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Computer Engineering Department

Subject : Digital Signal Processing

Assignment -4

Topic : DSP Algorithms

NOTE : [1] Solve any eight questions.

[2] Deadline for submission is 20th April 2021.

Q(1) **A Digital filter has impulse response** $h[n]=\{\underset{\uparrow}{2},\ 2,\ 1\}$**. Determine the output sequence response to the following input sequence** $x[n]=\{\underset{\uparrow}{3}\ 0,-2,0,2,1,0,-2,-1,0\}$ **using Overlap Add Method.**

OR

The unit response of the system is h[n]={ 3, 2, 1}. Use overlap add method of linear filtering to determine output sequence for the repeating input sequence x[n]={ 2, 0, -2, 0, 2, 1, 0, -2, -1, 0 }

Q(2) **A Digital filter has impulse response** $h[n]=\{\underset{\uparrow}{2},\ 2,\ 1\}$**. Determine the output sequence response to the following input sequence** $x[n]=\{\underset{\uparrow}{3}\ 0,-2,0,2,1,0,-2,-1,0\}$ **using Overlap Save Method.**

OR

Given h[n]= { 1, 2 }. Find the response of the filter to the input **x[n]={ 1, 2, -1, 2, 3, -2, -3, -1, 1, 2, -1 }** using Overlap Save Method.

Q(3) What are the limitations of Conventional Linear Convolution using FFT algorithm in real time applications.

Q(4) Given x[n] = (1, 2, 3, 4 } and h[n] = { 5, 6, 7 }. Give step by step procedure to obtain Circular Convolution using FFT–IFFT.

OR

Given x[n] = {x[0], x[1], x[2], x[3]} and h[n] = {h[0], h[1], h[2]}. Give step by step procedure to obtain Circular Convolution using FFT–IFFT.

Q(5) Let x[n] = (1, 2, 3, 4 } and h[n] = { 5, 0, 7 } Find Circular Convolution using FFT

Q(6) Given x[n] = {x[0], x[1], x[2], x[3]} and h[n] = {h[0], h[1], h[2]}. Both are non-periodic finite length sequences. Give step by step procedure to obtain linear convolution using FFT–IFFT.

Q(7) Impulse response of Linear Phase Low-Pass FIR filter is given by h[n]={ 1, 2, 2, 1 }. Give step by step procedure to find output of the filter to the input x[n] = { 1, 2, 3, 4} using FFT-IFFT.

Hint : Output of Digital filter is linear convolution of x[n] with h[n].
∴ Explain LC by CC by FFT.

Q(8) Given h[n]= { 1, 0, 2 } Find the response of a Digital FIR filter to the input x[n] = { 1, 2, 3, 4, 5, 6, 7 } using

(a) Overlap **Add** Method.
(b) Overlap **Save** Method.
(c) Linear Convolution Time Domain Method
