

B.TECH SEM – V (2007 COURSE) (BIOMEDICAL ENGG.) :

WINTER - 2017

SUBJECT : BIOMEDICAL DIGITAL SIGNAL PROCESSING

Day **Saturday**
Date **20/01/2018**

Time **02.30 PM TO 05.30 PM**
Max. Marks : 80

W-2017-2488

N.B.:

- 1) **Q.No.1 and Q.No.5 are COMPULSORY.** Out of the remaining attempt **ANY TWO** questions from each section.
- 2) Answers to both the sections should be written in the **SEPARATE** answer books.
- 3) Draw neat and labeled diagram **WHEREVER** necessary.
- 4) Figures to the right indicate **FULL** marks.
- 5) Assume suitable data if necessary.

SECTION – I

- Q.1** a) State and explain sampling theorem. [05]
b) Compare FIR filter and IIR filter. [05]
c) Why data reduction is important in biomedical signal processing? [04]
- Q.2** a) How do you convert digital signal into analog signal using voltage scaling? Explain. [07]
b) Define the following terms: [06]
i) Full Scale Error iv) Offset or Zero Error
ii) Gain Error v) Monotonicity Error
iii) Integral Linearity vi) Absolute Linearity
- Q.3** a) Explain different steps in designing a FIR filter using window method. [07]
b) What are Adaptive Filter? How it can be used as a noise canceller? [06]
- Q.4** a) Find the Huffman code for the following set of data points: [07]
{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}
- b) Describe the line detection operation of the AZTEC algorithm [06]

SECTION – II

- Q.5** a) What is autocorrelation and cross correlation? Describe its application. [05]
b) Describe in detail the power spectrum of ECG. [05]
c) How do you analyze EEG signals for significant features? [04]
- Q.6** a) Compute the autocorrelation for the following sequence [07]
 $x(n) = \{1, 2, 3, 4\}$.
b) Define Discrete Fourier Transform. Explain any two properties of DFT. [06]
- Q.7** a) Explain the steps required to detect QRS complex from an ECG signal using Band pass filtering technique. [07]
b) With neat block diagram describe Real time detection algorithm. [06]
- Q.8** a) Enumerate the steps involved in interpreting 12-lead ECG. [07]
b) Describe the arrhythmia analysis algorithm based on mapping of the RR interval and QRS duration into 2D space. [06]

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