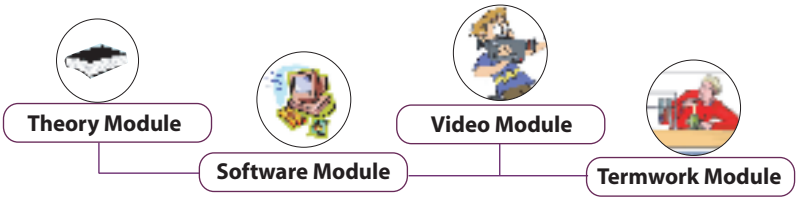
Learning Resources

Learning/Training Resources with Computer Aided Instructions in subject of

Introduction to Bio-Instrumentation Electronics

SoftTech ENGINEERS PVT.LTD. Introduces, Global e-Learning System in Education & Training in the form of Learning Resources with Computer Aided Instructions

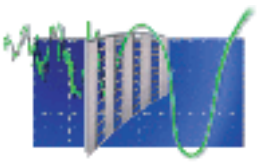


System Requirement:- IBM-PC Compatible with Window-OS, 128 MB RAM/Multimedia Kit

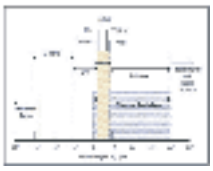
Aims and Objectives

This course is taken by the whole of the second year, but much of the emphaisis on application is within the medical area. The aims of this module are to teach theoretical and practical design aspects of instrumentation, including transducers, analogue signal processing, noise, power supplies and data acquisition.

Principles of Measurement and Instrumentation



Introduction to Measurement : Examples of measurement. Basic definitions. Challenges of measurement. Repeatability, accuracy, resolution. Design constraints.
Fundamentals of Instrument Design: Building blocks of instrumentation: non-ideal op-amps, integrators, differentiators, summers.
Op-amp circuit analysis and design: Transconductance and voltage-to-current amplifiers, instrumentation amplifiers, isolation amplifiers, logarithmic amplifiers, analogue multiplexers.



Case studies: amplifier design for electrical signal measurement from the heart (ECG) and the brain (EEG). Bandwidth, gain, input/output impedance.
Power Supplies: Physical construction and functional uses of power supplies. Linear regulators. Switched-mode power supplies. DC-DC converters. Batteries.
Transducers and Measurement Systems: Transducer system design.
Temperature measurement: thermistors, thermocouples, liquid-in-glass, radiation thermometry.
Displacement/force/acceleration measurement: potentiometers, strain gauges. Metallic elements, semiconductor elements.

Data Acquisition

Introduction to transducers: parameters, technologies. Bridges. Sample-and-hold/track-and-hold devices. Analogue-to-digital and digital-to-analogue converters. Voltage-to-frequency and frequency-to-voltage converters. Analogue line drivers and receivers.

Noise, Screening and Calibration

Sources of noise in electronic circuits: Thermal, Shot and I/f noise. The Friis equation and low noise amplifiers.
Noise reduction techniques: Screening electronic circuits from unwanted signals. Low frequency screening of electric and magnetic fields. High frequency screening using the skin effect.
The need for calibration: Traceability for standards. Uncertainty calculations for measurements.

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