

**Maulana Abul Kalam Azad University of Technology, West Bengal***(Formerly West Bengal University of Technology)***Syllabus for B. Tech in Electronics & Communication Engineering**

(Applicable from the academic session 2018-2019)

<b>OE-EC604A</b>	<b>Electronic Measurement &amp; Measuring Instruments</b>	<b>3L:0T:0P</b>	<b>3 credits</b>
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**UNIT I:**

Block Schematics of Measuring Systems:

Performance characteristics, Static characteristics, Accuracy, Precision, Resolution, Types of Errors, Dynamic Characteristics, Repeatability, Reproducibility, Fidelity, Lag;

Measuring Instruments: DC Voltmeters, D' Arsonval Movement, DC Current Meters, AC Voltmeters and Current Meters, Ohmmeters, Multimeters, Meter Protection, Extension of Range, True RMS Responding Voltmeters, Specifications of Instruments.

**UNIT II:**

Signal Analyzers: AF, HF Wave Analyzers, Harmonic Distortion, Heterodyne wave Analyzers, Spectrum Analyzers, Capacitance-Voltage Meters, Signal Generators: AF, RF Signal Generators, Sweep Frequency Generators, Pulse and Square wave Generators, Function Generators, Arbitrary waveform Generator.

**UNIT III:**

Oscilloscopes: CRT, Block Schematic of CRO, Time Base Circuits, Lissajous Figures, CRO Probes, High Frequency CRO Considerations, Delay lines, Applications: Measurement of Time, Period and Frequency.

Special Purpose Oscilloscopes: Dual Trace, Dual Beam CROs, Sampling Oscilloscopes, Storage Oscilloscopes, Digital Storage CROs.

**UNIT IV:**

Transducers: Classification, Strain Gauges, Bounded, unbounded; Force and Displacement Transducers, Resistance Thermometers, Hotwire Anemometers, LVDT, Thermocouples, Synchros, Special Resistance Thermometers, Piezoelectric Transducers, MagnetoStrictive Transducers.

**UNIT V:**

Bridges: Wheat Stone Bridge, Kelvin Bridge, and Maxwell Bridge.

Measurement of Physical Parameters: Flow Measurement, Displacement Meters, Liquid level

Measurement, Measurement of Humidity and Moisture, Velocity, Pressure

-High Pressure,

Vacuum level, Temperature

-Measurements, Data Acquisition Systems.

**TEXTBOOKS:**

1. Electronic instrumentation: H.S. Kalsi, TMH, 2nd Edition 2004.

2. Modern Electronic Instrumentation and Measurement Techniques: A.D. Helbincs, W.D. Cooper: PHI, 5th Edition, 2003

**REFERENCES:**

1. Electronic Instrumentation and Measurements, David A. Bell, Oxford Univ. Press, 1997.
2. Electronic Measurements and Instrumentation: B. M. Oliver, J. M. Cage TMH Reprint.
3. Measurement Systems, Emest O. Doebelin and Dhanesh N Manik, 6th Ed., TMH.
4. Electronic Measurements and Instrumentations by K. Lal Kishore, Pearson Education, 2010.
5. Industrial Instrumentation: T. R. Padmanabham Spiriger 2009.

**OUTCOMES**

Upon a successful completion of this course, the student will be able to:

1. Describe the fundamental concepts and principles of instrumentation
2. Explain the operation of various instruments required in measurements
3. Apply the measurement techniques for different types of tests
4. To select specific instruments for specific measurement function.
5. Understand principle of operation and working of different electronic instruments  
Students will understand functioning, specification and application of signal analyzing instruments