USN | | | | | | | | | |          **18MT751**

### Seventh Semester B.E. Degree Examination, Feb./Mar.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 Einthoven's triangle with a neat diagram. **(06 Marks)**
  b. Differentiate : (i) Invasive versus non invasive procedure
          (ii) Active versus passive procedure **(06 Marks)**
  c. Explain about computer-aided diagnostics based upon biomedical signal analysis with a neat diagram. **(08 Marks)**

### OR

2 a. Discuss any 6 difficulties encountered in biomedical signal acquisition and analysis. **(06 Marks)**
  b. Discuss about the cardiac equivalent generator with a neat diagram. **(06 Marks)**
  c. Explain simple analog-to-digital signal conversion system with a neat block diagram. **(08 Marks)**

## Module-2

3 a. Prove that the signal averaging improves SNR by a factor of $\sqrt{m}$ . **(08 Marks)**
  b. Explain typical signal averager with a neat block diagram. **(06 Marks)**
  c. Explain adaptive filter noise canceller with a neat block diagram. **(06 Marks)**

### OR

4 a. Give the applications of adaptive filtering with an example. **(06 Marks)**
  b. Discuss the flow chart of signal averaging program. **(08 Marks)**
  c. Discuss the characteristics of signal and noise with a neat diagram. **(06 Marks)**

## Module-3

5 a. Explain (i) CORTEX algorithm and (ii) FAN algorithm. **(06 Marks)**
  b. Discuss about Huffman coding and modified Huffman coding with necessary equations. **(08 Marks)**
  c. Discuss about : (i) Residual differencing algorithm (ii) Run-length encoding algorithm with necessary equations. **(06 Marks)**

### OR

6 a. Discuss convolution in, (i) Time domain and (ii) In Frequency domain with necessary equation. **(08 Marks)**
  b. Discuss (i) Power spectral analysis of periodic signal
          (ii) Power spectral analysis of an ECG. **(06 Marks)**
  c. Discuss about turning point algorithm with an example. **(06 Marks)**

## Module-4

7 a. Explain high speed QRS detection Algorithm with a neat block diagram. **(06 Marks)**
  b. Discuss the properties of matched filter. **(06 Marks)**
  c. Discuss about microprocessor based Recording with a neat diagram. **(08 Marks)**

**OR**

8  a. Explain Lead I, Lead II and Lead III with respect to Eithoven's triangle,  **(06 Marks)**
   b. Discuss long-term continuous ECG recording.  **(06 Marks)**
   c. Describe : (i) Brady cardia       (ii) Trachy cardia       (iii) Asystole
             (iv) Ventricular fibrillation  **(08 Marks)**

## Module-5

9  a. Describe about EEG signal and its characteristics with a neat diagram.  **(10 Marks)**
   b. Explain about adaptive segmentation algorithm.  **(08 Marks)**
   c. Define (i) Dendrites       (ii) Axon  **(02 Marks)**

**OR**

10 a. Discuss spectral error measure with a neat diagram.  **(06 Marks)**
   b. Discuss : (i) Diverging                        (ii) Converging
             (iii) Reverberating circuit with a neat diagram.  **(06 Marks)**
   c. Discuss about transient detection and elimination with a neat diagram.  **(08 Marks)**

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