Student Exam No: _____

GANPAT UNIVERSITY

B.Tech Sem. Vth Biomedical & Instrumentation

Regular Exam. November / December-2012

2BM504 Biological Digital Signal Processing

Time: 3 Hours **Total Marks-70**

Instructions:-

1. All the questions are compulsory.
2. Answer of each section must be written in separate answer books.
3. Figure to the right indicate marks.
4. Assume data, if needed.
5. Conventional terms / notations are used.

Section – I

Que.1.

a). What is signal processing? Explain digital signal processing and analog signal processing giving neat block diagram **[6]**

b). A Discrete time signal is shown in fig. 1. Sketch following signals. **[5]**

1). X(n-2) **2).** X(4-n) **3).** X(n+2) **4).** Even signals of X(n)

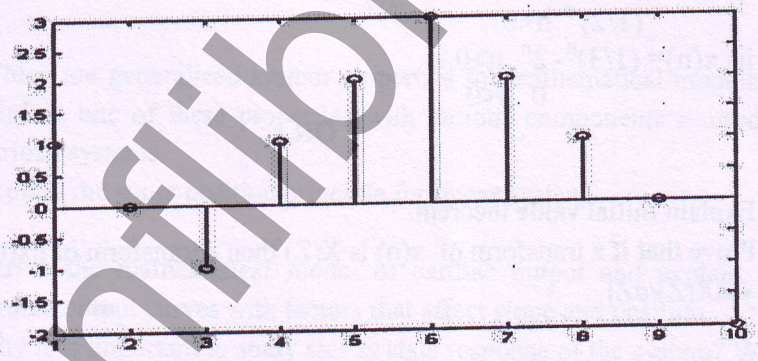

Figure 1

OR

Que.1.

a). Define system. Give the Classification of system. Explain with examples. **[6]**

b). What is finite precision effect? Represent the following number in single precision format. **[5]**

1). 0.5 **2).** 1 **3).** $3.92 * 10^2$

Que.2. **[12]**

a). Compute DFT of the sequence X[n]={ 1, 0, 0, 1}. Use DFT equation

b). For X[n]={ 1, 2, 2, 1}, find corresponding DFT of X[k] using DITFFT.

OR

Que.2. [12]

a). Perform circular convolution of sequence
X1[n]={ 2, 1, 2, 1}, X2[n]= { 1, 2, 3, 4}

b). Using radix 2 FFT algorithm, plot flow graph for N=16 for DIF FFT.

Que.3. **Answer any three.** [12]

a). Find IDFT of given sequence X[k], using matrix method.
X[k]= { 2, 1+j, 0 ,1-j }

b). Discuss comparison of Microprocessor with DSP processor.

c). Explain Harvard architecture giving neat diagram.

d). Enumerate application of DSP. Explain DSP application in Radar giving neat diagram.

Section – II

Que.4. [12]

a). Prove that if $x(n) = a_1 x_1(n) + a_2 x_2(n)$ and if $z\{x_1(n)\} = X_1(Z)$, $z\{x_2(n)\} = X_2(Z)$, then $X(Z) = a_1 X_1(Z) + a_2 X_2(Z)$, a_1, a_2 =constant and also solve $x(n) = (a^n + a^{-n})\, u(n)$ sum using above property

b). Determine z transform of following sequence.
i) $x(n) = (1/3)^n \quad n>0$
$(1/2)^{-n} \quad n<0$
ii) $x(n) = (1/3)^n - 2^n \quad n>0$
$0 \quad n<0$

OR

Que.4. [12]

a). Explain Initial value theorem.

b). Prove that if z transform of x(n) is X(Z) then z transform of nx(n) is $-(Z) \cdot [dX(Z)/dZ]$

Que.5. [11]

a). Derive equation for system transfer function of digital filer.

b). Explain Frequency sampling structure for FIR filter

OR

Que.5. [11]

a). Write down different types of structure used to design IIR filter and also explain Cascade structure for IIR filter

b). Explain Impulse Response of ideal low pass filter

Que.6. [12]

a). Write down Different types of method used to design IIR filter and also explain Bilinear Transformation method for IIR filter.

b). Find out H(z) using impulse invariance method at 10 Hz sampling frequency from H(s) as given below : H(s)= 2/[(s+1)(s+2)]

c). The transfer function of analog filter is H(s)=3/[(s+2)(s+3)] with Ts=0.1 sec. Design the digital IIR filter using BLT method

END OF PAPER