

BIO-MEDICAL INSTRUMENTATION

Unit-I: Transducers for Bio-Medical Applications:

Introduction: Man Instrument system, Components of the Man Instrument system, Physiological Systems of the body, Problems encountered in measuring a living system. Biometrics.

Transducers: Introduction, characteristics of transducers, different types of transducers, active transducers, passive transducers, pressure transducers, variable capacitance transducer, linear variable differential transformer (LVDT), strain gage transducer, piezoelectric transducer, temperature transducers, thermocouple, electric resistance thermometers, thermister.

Unit-II: Electrodes & Amplifiers for Biomedical Applications:

Electrodes: Introduction, Electrode-Electrolyte interface, Electrode potential, Electrode Potential stability, Chlorided silver electrodes, Electrode impedance, Electrodes on a subject, Impedance of Chlorided silver electrodes, The Platinised Platinum electrode, Electrodes for measuring Bioelectric events, Electrode electrolytes, Microelectrodes, Stimulating electrodes.

Amplifiers: Basic requirements, inverting amplifiers, non-inverting amplifiers, Differential amplifier, Isolation amplifiers, Instrumentation amplifiers, Chopper amplifier

Unit-III: Filters for Biomedical Applications & Cardiovascular System:

Filters: Basic requirements, Designing of Low-pass filters, High-pass filters, Band-pass filters, and Notch-filters.

Sources of Bioelectric potentials: Resting and Action potentials, Propagation of action potentials, The Bioelectric potentials.

Cardiovascular System: The Heart and Cardiovascular system, Electrocardiography, ECG recording techniques, ECG equipment, effect of artifacts on ECG recording, analysis of ECG Signals

Unit-IV: Nervous system & Laboratory Instruments:

Nervous System: The Anatomy of the Nervous system, Measurements from the Nervous system, Electroencephalography (EEG), EEG recording techniques, EEG equipment, Electromyography (EMG), EMG recording techniques, EMG equipment,

Laboratory Instruments:

Basic Principle and working of the following Equipment:

X-Ray Machine, USG Machine, BP Machine, Laboratory centrifuges.

Electrical Safety of Medical Equipment: Physiological effects of electrical current, Shock hazards from Electrical equipment, Methods of accident prevention

BOOKS RECOMMENDED

1. Brown and Gann, "Engineering Principles in Physiology", Vol. I, Academic Press.
2. Iberall and Guyton, "Regulation and Control in Physiological System", Instruments Society USA.
3. AVS De Renck, "Touch Heat and Pain", Churchill Ltd. London.
4. Harry Thomson, "Handbook of Bio-medical Instrumentation", Reston, Virginia
5. R S Khandpur, "Handbook of Bio-medical Instrumentation", Tata McGraw Hill.
6. D. L. Wise, "Applied Bio-Sensors", Butterworth , London.
7. R S C Cobbold, "Transducers for bio-medical Instruments", Prentice Hall.
8. S Webb, "The Physics of Medical Imaging", Adam Highler, Bristol.
9. C Kak, "Principle of Computed Tomography" IEEE Press Newyork.