100 MCQ

FOURIER TRANSFORM, LAPLACE TRANSFORM & Z- TRANSFORM

Q1. Which of the following is an even function of t.?

(a) t^2
(b) $t^2 - 4t$
(c) sin2t + 3t
(d) $t^3 + 6$

Q2. "A periodic function" is given by a function which

(a) Has a period T = 2π
(b) Satisfied f(t + T) = f(t)
(c) Satisfied f(t + T) = - f(t)
(d) Has a period T = π

Q3. The Fourier Transform of a real valued time signal has

(a) Odd symmetry
(b) Even symmetry
(c) Conjugate symmetry
(d) Real

Q5. The Fourier Transform of a signal h(t) is H(jω) = (2cosω)(sin2ω)/ω. The value of h(0) is

(a) ¼
(b) ½
(c) 1
(d) 2

Q6. A signal X(t) has a Fourier Transform X(ω). If X(t) is real and odd Function of t, then X(ω) is

(a) A real and even function of ω
(b) An imaginary and odd function of ω
(c) An imaginary and even function of ω
(d) A real and odd function of ω

Q7. The Fourier Transform of a conjugate symmetric function is always

(a) Imaginary
(b) Conjugate anti-symmetric
(c) Real
(d) Conjugate symmetric

Q8. A signal is represented by $x(t) = \begin{cases} 1, |t| < 1 \\ 0, |t| > 1 \end{cases}$. The Fourier Transform of the convolved signal y(t) = x(2t)*x(t/2) is

(a) $\frac{4}{\omega^2}\sin\left(\frac{\omega}{2}\right)$

(b) $\frac{4}{\omega^2}\sin(\omega)$

(c) $\frac{4}{\omega^2}\sin(2\omega)$

(d) $\frac{4}{\omega^2}\sin^2\omega$

Q9. A differentiable non-constant even function x(t) has a derivative y(t), and their respective Fourier Transform of X(ω) and Y(ω). Which of the following statement is true?

(a) X(ω) and Y(ω) are both real

(b) X(ω) is real and Y(ω) is imaginary

(c) X(ω) and Y(ω) are both imaginary

(d) X(ω) is imaginary and Y(ω) is real

Q10. Let $x(t) = \mathrm{rect}\left(t - \frac{1}{2}\right)$ (where rect(x) = 1 for $-\frac{1}{2} \le x \le \frac{1}{2}$ and zero otherwise). Then if $\sin(cx) = \frac{\sin \pi x}{\pi x}$, the Fourier Transform of x(t) + x(-t) will be given by

(a) $\mathrm{sinc}\left(\frac{\omega}{2\pi}\right)$

(b) $2\mathrm{sinc}\left(\frac{\omega}{2\pi}\right)$

(c) $2\mathrm{sinc}\left(\frac{\omega}{2\pi}\right)\cos\left(\frac{\omega}{2}\right)$

(d) $\mathrm{sinc}\left(\frac{\omega}{2\pi}\right)\sin\left(\frac{\omega}{2}\right)$

Q11. The Fourier Transform of the exponential signal $e^{j\omega_0 t}$ is

(a) A constant

(b) A rectangular gate

(c) An impulse

(d) A series of impulses

Q12. Inverse Fourier Transform of u(ω) is

(a) $\frac{1}{2}\delta(t) + \frac{1}{\pi t}$

(b) $\frac{1}{2}\delta(t)$

(c) $2\delta(t) + \frac{1}{\pi t}$

(d) $\delta(t) + \sin(t)$

Q13. The Fourier Transform of $f(x) = \begin{cases} 1, |x| < 1 \\ 0, |x| > 1 \end{cases}$ is

