U.S.N.										

B.M.S. College of Engineering, Bengaluru-560019

Autonomous Institute Affiliated to VTU

September / October 2023 Supplementary Examinations

Programme: B.E. **Semester: VI**
Branch: Medical Electronics **Duration: 3 hrs.**
Course Code: 19ML6PCBSP **Max Marks: 100**
Course: Biomedical Signal Processing **Date: 19.09.2023**

Instructions: 1. Answer any FIVE full questions, choosing one full question from each unit.
2. Missing data, if any, may be suitably assumed.

Important Note: Completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages. Revealing of identification, appeal to evaluator will be treated as malpractice.

SUPPLEMENTARY EXAMS 2023

UNIT - I

1 a) Illustrate the principle of operation of an adaptive filter with a neat diagram and equations. **06**

b) With a block diagram, explain cancellation of High frequency noise in electro surgery **06**

c) Consider an adaptive linear combiner for one weight, which is characterized by the following **08**

$E[y^2(n)]=1$, $E[x^2(n)]=4$ and $E[x(n)\,y(n)]=1$

Determine the optimum value of h that minimizes the mean square error $E[e^2(n)]$

UNIT - II

2 a) With a flow chart, explain the line detection part of the AZTEC algorithm. **06**

b) Explain the Turning point algorithm with an example. **06**

c) After applying the AZTEC algorithm to a signal, the saved array is **08**
{4,50,-4,30,-6,40,-6,25,-4,50,2,50}

(i) What is the amount of data compression achieved?

(ii) What is the peak-to-peak amplitude of the signal reconstructed from this data?

UNIT - III

3 a) Explain differentiation technique used as a QRS detection algorithm **06**

b) Discuss the template matching technique of QRS detection with suitable equations. **06**

c) With a block diagram, explain the working of a portable arrhythmia monitor. **08**

UNIT - IV

4 a) What do you understand by the phrase 'phenomenological' model? Explain **06**

b) Discuss on spectral error measure that is used in the analysis of EEG signal. **06**

c) Derive Yule-Walker equations for auto regression model **08**

OR

5	a)	Discuss on Adaptive segmentation with necessary equations.	**08**
	b)	Explain the Levinson's algorithm, which is used as a recursive estimation of AR parameter	**12**

UNIT - V

6	a)	What are the important characteristics of sleep stage 1 and 2 ? specify	**06**
	b)	What do you understand by the phrase, a simple Markov chain? Explain	**06**
	c)	Discuss on Hypnogram model parameters.	**08**

OR

7	a)	Describe in detail the characteristics of sleep stage 3 and 4.	**06**
	b)	What cumulative distribution function approximately characterizes the duration of sleep periods of nocturnal sleep? Specify.	**06**
	c)	Analyse the use of an event history analysis for modeling sleep.	**08**

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SUPPLEMENTARY EXAMS 2023