Practice Questions for Unit 5 of DSP

Questions Based on DFT

Question 1

(a) Determine the DFT of the sequence x(n) = (0.5, 0.5, 0.5)
(b) Find out DFT of the sample data sequence x(n) = (1, 5, 4, 2, 3).
(c) Calculate N-point DFT of $x(n) = a^N$
(d) Calculate DFT of the sequence x(n) = (4, 4, 4, 4)
(e) Discuss circular frequency shift property and circular time shift of DFT.
(f) Explain, DTFT is utilised to get DFT
(g) For DFT, prove that Re [X(k)] = Re[X(-K)] for a real periodic sequence x(n)
(h) With the help of appropriate mathematical expression, explain circular convolution property of DFT
(i) In case of 4-point DFT and 8-point DFT, evaluate values of twiddle factors.

Questions Based on FFT

Question 2

(a) If x(n) = (1, 2, 4, 8, 16, 32, 64, 128) then find X(k) using Decimation-In-Time Fast Fourier Transform Algorithm.
(b) If x(n) = (1, 3, 1, 5, 2, 3, 2, 1) then find X(k) using Decimation-In- Frequency Fast Fourier Transform Algorithm.
(c) If x(n) = (1, 3, 1, 5, 2, 3, 2, 1) then find X(k) using Decimation-In-Frequency Fast Fourier Transform Algorithm.
(d) If x(n) = (4, 5, 6, 7, 0, 1, 2, 3) then find out X(k) using Decimation-In-Time Fast Fourier Transform Algorithm.
(e) Explain FFT in detail. What are various algorithms for finding FFT.
(f) Discuss bit reversal in case of FFT? For 2-point FFT, draw the Butterfly structure.