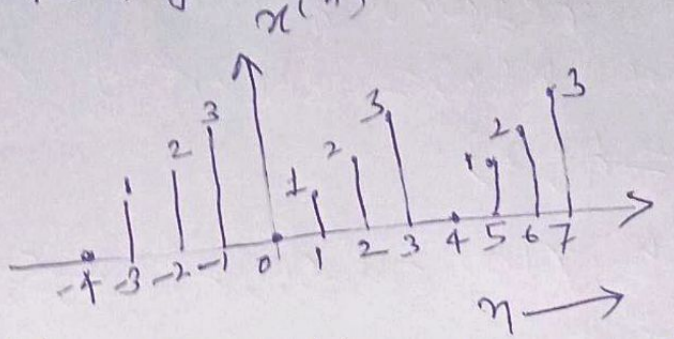
Assignment 1

Q1 Find both exponential and trignometric forms of Discrete fourier series representation of $x(n)$ shown in fig.



Q2 Explain the properties of Discrete fourier series.

Q3 Determine DFT of sequence

$$x(n) = \begin{cases} 2 & \text{for } 1 \le n \le 2 \\ 3 & \text{for } 5 < n < 8 \end{cases}$$

Q4 Determine DFT of sequence

$$x(n) = \begin{cases} 0.2 & \text{for } |n| \le 1 \end{cases}$$

Q5 Derive the DFT of $x(n) = \{1, 1, 2, 2, 3, 3\}$ compute & draw amplitude & phase spectrum.

Q6 compute DFT of each of following finite length sequence N (a) $x(n) = \delta(n)$ (b) $x(n) = \delta(n - n_0)$

Q7 Find 4 point DFT of $x(n) = \cos \frac{n\pi}{4}$

Q8 Find Inverse DFT of $X(k) = \{1, 1, 2, 3\}$

Q9 Find IDFT of $X(K) = \{3, 2+j, 1, 2-j\}$

Q10 Compute (a) linear (b) Circular periodic convolution of two sequence $x_1(n) = \{1, 1, 2, 2\}$ and $x_2(n) = \{1, 2, 3, 4\}$ (c) circular convolution using DFT & IDFT

(Q11) Compute $x_1(n) \otimes x_2(n)$ if

$x_1(n) = \delta(n) + \delta(n-1) - \delta(n-2) - \delta(n-3)$

$x_2(n) = \delta(n) + \delta(n-2) - \delta(n-4)$

given $N = 5$

(Q12) Find response of FIR Filter with impulse response $h(n) = \{1, 2, 4\}$ to input sequence $x(n) = \{1, 2\}$

(Q13) given $x(n) = \{0, 1, 2, 3, 4, 5, 6, 7\}$ find $X(K)$ using DIT-FFT.

(Q14) given $x(n) = 2^n$ find $X(K)$ using DIT-FFT algorithm if $N = 8$

(Q15) If $x_1(n) = \{1, 2, 3, 4\}$ $x_2(n) = \{1, 2\}$

(1) find $x_1(n)$ conv. $x_2(n)$ (2) find circular convolution

(3) Find correlation (4) find auto correlation

(5) Find convolution using DFT & IDFT

(6) Find correlation using DFT & IDFT

(Q16) given $x(n) = \{0, 1, 2, 3\}$, Find $X(K)$ using DIT-FFT algorithm

(Q17) given $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ find $X(k)$ using DIF-FFT

(Q18) Use 4 point inverse FFT and verify result using DFT. $\{6, -2+2j, -2, -2j-2\}$

(Q19) Given $X(K) = \{255, 48.63 + j166.05, -51 + j102, -78.63 + j46.05, -85, -78.63 - j46.05\}$ find $x(n)$.

(Q20) Derive expression for N point DIF-FFT and draw butterfly diagram to compute DIF-FFT.