

CBCS SCHEME

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18EC825

Eighth Semester B.E. Degree Examination, July/August 2022 Biomedical Signal Processing

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

- 1 a. Explain the nature of biomedical signals and list a few examples of biomedical signals. (06 Marks)
- b. With a neat diagram, explain the ECG characteristics and list any three difficulties of biomedical signal processing. (07 Marks)
- c. With a neat block diagram, explain the simple signal conversion system. (07 Marks)

OR

- 2 a. With a neat block diagram, explain the objective of biomedical signal analysis. (10 Marks)
- b. Explain sampling theorem and with a neat diagram, explain its effects in the frequency domain of sampling in the time domain. (06 Marks)
- c. Discuss briefly the conversion requirements for biomedical signals. (04 Marks)

Module-2

- 3 a. Explain with a neat block diagram, the working of a typical averager and signal averaging as a digital filter. (10 Marks)
- b. Illustrate how a sine wave model can be used for a 60Hz adaptive cancellation in biomedical signal processing. (10 Marks)

OR

- 4 a. Explain the basics of signal averaging and show that $SNR_m = \sqrt{m}$ SNR. List the limitations of signal averaging. (10 Marks)
- b. Explain the principle of the noise canceller model. In this context, explain the application of adaptive filter for maternal ECG in fetal ECG. (10 Marks)

Module-3

- 5 a. With an example, illustrate and explain the turning point algorithm. Also demonstrate the table for choosing the samples. (10 Marks)
- b. Give the following data set: {1, 1, 1, 1, 1, 1, 1, 2, 2, 2, 2, 2, 2, 3, 3, 3, 3, 3, 4, 4, 4, 4, 5, 5, 5, 6, 6, 7} derive the codewords for the data using Huffman coding. What is the average code word length and efficiency? (10 Marks)

OR

- 6 a. With an flow chart, explain ECG data compression using the AZTEC algorithm. (10 Marks)
- b. Explain ECG data compression using FAN algorithm. Illustrate with an example. (10 Marks)

Module-4

- 7 a. With neat diagrams, explain standard 12-lead Electrocardiogram (ECG) system of measurement. (10 Marks)
- b. Write a note on the different template matching techniques used in ECG analysis. (10 Marks)

OR

- 8 a. With block diagram of various filters involved in the ECG analysis, explain QRS detection algorithm with bandpass integer filter. (10 Marks)
b. With neat block diagram, explain portable arrhythmia monitor. (10 Marks)

Module-5

- 9 a. Sketch the configuration of a Neuron and explain brain and its potentials. (10 Marks)
b. With neat diagram, explain template matching for EEG spike and wave detection. (10 Marks)

OR

- 10 a. With neat diagram, explain EEG signal and its characteristics. (10 Marks)
b. With neat diagram, explain electrophysiological origin of brain waves. (10 Marks)

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