(a) $\frac{2\cos s}{s}$

(b) $\frac{2\sin s}{s}$

(c) $\frac{\cos(s)}{s}$

(d) $\frac{\sin s}{s}$

Q14. If F(s) is the Fourier Transform of f(x), then F[f(ax)] is

(a) $sF\left(\frac{s}{a}\right)$

(b) $\frac{1}{s}F\left(\frac{s}{a}\right)$

(c) $\frac{1}{a}F\left(\frac{s}{a}\right)$

(d) $aF\left(\frac{s}{a}\right)$

Q15. If F(s) is the Fourier Transform of f(x), then F[f(x-a)] is

(a) $e^{as}F(s)$

(b) $e^{-as}F(s)$

(c) $e^{ias}F(s)$

(d) $e^{-ias}F(s)$

Q16. The value of integral $\int_0^{\infty} \frac{\sin s}{s} ds$ is

(a) 0

(b) $-\frac{\pi}{2}$

(c) $\frac{\pi}{2}$

(d) 1

Q17. If F(s) is the Complex Fourier Transform of f(x), then F[f(x)cosax] is

(a) $\frac{1}{2}[F(s+a) - F(s-a)]$

(b) $\frac{1}{2}[F(s+a) + F(s-a)]$

(c) $\frac{1}{2}[F(a+s) + F(a-s)]$

(d) $\frac{1}{2}[F(a+s) - F(a-s)]$

Q18. If the Fourier Transform of f(x) and g(x) are F(s) and G(s) respectively, then $\frac{1}{2\pi}\int_{-\infty}^{\infty} F(s)\overline{G(s)}\, ds$ is

(a) $\int_{-\infty}^{\infty} \overline{f(x)}g(x)dx$

(b) $\int_{-\infty}^{\infty} f(x)\overline{g(x)}dx$

(c) $\int_0^{\infty} \overline{f(x)}g(x)dx$

(d) $\int_0^{\infty} f(x)\overline{g(x)}dx$

Q19. The value of the integral $\int_0^{\infty} \frac{dt}{(4+t^2)(9+t^2)}$ is

(a) $\frac{\pi}{50}$

(b) $\frac{\pi}{45}$

(c) $\frac{\pi}{36}$

(d) $\frac{\pi}{60}$

Q20. The value of the integral $\int_0^\infty \frac{t^2}{(t^2+1)^2} dt$ is

(a) $\frac{\pi}{2}$

(b) $\frac{\pi}{6}$

(c) $\frac{\pi}{4}$

(d) $\frac{\pi}{3}$

Q21. If the Fourier Transform of $f(x) = \begin{cases} 1 - |x|, |x| < 1 \\ 0, \quad |x| > 1 \end{cases}$ is $\frac{2(1-\cos s)}{s^2}$, then the value of the integral $\int_0^\infty \frac{\sin^4 t}{t^4} dt$ is

(a) $\frac{\pi}{6}$

(b) $\frac{\pi}{2}$

(c) $\frac{\pi}{4}$

(d) $\frac{\pi}{3}$

Q22. The Fourier Transform of $\frac{\partial u}{\partial x}$ is

(a) $F[u]$

(b) $is^2F[u]$

(c) $-isF[u]$

(d) $-is^2F[u]$

Q23. The Fourier Transform of $\frac{\partial^2 u}{\partial x^2}$ is

(a) $s^2F[u]$

(b) $sF[u]$

(c) $-s^2F[u]$

(d) $-sF[u]$

Q24. The signal described by $x(t) = \begin{cases} 1, -1 \le t \le 1 \\ 0, \text{ otherwise} \end{cases}$. Two of angular frequencies at which its Fourier Transform becomes zero are

(a) π, 2π

(b) 0.5π, 1.5π

(c) 0, π

(d) 2π, 2.5π

Q25. The Fourier sine transform of e^{-ax} is

(a) $\frac{a}{s^2+a^2}$

(b) $\frac{s}{s^2+a^2}$

(c) $\frac{a}{s^2-a^2}$

(d) $\frac{s}{s^2-a^2}$

Q26. The Fourier cosine transform of e^{-ax} is

(a) $\frac{a}{s^2+a^2}$ (c) $\frac{a}{s^2-a^2}$

(b) $\frac{s}{s^2+a^2}$ (d) $\frac{s}{s^2-a^2}$

MCQ ON LAPLACE TRANSFORM

Q27. If L[f(t)] = F(s) then the L.T. of $e^{at}f(t)$ is

a) $\frac{1}{s}F\left(\frac{s}{a}\right)$ c) $\frac{1}{a}F\left(\frac{s}{a}\right)$

b) $\frac{1}{s}F\left(\frac{a}{s}\right)$ d) $\frac{1}{a}F\left(\frac{a}{s}\right)$

