

**PEL7D015**

**BIOMEDICAL INSTRUMENTATION**

**4-0-0**

University level: 80%

**Module I (13 Hours)**

Introduction to Bioengineering, Biochemical Engineering, Biomedical Engineering, 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.

Bioelectrical Signals & Electrodes: Origin of Bioelectric Signals, Electrocardiogram, Electroencephalogram, Electromyogram, Electrode-Tissue Interface, Polarization, Skin Contact Impedance, Motion Artifacts.

**Module -II (14 Hours)**

Electrodes for ECG: Limb Electrode, Floating Electrodes, Prejelled disposable Electrodes, Electrodes for EEG, Electrodes for EMG.

Physiological Transducers: Introduction to Transducers, Classification of Transducers, Performance characteristics of Transducers, Displacement, Position and flow and pressure Transducers.

Strain gauge pressure transducers, Thermocouples, Electrical Resistance Thermometer, The mister, Photovoltaic transducers, Photo emissive Cells & Biosensors or Biochemical sensor

**Module -III (13 Hours)**

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)

20% Course (Institute Level)

Transformation techniques in biomedical signals ie. Laplace transform, Z-transform, DFT, DTFT, STFT, Wavelet transform, Effects of noise in biomedical instruments-filtering in biomedical instruments.

**Text Books:-**

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

**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