	L	T	P	C
IV Year I Semester				
Code: 17EC732	**3**	**1**	**0**	**3**

BIO-MEDICAL SIGNAL PROCESSING
Professional Elective

Unit I:
Neurological Signal Processing: The Brain and its potentials; The Electrophysiology origin of brain waves; the EEG Signal and its characteristics; EEG analysis; Linear prediction theory; The autoregressive (AR) method; Transient detection and elimination-the case of epileptic patients.

Unit II:
Adaptive Filter and Algorithm: A Review of the Wiener filtering problem; Principle of an adaptive filter; Steepest – descent algorithm; Windrow-hoff least –mean-square adaptive algorithm.

Unit III:
Data Compression Techniques: Lossy and Lossless data reduction Algorithms. ECG data compression using Turning point, AZTEC, CORTES, Huffman coding, vector quantization, DICOM Standards.

Unit IV:
Cardio logical Signal Processing: Pre-processing, QRS Detection Methods, Rhythm analysis, Arrhythmia Detection Algorithms, Automated ECG Analysis, ECG Pattern Recognition. Adaptive Noise Cancelling: Principles of Adaptive Noise Cancelling, Adaptive Noise Cancelling with the LMS Adaptation Algorithm, Noise Cancelling Method to Enhance ECG Monitoring, Fetal ECG Monitoring.

Unit V:
Signal Averaging, Polishing – Mean and trend removal, Prony's method, Prony's Method based on the Least Squares Estimate, Linear prediction, Yule – Walker (Y –W) equations, Analysis of Evoked Potentials.

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

Text Books:

1. Reddy D C. "Modern Biomedical Signal Processing – Principles and Techniques", TMH,
2. New Delhi, 2005
3. Akay M. "Biomedical Signal Processing", Academic press, California,1994.
4. Tompkins W J "Biomedical Signal Processing", Prentice hall of India, New Delhi, 1999.
5. Bronzino J D "The Biomedical Engineering handbook", CRC and Free press, Florida, 19

References:

1. Weitkunat R, “Digital Bio Dignal Processing”, 1991, Elsevier.
2. Arnon Cohen “Biomedical Signal Processing” Crc Pr I Llc; 2nd edition, May, 2002.