Printed Pages:2 **Sub Code:NIC041**

Paper Id: **131304** **Roll No.** | | | | | | | | | | |

B.TECH
(SEM VI) THEORY EXAMINATION 2018-19
BIOMEDICAL SIGNAL PROCESSING

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

SECTION-A

1. Attempt all of the following questions: **2×10=20**

(a) Define action potential and resting potential.

(b) What is the role of digital computers in biomedical application?

(c) Explain the difficulties in the acquisition of biomedical signals.

(d) Why EEG is more difficult to recognize than ECG?

(e) What is matched filtering??

(f) What are the different types of biomedical signals?

(g) Discuss discrete wavelet series and discrete wavelet transform.

(h) What are the different patterns of brain wave?

(i) What is the need of data reduction in biomedical signal processing?

(j) What do you mean by sleep EEG?

SECTION-B

2. Attempt any three of the following questions: **10×3=30**

(a) With a neat block diagram, explain the objectives of biomedical signal analysis.

(b) Explain briefly the QRS detection algorithm.

(c) Discuss about the Periodogram and Moving average method of EEG analysis.

(d) What is adaptive wavelet detection? Explain the detection of overlapping wavelets.

(e) Mention the characteristics of noise and signal in signal averaging technique. Explain with block diagram the typical signal averager. Draw the flow chart of a program for averaging an ECG signal.

SECTION – C

3. Attempt any one of following questions: **1×10=10**

(a) Describe the basics of Electromyography and Electro-retinography.

(b) Explain briefly how action potentials are generated and propagated in a human body?

4. Attempt any one of following questions: **1×10=10**

(a) Explain the removal of baseline wander and power line interference from ECG.

(b) Explain briefly about portable arrhythmia monitor with a neat sketch.

5. Attempt any one of following questions: 1×10=10

(a) Explain AZTEC algorithm and Fan algorithm used for the ECG data reduction.

(b) Classify the different data reduction techniques. Explain the turning point algorithm used for the ECG data reduction.

6. Attempt any one of following questions: 1×10=10

(a) Describe transition, detection and estimation of Epilepsy in detail.

(b) With suitable figures describe the AR modeling of seizure EEG. Explain the steps involved in sleep stage analysis.

7. Attempt any one of following questions: 1×10=10

(a) What are the advantages of adaptive filters? Design an adaptive filter using LMS algorithm.

(b) What are the different elements of digital filter? Mention the advantages of digital filters over analog filters.