PBM5I102 ELEMENTS OF BIOMEDICAL INSTRUMENTATION

Module I (13 Hours)

(i) What is bioengineering: Engineering versus Science, Bioengineering, Biochemical Engineering, Biomedical Engineering, and Career Opportunities.
(ii) Medical Instrumentation: Sources of Biomedical Signals, Basic medical Instrumentation system, Performance requirements of medical Instrumentation system, use of microprocessors in medical instruments, PC based medical Instruments, general constraints in design of medical Instrumentation system & Regulation of Medical devices.
(iii) Bioelectrical Signals & Electrodes: Origin of Bioelectric Signals, Electrocardiogram, Electroencephalogram, Electromyogram, Electrode-Tissue Interface, Polarization, Skin Contact Impedance, Motion Artifacts.
(Text Book-I-Chapter-0 , Text Book-II —Chapter-1, Text book-II- Chapter-2)

Module -II (14 Hours)

(iv) Electrodes for ECG: Limb Electrode, Floating Electrodes, Prejelled disposable Electrodes, Electrodes for EEG, Electrodes for EMG.
(v) Physiological Transducers: Introduction to Transducers, Classification of Transducers, Performance characteristics of Transducers, Displacement, Position and Motion Transducers.
(Text book-II- Chapter-2 , Text Book-II, Chapter- 3)

Module –III (13 Hours)

Physiological Transducers: Strain gauge pressure transducers, Thermocouples, Electrical Resistance Thermometer, Thermister, Photovoltaic transducers, Photo emissive Cells & Biosensors or Biochemical sensor
Recording Systems: Basic Recording systems, General considerations for Signal conditioners, Preamplifiers, Differential Amplifier, Isolation Amplifier, Electrostatic and Electromagnetic Coupling to AC Signals, Proper Grounding (Common Impedance Coupling)
(Text Book-II, Chapter- 3, Text Book-II-Chapter-4)

Text Books:-

1. Introduction to Biomedical Engineering by Michael M. Domach, Pearson Education Inc,-2004
2. Hand Book of Biomedical Instrumentation-2nd Ed by R.S.Khandpur, Tata McGraw Hill, 2003.

Reference Books:

1. Introduction to Biomedical equipment technology, 4e. By JOSEPH.J.CAAR JOHN.M.BROWN (Pearson education publication)
2. Medical Instrumentation-application & design. 3e – By JOHN.G.WEBSTER John Wiley & sons publications
3. Leslie. Cromwell – Biomedical instrumentation & measurements, 2e PHI
4. Dr. M. Arumugam – Biomedical instrumentations, Anuradha Publishers
5. Transducers and Instrumentation/Digital Signal Processing/ VSLI Design