PAPER ID-410199

Subject Code: KOE082

Roll No: | | | | | | | | | | | | | |

BTECH

(SEM VIII) THEORY EXAMINATION 2023-24

BIO MEDICAL SIGNAL PROCESSING

TIME: 3 HRS **M.MARKS: 100**

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

SECTION A

1. Attempt *all* questions in brief. **2 x 10 = 20**

Q no.	Question	Marks	CO
a.	How do computers contribute to the analysis and processing of biomedical signals?	02	1
b.	Define Electro-Retinography (ERG)	02	1
c.	What is the purpose of portable arrhythmia monitors?	02	2
d.	What does ECG measure?	02	2
e.	Explain the purpose of Huffman coding in data reduction.	02	3
f.	What is run-length coding used for?	02	3
g.	What is epilepsy transition?	02	4
h.	What is a periodogram in EEG spectral analysis?	02	4
i.	How does signal averaging improve EP estimation?	02	5
j.	What is adaptive noise cancelling?	02	5

SECTION B

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

a.	Discuss the process of acquiring biomedical signals. Explain the difficulties encountered during the acquisition of biomedical signals.	10	1
b.	Explain different methods for QRS detection in ECG signals	10	2
c.	Explain the Turning Point algorithm for data reduction. How does it work, and what are its key features?	10	3
d.	Explain the importance of neurological signal processing in analyzing EEG signals. How does EEG differ from other biomedical signals, and what are its unique characteristics?	10	4
e.	Explain the concept of signal averaging in EP estimation. How does averaging improve the signal-to-noise ratio?	10	5

SECTION C

3. Attempt any *one* part of the following: **1 x 10 = 10**

a.	Explain the process of acquiring an ECG signal. Discuss the techniques used to improve signal quality.	10	1
b.	Describe Electro-Retinography (ERG) and its significance in ophthalmology. How is ERG used to assess retinal function and diagnose eye diseases?	10	1

4. Attempt any *one* part of the following: **1 x 10 = 10**

a.	Explain the sources of baseline wander and power line interferences in ECG signals. How do these artifacts affect the accuracy of ECG interpretation?	10	2
b.	Define arrhythmia and discuss its significance in clinical practice. How is arrhythmia detected and diagnosed using ECG signals?	10	2

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5. Attempt any *one* part of the following: 1 x 10 = 10

a.	Explain how the AZTEC algorithm can be adapted to handle various types of biomedical signals, including ECG, EEG, and EMG.	10	3
b.	Explain the process of applying the Fan algorithm to biomedical signals. How does it handle signal variations and noise while preserving diagnostic information?	10	3

6. Attempt any *one* part of the following: 1 x 10 = 10

a.	Explain the dynamics of sleep/wake transition based on EEG signals. What changes occur in EEG patterns during the transition from wakefulness to sleep and vice versa?	10	4
b.	Explain the principles of the Periodogram, Maximum Entropy Method (MEM), and Autoregressive (AR) Method for spectral estimation in EEG analysis.	10	4

7. Attempt any *one* part of the following: 1 x 10 = 10

a.	Explain the Least Mean Squares (LMS) adaptive filter and its role in EP estimation. How does it update filter coefficients to minimize the mean squared error between the estimated and desired signals?	10	5
b.	Introduce the concept of wavelet detection in EP analysis. What advantages does wavelet analysis offer over traditional methods?	10	5