Q28. If L[f(t)] = F(s) then the L.T. of tf(t) is

a) $sF(s)$ c) $F'(s)$

b) $-sF(s)$ d) $-F'(s)$

Q29. If L[f(t)] = F(s) then the L.T. of f(t)/t is

a) $\int_0^\infty F(s)ds$ d) $\int_s^\infty \frac{F(s)}{s}ds$

b) $\int_s^\infty F(s)ds$

c) $\int_0^\infty \frac{F(s)}{s}ds$

Q30. The value of the integral $\int_0^\infty e^{-3t}\sin t\,dt$ is

a) $\frac{9}{10}$ c) $\frac{7}{10}$

b) $\frac{1}{10}$ d) $\frac{3}{10}$

Q31. The inverse Laplace transform of $\cot^{-1}\left(\frac{s}{a}\right)$ is

a) $\frac{\cos at}{t}$ c) $\frac{\sin at}{t}$

b) $\frac{1}{a}\frac{\cos t}{t}$ d) $\frac{1}{a}\frac{\sin t}{t}$

Q32. The solution of the integral equation

$y(t) = e^{-t} - 2\int_0^t y(u)\cos(t-u)\,du$ is

a) $e^t(1-t)^2$ c) $e^{-t}(1+t)^2$

b) $e^t(1+t)^2$ d) $e^{-t}(1-t)^2$

Q33. If u(t – a) is the unit step function the the Laplace transform of u(t – a) is

a) $\frac{e^{as}}{s}$ c) $\frac{e^{-as}}{s}$

b) se^{as} d) se^{-as}

Q34. The Laplace transform of sintu(t – 1) is

a) $\frac{e^{-\pi s}}{s^2+1}$

b) $\frac{e^{\pi s}}{s^2+1}$

c) $-\frac{e^{-\pi s}}{s^2+1}$

d) $-\frac{e^{\pi s}}{s^2+1}$

Q35 The solution of the differential equation $(D^2 - 2D + 2)x = 0, x(0) = x'(0) = 0$ is

a) $e^{-t}\cos t$

b) $e^{t}\cos t$

c) $e^{-t}\sin t$

d) $e^{t}\sin t$

Q36. The solution of the simultaneous differential equations $D^2x + y = -5\cos 2t,\ D^2y + x = 5\cos 2t$, where $x(0) = x'(0) = y'(0) = 1$ and $y(0) = -1$ is

a) $x = \sin t - \cos 2t, y = \sin t - \cos 2t$

b) $x = \sin t + \cos 2t, y = \sin t + \cos 2t$

c) $x = \sin t + \cos 2t, y = \sin t - \cos 2t$

d) $x = \sin t - \cos 2t, y = \sin t + \cos 2t$

Q37. The Laplace transform of $\int_0^t \frac{\sin t}{t} dt$ is

a) $\cot^{-1}s$

b) $s\cot^{-1}s$

c) $\tan^{-1}s$

d) $\frac{1}{s}\cot^{-1}s$

Q38. The inverse Laplace transform of $\frac{s+8}{s^2+4s+5}$ is

a) $e^{-2t}(\cos t + 6\sin t)$

b) $e^{2t}(\cos t + 6\sin t)$

c) $e^{-2t}(\cos t - 6\sin t)$

d) $e^{2t}(\cos t - 6\sin t)$

Q39. The Laplace transform of a function f(t) is $\frac{1}{s^2(s+1)}$. The function f(t) is

a) $t - 1 + e^{-t}$

b) $t + 1 + e^{-t}$

c) $-1 + e^{-t}$

d) $2t + e^{t}$

Q40. The Laplace transform of a function f(t) is $\frac{1}{s(s^2+4)}$. The function f(t) is

