

III Year - II Semester

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Electronic Instrumentation

Open Elective

Learning Objectives:

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UNIT-I:

Introduction:

(a) **Measurement Errors:** Gross errors and systematic errors, Absolute and relative errors, Accuracy, Precision, Resolution and Significant figures.

(b) **Voltmeters and Multimeters:** Introduction Multi range voltmeter, Extending voltmeter ranges, Loading, AC voltmeter using Rectifiers – Half wave and full wave, Peak responding and True RMS voltmeters.

UNIT-II:

Digital Instruments: Digital Voltmeters – Introduction, DVM's based on $V - T$, $V - F$ and Successive approximation principles, Resolution and sensitivity, General specifications, Digital Multi-meters, Digital frequency meters, Digital measurement of time.

UNIT-III:

Oscilloscopes: Introduction, Basic principles, CRT features, Block diagram and working of each block, Typical CRT connections, Dual beam and dual trace CROs, Electronic switch.

Special Oscilloscopes: Delayed time-base oscilloscopes, Analog storage, Sampling and Digital storage oscilloscopes.

UNIT-IV:

Signal Generators: Introduction, Fixed and variable AF oscillator, Standard signal generator, Laboratory type signal generator, AF sine and Square wave generator, Function generator, Square and Pulse generator, Sweep frequency generator, Frequency synthesizer.

UNIT-V:

Measurement of resistance, inductance and capacitance: Whetstone's bridge, Kelvin Bridge; AC bridges, Capacitance Comparison Bridge, Maxwell's bridge, Wein's bridge, Wagner's earth connection .

UNIT-VI:

Transducers & Miscellaneous: Introduction, Electrical transducers, Selecting a transducer, Resistive transducer, Resistive position transducer, Strain gauges, Resistance thermometer,

Thermistor, Inductive transducer, Differential output transducers, LVDT, Piezoelectric transducer, Photoelectric transducer, Photovoltaic transducer, Semiconductor photo devices, Temperature transducers-RTD, Thermocouple.

Display devices: Digital display system, classification of display, Display devices, LEDs, LCD displays; Bolometer and RF power measurement using Bolometer; Introduction to Signal conditioning.

Outcomes:

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Text Books:

1. Electronic Instrumentation, H. S. Kalsi, TMH, 2004.
2. Electronic Instrumentation and Measurements, David A Bell, PHI / Pearson Education, 2006.

Reference Books:

1. Principles of Measurement Systems, John P. Beatly, 3rd Edition, Pearson Education, 2000.
 2. Modern Electronic Instrumentation and Measuring Techniques, Cooper D & A D Helfrick, PHI, 1998.
 3. Electronic and Electrical Measurements and Instrumentation, J. B. Gupta, S. K. Kataria & Sons, Delhi.
 4. Electronics & Electrical Measurements, A K Sawhney, Dhanpat Rai & Sons, 9th edition.
- Instrumentation & Control Systems, K. Padmaraju, Y.J. Reddy, McGraw Hill Education, 2016.