Total No. of Questions :5] *[Total No. of Printed Pages :3*

Roll No .....

EI/IC-7203

B.E. VII Semester

Examination, December 2016

Bio-Medical Digital Signal Processing

Time : Three Hours

Maximum Marks : 70

Note: i) Answer five questions. In each question part A, B, C is compulsory and D part has internal choice.

ii) All parts of each question are to be attempted at one place.

iii) All questions carry equal marks, out of which part A and B (Max. 50 words) carry 2 marks, part C (Max. 100 words) carry 3 marks, part D (Max. 400 words) carry 7 marks.

iv) Except numericals, Derivation, Design and Drawing etc.

Unit - I

1. a) What do you mean by a bio-medical signal? List the various bio-medical signals.

   b) Classify the bio signals according to their characteristics.

   c) Discuss the difficulties encountered during acquisition of biosignal.

   d) Define concurrent, coupled and correlated processes. State clearly, why it is important while performing biosignal analysis.

   OR

   Discuss how the noise coupling and power line interference effect the measurements of biological signals. Also discuss how we can avoid it.

Unit - II

2. a) List the various filter techniques used for removal of artifact.
   b) Explain the principle of an adaptive filter.
   c) Write the differences between static filter and adaptive filter.
   d) Discuss the moving averaging filtering. Also, explain under what condition averaging fails to remove noise.

OR

What do you understand by frequency domain filtering techniques? List them and explain any one technique.

Unit - III

3. a) What are the different parameters of an ECG wave?
   b) Describe importance of QRS detection technique.
   c) What are the Fourier-domain equivalent of the autocorrelation function and cross-correlation function?
   d) Discuss how, correlation and coherence analysis helpful in the detection of waves of bio signals.

OR

Give a schematic representation of ECG signal acquisition with specifications. How can we detect QRS complex using template cross correlation method.

Unit - IV

4. a) Write the Importance of measurement of event related potential.
   b) How can we detect the QRS complex from an ECG signal?
   c) Draw filter-circuit to detect spike-and-wave complexes in an EEG signal.

   d) List the various methods used for envelope extraction analysis. Why biological envelope extraction is important?

OR

What is Cepstrum Analysis? Explain, How it help in feature extraction, separation and detection of anomalies from common biomedical signals.

Unit - V

5. a) What is the need of short-time spectral analysis?
   b) Explain about power spectral density function.
   c) What are the limitations of non-parametric methods in spectral estimation?
   d) Drive the mathematical expressions for Wavelet Transform. Also discuss the transform applications in the area of biomedical signals.

OR

Discuss the short time Fourier transform and their applications to bio-signals.

******