BIOMEDICAL INSTRUMENTATION AND SIGNAL PROCESSING

MODULE – I

Introduction: Cell structure, basic cell function, origin of bio-potentials, electric activity of cells.

Biotransducers: Physiological parameters and suitable transducers for its measurements, operating principles and specifications for the transducers to measure parameters like blood flow, blood pressure, electrode sensor, temperature, displacement transducers.

MODULE – II

Cardiovascular system: Heart structure, cardiac cycle, **ECG** (electrocardiogram) theory (B.D.), **PCG** (phonocardiogram). **EEG, X-Ray, Sonography, CT-Scan**,The nature of biomedical signals.

Analog signal processing of Biosignals: Amplifiers, Transient Protection, Interference Reduction, Movement Artifact Circuits, Active filters, Rate Measurement. Averaging and Integrator Circuits, Transient Protection circuits.

MODULE – III

Time-frequency representations: Introduction, Short-time Fourier transform, spectrogram, wavelet signal decomposition.

Biomedical applications: Fourier, Laplace and z-transforms, autocorrelation, crosscorrelation, power spectral density.

Noise: Different sources of noise, Noise removal and signal compensation.

Software based medical signal detection and pattern recognition.

TextBooks:

1. R S Kandpur, ***Handbook of Biomedical Instrumentation***, 2nd Edn, TMH Publication, 2003
2. E. N. Bruce, ***Biomedical Signal Processing and Signal Modelling***, John Wiley, 2001.

References

1. Wills J. Tompkins, ***Biomedical Digital Signal Processing***, PHI.
2. M. Akay, ***Time Frequency and Wavelets in Biomedical Signal Processing***, IEEE Press, 1998.
3. Cromwell, ***Biomedical Instrumentation and Measurements***, 2nd Edn, Pearson Education.