UEI846: BIO–MEDICAL DSP

L	T	P	Cr
3	1	0	3.5

Course Objectives: To provide students with skills and knowledge in characterization of medical data like ECG, EEG etc., by filtering, data reduction, feature extraction and its interpretation

Introduction: Characteristics of medical data, Software designof digital filters, Basic electrocardiography, ECG lead system, ECG signal characteristics, Sampling basics, Simple conversion system, Conversion requirements for biomedical signals.

Adaptive filters: Principle noise canceller model, 50Hz adaptive canceling, Other applications of adaptive filtering, Basics of signal averaging, Signal averaging as digital filter, A typical average, Software for signal averaging , Limitations of signal averaging.

Data reduction techniques: Turning point algorithm, AZTECH algorithm, Fan algorithm, Huffman coding, SPIHT using wavelets and other techniques.

ECG Analysis: Power spectrum of ECG, Band pass filtering techniques, Differentiation techniques, Template matching techniques, A QRS detection algorithm, ECG interpretation, ST segment analyzer, Potable arrhythmia monitor.

Neurological signal processing: Brain and its potential, EEG signal and its characteristics, EEG analysis, Linear prediction theory, Auto regressive methods, Recursive parameter estimation, spectral error measure, Adaptive segmentation, Transient detection and elimination.

Course Learning Outcomes (CLO):

After the successful completion of the course the students will be able to:

1. describe adaptive filters and their application in biomedical signal processing
2. apply data reduction techniques in biomedical signals
3. analyse ECG signals
4. analyse EEG signals
5. describe neurological signal processing

Text Books:

1. *Prokis, J.G., Digital signal processing, Prentice–Hall of India Private Limited (1997).*
2. *Tomkin, W. J., Biomedical DSP, Prentice–Hall of India Private Limited (2003).*

Reference Books:

1. *Carr, J., Biomedical instrumentation, PHI Learning Pvt. Limited (2008).*

Evaluation Scheme:

S.NO.	Evaluation Elements	Weightage (%)
1	MST	30
2	EST	45
3	Sessional (May include Assignments//Quizzes/Lab Evaluations)	25