

9. What is the Laplace transform of a delayed unit impulse function $\delta(t-1)$?
 (A) 1 (B) Zero
 (C) $\exp(-s)$ (D) s
10. The Laplace transform of $e^{at} \cos(bt)$ is equal to
 (A) $\frac{s+a}{(s+a)^2+b^2}$ (B) $\frac{s-a}{(s-a)^2+b^2}$
 (C) $\frac{s-a}{(s+a)^2+b^2}$ (D) $\frac{s+a}{(s-a)^2}$
11. The impulse response of a system is $h(t) = \delta(t-0.5)$. If two such systems are cascaded, the impulse response of the overall system will be
 (A) $0.5\delta(t-0.25)$ (B) $\delta(t-0.25)$
 (C) $\delta(t-1)$ (D) $0.5\delta(t-1)$
12. A good measure of similarity between two signal $x_1(t)$ and $x_2(t)$ is
 (A) Convolution (B) Correlation
 (C) Power density spectrum (D) Fourier transform
13. The direct evaluation DFT requires _____ complex multiplications
 (A) $N(N-1)$ (B) N^2
 (C) $N(N+1)$ (D) $\frac{N(N-1)}{2}$
14. The discrete Fourier transform of $x^*(n)$ is
 (A) $x^*(k)$ (B) $x^*(-k)$
 (C) $x(N-k)$ (D) $x^*(N-k)$
15. Which of the following systems are casual?
 (A) $h(n) = \left(\frac{1}{2}\right)^n u(n)$ (B) $h(n) = a^n u(-n)$
 (C) $h(n) = \cos \pi n$ (D) $h(n) = \sin(n\pi/4)$
16. The linear convolution of $x(n) = \{1, 2, 3\}$ and $h(n) = \{4, 5, 6\}$ is given by
 (A) $y(n) = \{4, 13, 28, 27, 18\}$ (B) $y(n) = \{4, 23, 28, 7, 18\}$
 (C) $y(n) = \{14, 13, 2, 27, 18\}$ (D) $y(n) = \{4, 13, 2, 27, 8\}$
17. The region of convergence of the Z-transform of a unit step function is
 (A) $|z| > 1$ (B) $|z| < 1$
 (C) (Real part of z) > 0 (D) (Real part of z) < 0
18. The region of convergence of Z-transform cannot contain
 (A) Zeros (B) Poles
 (C) Complex values (D) Roots
19. Which one of the following represents the impulse response of a system defined by $H(z) = z^{-m}$?
 (A) $\mu(n-m)$ (B) $\delta(n-m)$
 (C) $\delta(m)$ (D) $\delta(m-n)$

20. The minimum number of delay elements required in realizing a digital filter with the transfer function $H(z) = \frac{1+az^{-1}+bz^{-2}}{1+cz^{-1}+dz^{-2}+ez^{-3}}$
 (A) 2 (B) 3
 (C) 4 (D) 5

PART - B (5 × 4 = 20 Marks)
 Answer ANY FIVE Questions

21. Sketch the following signals
 (i) $x(t) = 2u(t-1)$
 (ii) $x(t) = 3r(t-1)$
22. Evaluate the following integrals
 (i) $\int_{-\alpha}^{\alpha} e^{-at^2} \delta(t-10) dt$
 (ii) $\int_{-\alpha}^{\alpha} [\delta(t) \cos t + \delta(t-1) \sin t] dt$
23. State and prove Parseval's relation in Fourier series.
24. Determine the response of an LTI system with impulse response $h(t) = e^{-2t} u(t)$ for the input $x(t) = \cos 10t$ using Fourier transform.
25. State initial value and final value theorem for Laplace transform.
- 26.(i) State the condition for the existence of DTFT.
 (ii) Find the DTFT for the signal $x(n) = u(n-k)$.
27. Using Z-transform, find the convolution of two sequences $x_1(n) = \{1, 2, -1, 0, 3\}$, $x_2(n) = \{1, 2, -1\}$.

PART - C (5 × 12 = 60 Marks)
 Answer ALL Questions

28. a.i. Test whether the signal is periodic or not
 (1) $x(t) = te^{\sin(t)}$
 (2) $x(t) = 2\cos(10t+1) - \sin(4t-1)$
 ii. Find the energy and power of the signal
 (1) $x(t) = tu(t)$
 (2) $x(n) = 2e^{j3\pi n}$
- (OR)
- b. Check whether the given systems are static, causal, time invariant, linear and stable or not
 (1) $y(t) = \text{odd } x(t)$
 (2) $y(n) = \cos[x(n)]$
29. a. Obtain the trigonometric fourier series representation of a half wave rectifier.

(OR)