a) $\frac{1}{4}(1 + \cos 2t)$

b) $\frac{1}{4}(1 - \cos 2t)$

c) $\frac{1}{4}(1 + \sin 2t)$

d) $\frac{1}{4}(1 - \sin 2t)$

Q41. The Laplace transform of a function f(t) is $\frac{4s+1}{16s^2-25}$. The function f(t) is

a) $\frac{1}{5}\cosh\left(\frac{4}{5}t\right) + \frac{4}{3}\sinh\left(\frac{4}{5}t\right)$

b) $\frac{1}{5}\cosh\left(\frac{5}{4}t\right) + \frac{3}{4}\sinh\left(\frac{5}{4}t\right)$

c) $\frac{1}{4}\cosh\left(\frac{5}{4}t\right) + \frac{3}{4}\sinh\left(\frac{5}{4}t\right)$

d) $\frac{1}{4}\cosh\left(\frac{4}{5}t\right) + \frac{3}{4}\sinh\left(\frac{4}{5}t\right)$

Q42. The inverse Laplace transform of $\frac{s}{(s+a)^2}$ is

a) $(1+at)e^{-at}$
b) $(1+at)e^{at}$
c) $(1-at)e^{at}$
d) $(1-at)e^{-at}$

Q43 The inverse Laplace transform of $\frac{s}{(s^2+a^2)^2}$ is

a) $\frac{1}{2a}tcosat$
b) $\frac{1}{2a}tsinat$
c) $\frac{1}{a}tcosat$
d) $\frac{1}{a}tsinat$

Q44 The inverse Laplace transform of $\frac{1}{(s^2+a^2)^2}$ is

a) $\frac{1}{2a^3}(sinat + atcosat)$
b) $\frac{1}{2a^3}(cosat + atsinat)$
c) $\frac{1}{2a^3}(sinat - atcosat)$
d) $\frac{1}{2a^3}(cosat - atsinat)$

Q45. If $L\left[2\sqrt{\frac{t}{\pi}}\right] = \frac{1}{s^{3/2}}$ then $L\left[\frac{1}{\sqrt{\pi t}}\right]$ is

a) $\frac{1}{s^{-1/2}}$
b) $\frac{1}{s^{1/2}}$
c) $\frac{1}{s^{3/2}}$
d) $\frac{1}{s^{-3/2}}$

Q46. The Laplace transform of t^3e^{-3t} is

a) $\frac{2!}{(s+3)^4}$
b) $\frac{2!}{(s+3)^3}$
c) $\frac{3!}{(s+3)^3}$
d) $\frac{3!}{(s+3)^4}$

Q47. The Laplace transform of $\frac{cosat-cosbt}{t}$ is

a) $\frac{1}{2}\log\left(\frac{s^2+b^2}{s^2+a^2}\right)$
b) $\frac{1}{2}\log\left(\frac{s^2-b^2}{s^2-a^2}\right)$
c) $\frac{1}{2}\log\left(\frac{s^2+a^2}{s^2+b^2}\right)$
d) $\frac{1}{2}\log\left(\frac{s^2-a^2}{s^2-b^2}\right)$

Q48. If $L^{-1}[F(s)] = f(t)$ and $L^{-1}[G(s)] = g(t)$ then $L^{-1}[F(s).G(s)]$ is

a) $\int_0^\infty f(t)g(t-u)dt$
b) $\int_0^\infty f(u)g(t-u)du$
c) $\int_0^t f(u)g(t-u)du$
d) $\int_0^t f(t)g(t-u)dt$

Q49. The solution of the integral equation $F(t) = \frac{1}{2}t^2 - \int_0^t (t-u)F(u)du$ is

a) 1 + cost
b) 1 + sint
c) 1 – sint
d) 1 – cost

Q50. The inverse Laplace transform of $\frac{e^{-2s}}{s-3}$ is

a) $e^{3(t+2)}u(t+2)$
b) $e^{3(t-2)}u(t-2)$
c) $e^{3t}u(3t)$
d) $e^{2t}u(2t)$

Q51. The Laplace transform of the square wave function of period 'a' defined by

$f(t) = \begin{cases} 1, 0 < t < \frac{a}{2} \\ -1, \frac{a}{2} < t < a \end{cases}$ is

a) $\frac{1}{s}\coth\left(\frac{as}{4}\right)$
b) $\frac{1}{s}\tanh\left(\frac{as}{4}\right)$
c) $s\coth\left(\frac{as}{4}\right)$
d) $s\tanh\left(\frac{as}{4}\right)$

