Printed Pages: 4 **EIC-032**

(Following Paper ID and Roll No. to be filled in your Answer Books)

Paper ID : 132852

B.TECH.

Theory Examination (Semester-VIII) 2015-16

BIOMEDICAL SIGNAL PROCESSING

Time : 3 Hours ***Max. Marks : 100***

Section-A

Q1. Attempt all parts. All parts carry equal marks. Write answer of each part in short. (2×10=20)

(a) Differentiate between correlation and convolution techniques.

(b) In an ECG signal if the peaks are detected at intervals 70 and 180, sampled at 120 times per second then calculate heart rate in bpm.

(c) How is the ECG signal generated?

(d) What is auto correlation fuction?

(e) Write a note on Data acquisition of EMG signal.

(f) Write a note on Dynamics of sleep-wake transitions.

(g) Write a note on Properties of Linear Prediction theory.

(h) After applying AZTEC algorithm to a signal, The saved array is {4, 50, – 4, 30, – 6, 40, – 6, 25, – 4, 50, 2, 50}. Reconstruct the signal waveform.

(i) What is data reduction algorithm.

(j) What is the application of adaptive filter?

Section-B

Q2. Attempt any five questions. (10×5=50)

(a) Propose a method to detect the presence of the α rhythm in an EEG channel. How is it extended to detect the presence of the same rhythm simultaneously in two channels?

(b) What a suitable algorithm, substantiate the adaptive segmentation of EEG signals.

(c) Discuss the electric activity of the heart. What is the significance of the Einthoven's triangle?

(d) Design an optimal filter to remove noise from a signal, given that the signal and noise processes are independent, stationary, random processes.

(e) Comment on ICA. How is it applicable for cooktail party like problem as applied to EEG signals?

(f) Given a blomedical signal, identify discrete signal epochs and correlate them with events in the related physiological processes.

(g) List out a few physiological interferences that may be encountered while acquiring a signal of interest.

(h) Highlight the applications of EEG.

Section-C

Note: Attempt any two questions: **(15×2=30)**

Q3. (a) Write a note on Joint Time-frequency analysis of bio-medical signals.

(b) Mention the types of artefacts interfering with the EEG acquisition and the method by which they are processed.

Q4. (a) What are the methods for the analysis of heart rate variablility?

(b) Give an account of the salient ECG parameters and their intervals.

Q5. Explain the principle of Adaptive noise canceller with an example.