METHODIST COLLEGE OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ECE

SUB: DIGITAL SIGNAL PROCESSING

FACULTY: T. SRAVAN KUMAR BRANCH: V SEM ECE-A

**TUTORIAL-1**

1) a) Perform the 6- point DFT of the sequence x(n)={1,3,-2,5,3,2,}.

 b) Perform the 6-point IDFT of the DFT problem.

2) Compute the 8-point DFT using DITFFT algorithm of x(n)={4,2,3,-2,1,3,1,-3}.

3) Compute the 8-point DFT using DIFFFT of x(n)={4,2,3,-2,1,3,1,-3}.

**TUTORIAL-2**

1) Obtain the IDFT of the sequence X(K)={4,1-j2.414 ,0,1- j0.414,0,1+j0.414,0,1+j2.414} using i) DIT-FFT algorithm ii) DIF-FFT algorithm.

2) Perform the circular convolution of two sequences x1(n) = {2, 1, 2,-1} and x2(n) = {1, 2, 3, 4}

**TUTORIAL-3**

1) Design a FIR LPF using Rectangular Window for N=7, wc =0.2πrad/sample and draw the realization diagram.

2) Design a FIR HPF using Hamming Window for N=7, wc =0.8π rad/sample and draw the realization diagram.

3) Design a FIR BPF using Hanning Window for N=7, wc1 =0.4π, wc2 =0.6π rad/sample and draw the realization diagram.

4) Design a FIR BSF using rectangular Window for N=7, wc1 =0.4π, wc2 =0.6π rad/sample and draw the realization diagram.

**TUTORIAL-4**

1) Design Butterworth LPF using BLT by taking T=0.1 second to meet the following specifications 0.6 ≤│H (ejw) │≤ 1.0; for 0≤w≤ 0.35π

 │H (ejw) │≤ 0.1; for 0.7π≤w≤ π

2) Design Butterworth LPF using I2T by taking T=1 second to meet the following specifications 0.707≤│H (ejw) │≤1.0; for 0≤w≤ 0.3π

 │H (ejw) │≤0.2; for 0.75π≤w≤ π

3) Design Chebyshev LPF using I2T by taking T=1 second to meet the following specifications

0.9 ≤│H(ejw)│≤ 1.0 ; for 0≤w≤ 0.25π

 │H (ejw) │≤ 0.24; for 0.5π≤w≤ π

4) Design Chebyshev LPF using BLT by taking T=1 second to meet the following specifications

0.8 ≤│H (ejw) │≤ 1.0; for 0≤w≤ 0.2π

 │H (ejw) │≤ 0.2; for 0.32π≤w≤ π

**TUTORIAL-5**

1) Draw the spectrum of the down sampled signal for the sampling rate factor D=2 and D=3

 

2) a) Explain the need for multirate processing.

 b) What are the applications of multirate processing?

3) Explain the frequency spectrum of down sampler and up sampler?

4) Draw the spectrum of the signal if it is up sampled by I=2, 3 and 4.

 

5) Consider a discrete time signal x(n)={2,4,6,8,10,12,14,16,18,20}.

 Determine i) the down sampled version of the signal for D=2,3 and 4.

 ii) the up sampled version of the signal for I=2 and 3