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Seventh Semester B.E. Degree Examination, Dec.2023/Jan.2024
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. Define Biopotential. Explain sources of biomedical signals. (10 Marks)
 b. With Schematic, explain EEG signal acquisition and analysis. (10 Marks)

OR

- 2 a. What are the important goals of biomedical signal analysis method? Enumerate them. (08 Marks)
 b. With schematic, explain the principle of adaptive segmentation of an EEG signal. (12 Marks)

Module-2

- 3 a. Enumerate the procedure to design a Butterworth lowpass filter. (10 Marks)
 b. Design Notch filter in frequency domain. (10 Marks)

OR

- 4 a. Obtain an equation of Wiener – Hopf for the optimal filter application. (14 Marks)
 b. Write a note on structured noise. (06 Marks)

Module-3

- 5 a. With given transition matrix, explain the working of Markov chain model.

$$T = \begin{bmatrix} 1 & \frac{1}{2} & 0 & \frac{1}{4} & \frac{1}{4} \\ 0 & \frac{1}{2} & \frac{1}{8} & 0 & \frac{3}{8} \\ \frac{1}{4} & \frac{1}{4} & 0 & \frac{1}{4} & \frac{1}{4} \\ \frac{1}{3} & 0 & \frac{2}{3} & 0 & 0 \\ \frac{1}{2} & \frac{1}{4} & \frac{1}{4} & 0 & 0 \end{bmatrix}$$

(10 Marks)

- b. Discuss characteristics of EEG in various sleep stages. (10 Marks)

OR

- 6 a. Describe a statistical model of event history analysis for modeling sleep. (12 Marks)
 b. Write the flowchart of signal averaging program. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
 2. Any revealing of identification, appeal to evaluator and /or equations written eg. 42+8 = 50, will be treated as malpractice.

Module-4

- 7 a. Describe P-wave detection technique in an ECG. (10 Marks)
b. Describe ST segment. Give its analysis for normal, elevated and depression. (10 Marks)

OR

- 8 a. What is Matched filter? Explain its properties. (10 Marks)
b. Explain the estimation of R-R interval by the Finite - First Difference method. (10 Marks)

Module-5

- 9 a. What is the need for data compression? Illustrate the implementation of zero order predictor algorithm. (10 Marks)
b. With block diagram, explain DPCM. (10 Marks)

OR

- 10 a. Explain how redundancy occur in biomedical digital signals. (08 Marks)
b. With flow chart describe CORTES. (12 Marks)

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