Examination May-2014
Digital Signal Processing
Subject Code : BTEC - 502
Paper ID:A-2104

Time : 03 Hrs.   Max. Marks:60

SECTION - A

1.   a)   List the advantages of Digital Signal Processing

      b)   Check whether the following system is stable, linear, or time-invariant

$$y(x^1 = x(x^2)$$

      c)   What is the physical significance of convolution, and correlation? List the applications also.

      d)   Find the Z - transform of the signal

$$x(x1 = U\left(\frac{x}{2}\right)$$

      e)   List Ø prove the "Differentiation in Z-domain" property of Z-transform.

      f)   For the function, $X(z) = \frac{10}{1+\frac{1}{2}z^{-1}}$, $Roc = |Z| > \frac{1}{2}$ compute the DTFT as the corresponding time-domain signal directly, if it exists.

      g)   Differentiate FIR filters & IIR filters.

      h)   Mathematically Justify, how line as phase condition is achieves in FIR filters.

      i)   Differentiate fixed point & floating paint representation of numbers.

      j)   What is the difference between DSP processor and microprocessor.

                                                       (20 x 2 = 20)

SECTION - B

2.   Determine the response $y(x)$, $x \geq 0$ of the following system

$$y(x1 - 4y(x - 1) + 4y(x - 2) = x(x1 - x(x - 1)$$

When the input is

$$x(n) = (-1)^n u(n)$$

And the initial conditions are $y(-1) = y(-2) = 0$ 5

3.   Derive DIF - FFT algorithm for 8 point sequence and draw the butterfly diagram.   5

4.   Describe different types of finite word length effects present in Digital filters and ways to rectify them, with the help of examples.   5

5.   Find the Z-transform of the signal   5

$$x(n1 = |n|a^{|n|}$$

6.   Design a low-pass filter with desired frequency response

$$H_d(w) = \int \begin{matrix} \bar{e}^{j3w} & \dfrac{-\pi}{2} \leq W \leq \dfrac{\pi}{2} \\ 0 & \dfrac{\pi}{2} < |W| < \pi \end{matrix}$$

Use hanning window with a lengthy 7.   5

SECTION - C

7.   Describe the Architecture of TMS series processor. Explain Addressing modes, memory structure, Interrupts, and Applications.   10

8.   a)   Find the inverse Z-transform of

$$X(2) = \frac{1}{1 - 1.5\bar{z}^1 + 0.5\bar{z}^2} \quad |z|7|$$

Using the contour integration method.   6

  b)   Briefly, describe the Architecture of ADSP processor.   4

9.   a)   Consider a periodic signal

$$x(t 1 = \begin{cases} 1 & 0 \leq t \leq 1 \\ -2 & 1 < t < 2 \end{cases}$$

With a period T = 2. The derivative of this signal is relate to impulse train

$$g(t1 \quad \&(t \quad 2\frac{1}{2})$$
$$_{b}$$

With a period T = 2. It can be shown that

$$\frac{dx(t)}{dt} = A_1 g(t - t_1) + A_2 g(t - t_2)$$

Determine the values of A_1, t_1, A_2 and t_2 5

  b)   Describe Matched Z-transformation methods for design of IIR filter.

      5

…………End………

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