

I.

- i) If the length of two sequences is given by M and N respectively then the total length of the convoluted sum-
- a) $L-M+1$
 - b) $L+M-1$
 - c) $L+M+1$
 - d) $L-M-1$
- ii) During mapping of many points from s-plane to Z-plane aliasing occurs when the
- a) Sample of two sinusoidal signals of frequencies which differ by a multiple of the sampling frequency
 - b) Sample of two sinusoidal signals of frequencies which differ by an even multiple of the sampling frequency
 - c) Sample of two sinusoidal signals of frequencies which differ by an odd multiple of the sampling frequency
 - d) None of the above
- iii) For normal DFT calculations total number of complex multiplication required
- a) N
 - b) $2N(N-1)$
 - c) N^2
 - d) $N(N-1)$
- iv) If the input and output sequence is M and N respectively then the total number of memory location required in direct form-I structure is-
- a) $\text{MIN}\{M,N\}$
 - b) $M+N-1$
 - c) $M+N+1$
 - d) $\text{MAX}\{M,N\}$
- v) Actual value of $W_{N/2}^{(k+\frac{N}{2})}$
- a) $-W_{N/2}^k$
 - b) $W_{2N}^{-k-\frac{N}{2}}$
 - c) $-W_N^k$
 - d) $W_N^{\frac{k}{2}}$
- vi) Linear convolution can be evaluated from the circular convolution of two sequences of length L and M respectively ($L > M$) when the length of the circular convolution is
- a) L
 - b) M
 - c) $L+M+1$

d) $L+M-1$

vii) If $X(z) = Z\{x(n)\}$, then $Z\{nx(n)\}$ is equal to

a) $z \frac{d}{dz} X(z)$

b) $-z \frac{d}{dz} X(z)$

c) $z^{-1} \frac{d}{dz} X(z)$

d) $-z^{-1} \frac{d}{dz} X(z)$

viii) DFT $[x(N-m)]$ is equal to

a) $X(N-m)$

b) $X(N-k)$

c) $X(m-k)$

d) $X(m+k)$

ix) To design a digital filter using Bilinear Transformation we have to substitute

a) $s = \frac{2}{T} \frac{z-1}{z+1}$

b) $s = 2T \frac{z-1}{z+1}$

c) $s = \frac{2}{T} \frac{z+1}{z-1}$

d) $s = \frac{1}{T} \frac{z-1}{z+1}$

x) During FFT calculations using DIT algorithm-

a) Outputs are in bit reversal form

b) Inputs are taken in bit reversal form

c) Both input and outputs are taken in bit reversal form

d) None of this

xi) The equation for hamming window is-

a) $w_H(n) = 0.46 + 0.54 \cos(2\pi n/N - 1)$ for $-(N-1)/2 \leq n \leq (N-1)/2$

b) $w_H(n) = 0.54 + 0.46 \cos(2\pi n/N - 1)$ for $-(N-1)/2 \leq n \leq (N-1)/2$

c) $w_H(n) = 0.46 + 0.54 \sin(2\pi n/N - 1)$ for $-(N-1)/2 \leq n \leq (N-1)/2$

d) $w_H(n) = 0.54 + 0.46 \sin(2\pi n/N - 1)$ for $-(N-1)/2 \leq n \leq (N-1)/2$

2. A Check whether the signal is energy signal or power signal?

$$x(n) = (1/4)^n u(n).$$

3. Write down some advantages and limitations of DSP.

4. Find the inverse Z-Transform of $X(z) = \frac{z(z^2 - 3z + 4)}{(z-4)(z-2)(z-1)}$ for $ROC 1 < |Z| < 2$.

5. Using the bilinear transformation find out the order of a high pass Butterworth filter having pass band with cutoff frequency of 1 KHz and down 10dB at 500 Hz. The sampling frequency is 10 KHz.

6. Determine the direct form II structure for the given system:
 $y(n) = 0.3y(n-1) - 0.5y(n-2) + 0.75y(n-3) + 0.25x(n-1) + 0.55x(n)$.
7. a) Find out the linear convolution sum of the given sequences using graphical method:
 $x(n) = \{2, 1, 3, 1\}$; $h(n) = \{1, 2, 1, 1\}$
 \uparrow \uparrow
 b) Determine the stability of the system: $h(n) = 0.2^n u(-n) + 3^n u(-n)$.
8. a) Find the 8 point DFT of the sequence $x(n) = \{1, 2, -1, 2\}$
 b) Using overlap save method find out the linear convolution of two data sequences
 $x(n) = \{1, 2, 1, 3, 1, 2, 3, 4, 2, 2, 2, 1\}$ and $h(n) = \{1, 2, 1\}$
9. a) Find out the 8 point DFT using DIF algorithm for the given sequences:
 $x(n) = \{2, 3, 1, 3, 2, 1, 2\}$
 b) Prove $Z[x_1(n) * x_2(n)] = X_1(Z) X_2(Z)$
10. Design a digital Butterworth filter using the following constraints by bilinear Transformation and also realize it by direct form-II structure:
 $0.707 \leq |H(e^{j\omega})| \leq 1$ for $0 \leq \omega \leq 0.3\pi$
 $|H(e^{j\omega})| \leq 0.2$ for $0.75\pi \leq \omega \leq \pi$
11. a) Design a linear phase filter using Rectangular window with $N=7$ for
 $H_d(e^{j\omega}) = e^{-j3\omega}$ for $-\frac{\pi}{4} \leq \omega \leq \frac{\pi}{4}$
 $= 0$ for $\frac{\pi}{4} \leq \omega \leq \pi$
 b) What is Gibb's phenomenon?
 c) What is Warping?