

BIOMEDICAL SIGNAL PROCESSING

3-1-0

MODULE-I

(8 Hours)

Introduction to Biomedical Signals:Tasks in Biomedical Signal Processing, Computer Aided Diagnosis, Examples of Biomedical signals: ECG, EEG, EMG etc., Review of linear systems, Fourier Transform and Time Frequency Analysis (Wavelet) of biomedical signals, Processing of Random & Stochastic signals, spectral estimation.

MODULE-II

(8 Hours)

Cardio-logical Signal Processing:Pre-processing, QRS Detection Methods, Rhythm analysis, Arrhythmia Detection Algorithms, Automated ECG Analysis, ECG Pattern Recognition, Heart rate variability analysis.

MODULE-III

(8 Hours)

Adaptive Noise Canceling:Principles of Adaptive Noise Canceling, Adaptive Noise Canceling with the LMS adaptation, Algorithm, Noise Canceling Method to Enhance ECG Monitoring, Fetal ECG Monitoring.

MODULE-IV

(8 Hours)

Neurological Signal Processing:Modeling of EEG Signals, Detection of spikes and spindles, Detection of Alpha, Beta and Gamma Waves, Auto Regressive (A.R.) modeling of seizure EEG, Sleep Stage analysis, Inverse Filtering.

ADDITIONAL MODULE (Terminal Examination-Internal)

(6 Hours)

Properties and effects of noise in biomedical instruments;Filtering in biomedical instruments; Least squares and polynomial modeling;

Reference Books

1. Biomedical Signal Processing: Principles and techniques, D.C.Reddy, Tata McGraw Hill, New Delhi, 2005.
2. Biomedical Signal Processing, Willis J Tompkins, Prentice Hall, 1993
3. Biomedical Signal Analysis, R. Rangayan, Wiley, 2002.
4. Biomedical Signal Processing & Signal Modeling, Eugene N. Bruce, Wiley, 2001.
5. Biomedical Signal and Image Processing, K. Najarian and R. Splinter, The CRC Press, Second Edition.