

Biomedical Instrumentation



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Text

**Cromwell, Weibell, Pfeiffer:
Biomedical Instrumentation and Measurements
Prentice-Hall India**

Biomedical Engineering

**Application of Engineering Sciences to Medicine
and Biology**

Purpose: Better Healthcare

Role of Engineers:

Mathematical Modeling of Physiological Systems

Instrumentation

Interpretation

Sensory Aids, Therapeutic Devices

Imaging

Biomaterials

Major Physiological Systems:

Biochemical System

Cardiovascular System

Respiratory System

Nervous System

Biometrics

Science of measurement of physiological parameters and variables

Problems of measurement

Inaccessibility of variables to measurement

Variability of data

Lack of knowledge about interrelationship

Interaction among physiological systems

Effect of electrode and/or transducer on measurement

Artifacts

Energy limitations

Safety considerations

Ethical issues

Biometrics

Design Factors

Range: amplitude, frequency

Sensitivity

Linearity

Hysteresis

Frequency response

Accuracy

Signal to Noise Ratio

Stability

Isolation

Simplicity

Cost

Instrumentation

- ❖ Information gathering
- ❖ Diagnosis
- ❖ Evaluation
- ❖ Monitoring
- ❖ Control

Man-Instrument System

- ❖ The Subject
- ❖ Stimulus
- ❖ Transducer / Electrode
- ❖ Signal Conditioning Equipment
- ❖ Display Equipment
- ❖ Recording, Data processing and transmission equipment
- ❖ Control Devices

Bio-Signal

Signal produced by each organ (even in cellular level) to show its activity. Two types:

- ❖ Electrical: collected by electrodes
- ❖ Non-electrical: converted by Transducer

Electrical voltage

Ionic potential due to electrochemical activity of cells

Ionic potential \rightarrow electrode \rightarrow electric voltage

Questions?
Comments!
Thank You !!!
