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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; Aug. / Sep. - 2020

Biomedical Signal Processing

4/9/2020

Time: 3 hrs *Max. Marks: 100*

***Note**: i) Answer **TWO** full questions, selecting **ONE** full question from **UNIT - I** and **UNIT - II**.*
*ii) Answer any **THREE** full questions, choosing from **UNIT - III, UNIT - IV** and **UNIT - V**.*

UNIT - I

1 a. Explain the nature of the following EEG rhythms:
i) Alpha (α) ii) Beta (β) 10
iii) Delta (δ) iv) Theta (θ) v) K-complex

b. Explain the basic ECG with a neat sketch of P, QRS and T waves. 10

OR

2 a. Describe the events and transients that occur in EEG signal. 10

b. Briefly describe the maternal Interference in fetal ECG. 6

c. Discuss briefly with a neat diagram time variant vocal tract-filter system. 4

UNIT - II

3 a. Illustrate how moving average filter technique can be used to remove random noise from a given signal? 10

b. Develop a time domain technique to remove base-line drift in the ECG signal. 10

OR

4 a. Design a frequency domain filter to remove periodic artifacts such as power line interference. 8

b. Design a Butterworth low pass filter for $N = 4$, cut off frequency = 40 Hz and sampling frequency = 200 Hz using bilinear transformation method to remove high frequency noise in ECG signal. 12

UNIT - III

5 a. With an example, illustrate and explain Huffman coding. 10

b. What is the difference between Lossy and Lossless data compression technique? 10

6 a. What are the different types of noise eliminated in ECG signal by adaptive noise cancellation? Explain any two types of noise cancellation in ECG signal using adaptive algorithm. 10

b. Derive LMS adaptive filter equation for updating filter coefficients. 10

UNIT - IV

7 a. Explain differentiation based algorithm to detect QRS complexes in an ECG signal. 10

b. What is adaptive segmentation? Explain different steps used for segmentation. 10

8. With example, explain Levinson's algorithm to compute predictor coefficients. 20

Contd....2

UNIT - V

9 a. With example, explain covariance method of linear prediction. 10

b. With suitable example, explain clinical application of Prony's method. 10

10 a. Why Prony's method suggested for modeling of evoked potentials? Give reasons. 6

b. Show how an ARMA model results when one uses the Prony's method for modeling exponentials buried in additive noise? 14

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4/9/2020

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