CBCS SCHEME

18MT751
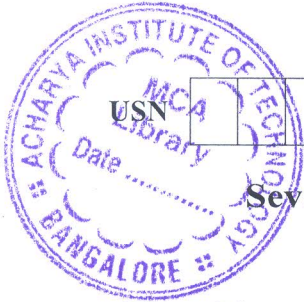
Seventh Semester B.E. Degree Examination, June/July 2024
Biomedical Signal Processing

Time: 3 hrs.   Max. Marks: 100

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

Module-1

1   a. Describe the following:
        (i)   Action potential
        (ii)   Resting potential
        (iii) Depolarization
        (iv)   Repolarization   **(08 Marks)**
    b. Draw a diagram to illustrate the electrode placement for the Frank VCG lead system. Also write the resister network for combining the body surface potentials to produce three time varying scale leads of Frank VCG lead system.   **(08 Marks)**
    c. Explain how ECG is measured using electrodes attached to body.   **(04 Marks)**

OR

2   a. Explain different aspects to be considered in the design of biomedical instruments. **(10 Marks)**
    b. Describe different converter characteristics of DACs.   **(10 Marks)**

Module-2

3   a. Discuss how signal averaging can be used as a digital filter.   **(04 Marks)**
    b. Explain the limitations of signal averaging.   **(04 Marks)**
    c. Discuss applications of adaptive filtering.   **(06 Marks)**
    d. Discuss principal of noise canceller model.   **(06 Marks)**

OR

4   a. Discuss with block diagram a typical average along with flow chart.   **(10 Marks)**
    b. Discuss 60 Hz adaptive cancelling using a sine wave model.   **(10 Marks)**

Module-3

5   a. Discuss AZTEC data reduction algorithm.   **(10 Marks)**
    b. Explain Huffman coding for a given sequence
        {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}   **(10 Marks)**

OR

6   a. With an example illustrate and explain turning point diagram. Also show the table choosing the samples.   **(10 Marks)**
    b. What is data compression algorithm? Explain lossy and lossless data compression. Classify data reduction algorithms into these categories.   **(06 Marks)**
    c. Describe adaptive coding.   **(04 Marks)**

Module-4

7   a. Explain how ECG acquisition is performed.   **(06 Marks)**
    b. Explain differentiation based QRS detection techniques.   **(08 Marks)**
    c. Explain different ECG signal characteristics.   **(06 Marks)**

OR

8 a. Explain template matching techniques of QRS detection.   (10 Marks)
   b. Discuss different band pass filtering techniques to select QRS complex from ECG. (10 Marks)

Module-5

9 a. Describe different waves of EEG signals.   (06 Marks)
   b. Describe correlation analysis of EEG rhythms.   (08 Marks)
   c. Describe how template matching can be used for EEG spike detection.   (06 Marks)

OR

10 a. Describe electrophysiological origin of brain waves.   (06 Marks)
    b. Describe different events and transients that occur in EEG signals.   (10 Marks)
    c. Explain Different Rhythms detection in EEG.   (04 Marks)

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