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P.E.S. College of Engineering, Mandya - 571 401

(An Autonomous Institution affiliated to VTU, Belagavi)

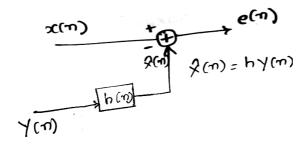
Eighth Semester, B.E. - Electronics and Communication Engineering Semester End Examination; July - 2021 Biomedical Signal Processing

Time: 3 hrs Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. Explain basic ECG with PQRS and T waves.
 - b. Explain EEG and its characteristics.
- 2 a. Explain the major objectives of biomedical signal analysis.
 - b. With neat diagram, briefly explain computer aided diagnosis based upon biomedical signal.
- 3 a. Propose a time domain techniques to remove random noise given the possibility of acquiring multiple realization of the signal/event of interest.
 - b. Develop a time domain techniques to remove baseline drift in the ECG signal.
- 4 a. Design a frequency domain filter which can remove low frequency noise minimal loss of signal component in a specified pass band.
 - b. If $y(n) = \frac{3}{4}y(n-1) \frac{1}{8}y(n-2) + x(n)$
 - i) Determine the response of the causal systems
 - ii) Determine output for input signal $x(n) = \delta(n) \frac{1}{4} \delta(n-1)$
- 5 a. Detrmine the optimal value 'h' that minimize the mean square error $E[e^2(n)]$ and also find the value of mean square errors for the following characteristes:

 $E[y^2(n)] = 1$, $E[x^2(n)] = 4$ and E[x(n)y(n)] = 1 for the given figure



- b. Explain the cancellation of 60 Hz interface in an ECG signal using adaptive filters.
- 6 a. Explain the basic requriment for the need of data compression.
 - b. Classify the different data reduction techniques and explain the turning point algorithm used for ECG data reduction.
- c. Explain data compression using DPCM with block diagram.
- 7 a. Why model based approaches are preferred in EEG analysis? Explain.
 - b. Explain the three different ways to remove the correlation from the LP signal.
 - c. Describe adoptive segmentation algorithm and how it is applied for EEG analysis?

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8 8	a.	Explain the high speed QRS detection algorithm with a block diagrams.		
l	b.	Describe the various types of Arrhythmias.		
9 ;	a.	With the help of single exponent case, describe Prony's exponential model.		
l	b.	Explain original Prony problem and the computation steps in it.		
10 a	a.	Describe clinical application of Prony's method by considering suitable example.		
l	b.	Explain the steps involved in solving	ng Prony's problem using cov	
	prediction method.			12

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