

10. The Fourier transforms
- converts the phasor domain to the magnitude domain.
 - converts the frequency domain to the time domain.
 - is used to make real time spectrum analyzers.
 - converts the time domain to the frequency domain.
11. What are fourier coefficients?
- The terms that are present in a fourier series.
 - The terms that are obtained through fourier series
 - The terms which consist of the fourier series along with their sine or cosine values
 - The terms which are of resemblance to fourier transform in a fourier series are called fourier series coefficients.
12. The value of twiddle factor W_8^5 is
- $0.707 - j0.707$
 - $-0.707 + j0.707$
 - $-0.707 - j0.707$
 - 1
13. Which of the following is true regarding the number of computations required to compute an N-point DFT?
- N^2 complex multiplications and $N(N-1)$ complex additions
 - N^2 complex additions and $N(N-1)$ complex multiplications
 - N^2 complex multiplications and $N(N+1)$ complex additions
 - N^2 complex additions and $N(N+1)$ complex multiplications
14. The value of twiddle factor W_4^0 is
- j.
 - 1.
 - 1.
 - 0.
15. The total number of complex multiplications required for N point FFT is
- N^2 .
 - $\frac{N}{2} * \log_2 N$.
 - $4 N^2$.
 - $N * \log_2 N$.
16. The ROC of delta function is
- entire Z plane.
 - entire Z plane except $z=0$.
 - entire Z plane except $z=\infty$.
 - entire Z plane except $z=0$ and $z=\infty$.
17. Which of the following justifies the linearity property of z-transform? $[x(n) \leftrightarrow X(z)]$.
- $x(n)+y(n) \leftrightarrow X(z)Y(z)$
 - $x(n)+y(n) \leftrightarrow X(z)+Y(z)$
 - $x(n)y(n) \leftrightarrow X(z)+Y(z)$
 - $x(n)y(n) \leftrightarrow X(z)Y(z)$
18. If the conversion technique is to be effective, then the LHP of s-plane should be mapped into:
- outside of unit circle
 - unit circle
 - inside unit circle
 - anywhere in circle
19. significantly passes all frequency above cut-off frequency.
- Low Pass Filter
 - High Pass Filter
 - Band Pass Filter
 - Band Stop Filter
20. Impulse Invariance method of IIR filer are mapping, from s-domain to z- domain.
- many to one
 - many to many
 - one to many
 - one to one

SECTION "B"

[5Q. × 8 = 40 marks]

Attempt ANY FIVE questions.

1. a. For the signal $x[n] = |n - 1|$; $-2 \leq n \leq 2$ in graph and find [1 × 4 = 4]
i. $x[n - 2]$.
ii. $x[2 - n]$.
iii. $x[2n]$.
iv. Energy and Power of the signal.
- b. Discuss the following terms. [2 × 2 = 4]
i. Time Variant System and Invariant system.
ii. Stability of LTI System.
2. a. For a LTI system, find the linear convolution between two signal $x[n]$ and $h[n]$, [2.5]
where $x[n] = \begin{cases} 1; & -2 \leq n \leq 1 \\ 0; & \text{elsewhere} \end{cases}$ & $h[n] = \begin{cases} 1; & -1 \leq n \leq 1 \\ 0; & \text{elsewhere} \end{cases}$.
- b. Discuss Nyquist sampling theorem and aliasing in detail. [2.5]
c. State and prove time shifting property of DTFT. [3]
3. a. Compute the circular convolution of following sequences [3]
 $x[n] = \{0, 1, 2, 3, 1\}$ & $h[n] = \{1, 1, 2, 1\}$.
- b. Use the butterfly diagram to compute 8-point DIT- FFT of the following sequence [5]
using radix-2 decimation in time algorithm, $x(n) = \{\frac{1}{2}, \frac{1}{2}, \frac{1}{2}, \frac{1}{2}, 0, 0, 0, 0\}$.
4. a. State time scaling property of Z-transform. Find the inverse Z-transform of [1 + 3]
 $H(z) = \frac{z(z+3)}{z^2-3z+2}$ ROC: $|z| < 2, |z| > 2$.
- b. Find the Lattice Ladder Structure of the following system. [4]
$$H(z) = \frac{1 + 2z^{-1} + 2z^{-2} + z^{-3}}{1 + 0.928z^{-1} + 0.625z^{-2} - 0.33z^{-3}}$$
5. a. Derive a transfer relation of IIR filter, between s-plane and z-plane by using Bilinear Transformation method. [4]
b. Discuss Butterworth Filter Approximations with the help of suitable diagram. [2]
c. Discuss difference between FIR filter and IIR filter. [2]
6. a. Explain FIR filter design using rectangular window. [3]
b. Explain in detail the following terms. [2.5 × 2 = 5]
i. Linear Phase Filter.
ii. Gibbs phenomenon.

