INST/ DI/Digital Signal /221.5/15 INST

(3 Hours) WARJAN

QP Code: 5079

[Total Marks: 80

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- N.B. (1) Question no. 1 is compulsory
 - (2) Attempt any three questions out of remaining five questions.
 - (3) Assume suitable data if necessary.
- Solve any four:-
 - (a) $h(n) = [1 \ 2 \ 3 \ 4], y(n) = [5 \ 16 \ 28 \ 24] find x(n), using convolution property of z transform.$
 - (b) Explain the block diagram of DSP. 5
 - (c) Compare between chebysher and butter worth filter 5
 - (d) What are the advantages of FFT cres the DFT interms of calculations?

 Justify your answer with suitable example
 - (e) Draw the polezero plot and Transfer funtion of following filter

 (i) Comb filter (ii) Notch filter
- 2. (a) Find the DFT of $x(n) = [4+5j \ 3+6j \ 3+4j \ 2+2i]$ other wise find the DFT of

$$x_1(n) = [4 \ 3 \ 3 \ 2]$$

 $x_2(n) = [5 \ 6 \ 4 \ 2]$
 $x_3(n) = [9 \ 9 \ 7 \ 4]$

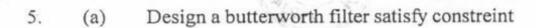
- (b) Differenciate between linear and circular convolution. Find the circular convolution of a sequences using DFT and IDFT method $x_1(n) = \begin{bmatrix} 2 & 3 & 1 & 1 \end{bmatrix} \quad x_2(n) = \begin{bmatrix} 1 & 3 & 5 & 3 \end{bmatrix}$
- 3. (a) Find the 8 point DFT busing DIT-FFT algorithm $x(n) = \begin{bmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \end{bmatrix}$ 10
 - (b) Determine the output of a linear FIR filter whose impulse response $h(n) = [1, 2, 3] \times (n) = [1 \ 1 \ 2 \ -1 \ 2 \ -3 \ -1 \ 1 \ 2 \ 1 \ -3 \ -1]$ using overlap save method.
- 4. (a) The system with differential equation (n) = 0.9(n-1) + σ1 x(n) find the magnitude and phase response of the system comment on filter charactristics
 - (b) Obtain DF-II, cascade and parallel realization of system function

$$H(z) = \frac{1 + 2z^{-1} + z^{-2}}{1 - 0.75z^{-1} + 0.1252^{-2}}$$

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$$0.707 \le |H(e^{jw})| \le 1$$
 for $0 \le w \le \frac{\pi}{2}$
 $|H(e^{jw})| \le 0.2$ $\frac{3\pi}{4} \le |w| \le \pi$

with T z1 sec Invariance Technique

6. (a) The desired frequency response of LPF is

$$Hd(e^{jw}) = e^{-j3w} \qquad \frac{-3\pi}{4} \le w \le \frac{3\pi}{4}$$
$$= 0 \qquad \frac{3\pi}{4} \le |w| \le \pi$$

Determine H(ejw) using Hamming window also find frequency response of it. 10

(b) A one stage decimater is characteriesed by the following:-

Decimation factor = 3

Antialising filter coefficent

$$h(0) = -0.06 = h(4)$$

$$h(1) = 0.30 = h(3)$$

$$h(2) = 0.62$$

given the datax(n) with a successive [6 -2 -3 8 6 4 -2]. Calculate and list filtered output w(n) and the output of the decimator y(n)

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