

Total No. of Questions : 8]

SEAT No. :

P3612

[Total No. of Pages : 2

[4959] - 1098

**B.E. (Electronics & Telecommunication)  
BIOMEDICAL SIGNAL PROCESSING  
(2012 Pattern) (End Semester)**

*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) What is a function of Electromyography? Enlist the types of EMG and explain the procedure to perform EMG. [8]
- b) Draw and explain unipolar and bipolar arrangement of ECG acquisition. [6]
- c) Write a short note on STFT. [6]

OR

- Q2)** a) Write a note on direct and indirect blood pressure measurement. [8]
- b) Explain PAN TOMPKINS algorithm to detect QRS segment from acquired ECG signal. [6]
- c) Explain various heart sounds generated in the pumping activity of heart. [6]

- Q3)** a) Draw and explain 10-20 electrode placement for acquisition of EEG. [8]
- b) Explain various EEG waveforms with their frequency and significance. [8]

OR

- Q4)** a) Draw and explain structure of brain. [8]
- b) Explain grounding and shielding techniques. [8]
- Q5)** a) Write a note on ECG amplifier and isolation circuit. [8]
- b) Describe basics of low pass filtering and high pass filtering for bio signals. [8]

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OR

- Q6)** a) Explain the technique to cancel out maternal ECG from fetal ECG. [8]  
b) Write requirement of basic amplifier and Explain the use of instrumentation amplifier. [8]
- Q7)** a) Describe the significance of Principal component analysis for biosignals analysis. [10]  
b) State the differences between FIR and IIR filters for biosignal analysis. [8]

OR

- Q8)** a) Distinguish between stationary and non-stationary bio signals. Also state the edge effects due to sampling a finite length data sequence. [10]  
b) For an input represented by  $X(z)$  and output given by  $Y(z)$ , State the generalized transfer function  $H(z)$  in terms of  $b(k)$  and  $a(k)$  as coefficients of numerator and denominator respectively and state a method to find the frequency spectrum of the same. [8]

