Paper ID : 250253

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

BTECH
(SEM VIII) THEORY EXAMINATION 2024-25
BIO MEDICAL SIGNAL PROCESSING

TIME: 3 HRS   M.MARKS: 100

Note: Attempt all Sections. In case of any missing data; choose suitably.

SECTION A

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

Q No.	Question	CO	Level
a.	What are the basic characteristics of biomedical signals?	1	K1
b.	Define Electroencephalography (EEG) and its clinical importance.	1	K1
c.	What is the significance of heart sound (phonocardiogram) analysis?	2	K1
d.	Define the term "baseline wander" in ECG signals.	2	K1
e.	What is the role of AZTEC algorithm in signal compression?	3	K1
f.	Define the concept of signal-to-noise ratio (SNR) in biomedical signals.	3	K1
g.	What is evoked potential (EP) estimation?	4	K1
h.	Define Maximum Entropy Method (MEM) in spectral estimation.	4	K1
i.	Explain the function of adaptive filtering in EEG signal denoising.	5	K2
j.	What are the applications of wavelet transform in biomedical signal processing?	5	K1

SECTION B

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

Q No.	Question	CO	Level
a.	Explain the types of biomedical signals and their acquisition methods with examples.	1	K2
b.	Analyze the various techniques used for removal of noise and artifacts in ECG signals.	2	K4
c.	Discuss the Fan and Turning Point algorithms used for data reduction. Compare their efficiency.	3	K2
d.	Explain the importance of EEG signal processing in detecting neurological disorders.	4	K5
e.	Illustrate the concept and advantages of using adaptive noise canceling techniques in biomedical signal processing.	5	K2

SECTION C

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

Q No.	Question	CO	Level
a.	Examine the methods used for acquiring heart sound signals (Phonocardiogram). Mention challenges involved.	1	K4
b.	Explain the principles of Electrooculography (EOG) and its clinical applications.	1	K2

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

Q No.	Question	CO	Level
a.	Explain various sources of artifacts in EEG signals. How are these removed to improve signal accuracy?	2	K2
b.	Discuss the significance of Heart Rate Variability (HRV) analysis in clinical diagnosis.	2	K2

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

Q No.	Question	CO	Level
a.	Demonstrate the working principle of Run-Length Coding and its applications in biomedical data compression.	3	K2
b.	Explain how Huffman coding is applied to biomedical signals for efficient data reduction.	3	K2

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

Q No.	Question	CO	Level
a.	Describe the Maximum Likelihood Method for spectral estimation. Discuss its advantages and challenges in the context of biomedical signal processing.	4	K4
b.	Explain the clinical significance of epilepsy detection using EEG signal processing methods.	4	K2

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

Q No.	Question	CO	Level
a.	Explain the Least Squares method for adaptive filtering in biomedical signal applications.	5	K2
b.	Discuss the use of Wavelet Transform in ECG denoising and its advantages over traditional filtering techniques.	5	K2