

Total No. of Questions : 8]

SEAT No. :

**P3629**

**[4959]-1118**

[Total No. of Pages : 2

**B.E. (Electronics)**

**BIOMEDICAL SIGNAL PROCESSING**

**(2012 Pattern) (End Sem.) (Revised)**

*Time : 2½ Hours]*

*[Max. Marks : 70*

*Instructions to the candidates:*

- 1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6, Q7 or Q8.*
- 2) *Neat diagrams must be drawn wherever necessary.*
- 3) *Figures to the right side indicate full marks.*
- 4) *Use of Calculator is allowed.*
- 5) *Assume suitable data, if necessary.*

- Q1)** a) Explain Pan Tomkins algorithm for QRS detection in an acquired ECG signal. **[8]**
- b) Explain the electro conduction system of heart. **[6]**
- c) Draw the structure of a nerve cell and explain synapses. **[6]**

OR

- Q2)** a) Explain Einthoven's triangle? Explain its significance with help of neat sketch. **[8]**
- b) Explain Pan Tomkins algorithm for QRS detection in an acquired ECG signal. **[6]**
- c) Draw the structure of a nerve cell and explain synapses. **[6]**
- Q3)** a) Draw & explain structure of brain. **[8]**
- b) Explain EEG rhythms & waveform. Also explain categorization of EEG activity & its recording techniques. **[8]**

OR

**P.T.O.**

- Q4)** a) Explain Low Pass and High Pass Integer Filters with their basic design concept in detail. [8]  
b) Draw and explain the block diagram for Brain computer interface. [8]

- Q5)** a) Explain how Fourier Transform in EEG Signal Analysis. [8]  
b) Explain Adaptive Filters with its basic concept. Also explain principle noise cancellation model of the same. [8]

OR

- Q6)** a) State the Weiner Hopf equation. Explain the with equations the least mean square approach to find the filter coefficients. [8]  
b) Explain the concept of Low pass filtering and high pass filtering with respect to biosignals. [8]

- Q7)** a) Explain QRS detection using Multivariate analysis method ICA. [10]  
b) Explain how FIR or IIR filters are used specifically for event detection in ECG. [8]

OR

- Q8)** a) State the difference between stationary and non-stationary signals. Support the answer with relevant application to biomedical domain. [10]  
b) State the PCA algorithm and its significance. [8]

