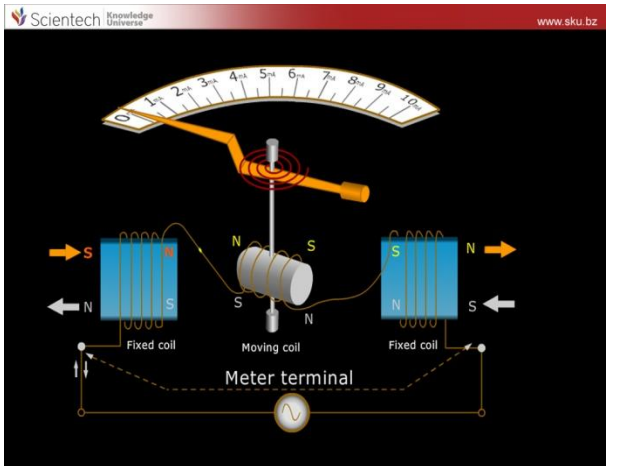
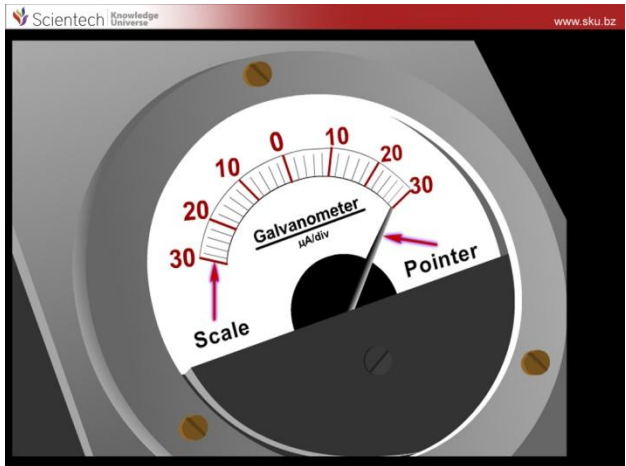


**Instrumental Error**

Instrument errors are due to friction in bearings of meter movement, incorrect spring tension, improper calibration or faulty instruments. Instrument error can be reduced by proper maintenance, use and handling of instrument.

**Accuracy**

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### LED Applications

LED Applications

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- In 7 or 16 Segment Display
- In ON/OFF Switches
- As Light Source in Fiber Optics
- In Traffic Signals
- In Electronic kits



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