Q52. The inverse L.T. of $\frac{2s^2-4}{(s-3)(s^2-s-2)}$ is

(a) $(1+t)e^{-t} + \frac{7}{2}e^{-3t}$
(b) $\frac{e^t}{3} + te^{-t} + 2t$
(c) $\frac{7}{2}e^{3t} - \frac{e^{-t}}{6} - \frac{4}{3}e^{2t}$
(d) $\frac{7}{2}e^{-3t} - \frac{e^t}{6} - \frac{4}{3}e^{-2t}$

Q53. The inverse L.T. of the function $\frac{1}{s(s+1)}$ is

(a) Sint
(b) $e^{-t}\sin t$
(c) e^{-t}
(d) $1 - e^{-t}$

Q54. The function f(t) satisfies the differential equation $\frac{d^2f}{dt^2} + f = 0$ and the auxiliary conditions, f(0)=0, $f'(0) = 4$.the Laplace Transform of f(t) is given by

(a) $\frac{2}{s+1}$
(b) $\frac{4}{s+1}$
(c) $\frac{4}{s^2+1}$
(d) $\frac{2}{s^4+1}$

Q55. The Laplace Transform of $cos\omega t$ is $\frac{s}{s^2+\omega^2}$. The L.T. of $e^{-2t}cos4t$ is

(a) $\frac{s-2}{(s-2)^2+16}$
(b) $\frac{s+2}{(s-2)^2+16}$
(c) $\frac{s-2}{(s+2)^2+16}$
(d) $\frac{s+2}{(s+2)^2+16}$

Q56. The Laplace Transform of a function $f(t) = \begin{cases} 1 \; if \; a \le x \le b \\ 0 \; otherwise \end{cases}$

(a) $\frac{a-b}{s}$

(b) $\frac{e^{s}(a-b)}{s}$

(c) $\frac{e^{-as}-e^{-bs}}{s}$

(d) $\frac{e^{s(a-b)}}{s}$

Q57. The Laplace Transform ofe^{i5t} where $i = \sqrt{-1}$ is

(a) $\frac{s-5i}{s^2-25}$

(b) $\frac{s+5i}{s^2+25}$

(c) $\frac{s+5i}{s^2-25}$

(d) $\frac{s-5i}{s^2+25}$

Q58. The Laplace Transform of a function $(t) = \frac{1}{s^2(s+1)}$. The f(t) is

(a) $t - 1 + e^{t}$

(b) $t + 1 + {}^{e-t}$

(c) $-1 + e^{t}$

(d) $2t + e^{t}$

Q59. If F(s) is the Laplace Transform of function f(t), then L.T of $f'(t)$ is

(a) $\frac{1}{s}\ F(s)$

(b) $\frac{1}{s}\ F(s) - f(0)$

(c) $sF(s) - f(0)$

(d) $\int F(s)ds$

Q60 Let $X(s) = \frac{3s+5}{s^2+10s+21}$ be the L.T of a Signal x(t). Then $x(0^{+})$ is

(a) 0

(b) 3

(c) 5

(d) 21

Q61 Given $f(t) = L^{-1}\left[\frac{3s+1}{s^3+4s^2+(k-3)s}\right]$. $\lim_{n\to\infty} f(t) = 1$ then the value of k is

(a) 1

(b) 2

(c) 3

(d) 4

Q62. Which f the following is the L.T of$f(t) = \begin{cases} 1 & if\ o \le t \le 2 \\ t^{2-4t+4} & if\ t>2 \end{cases}$

(a) $\frac{2e^{-2s}}{s^3}$

(b) $\frac{1-e^{-2s}}{s} + \frac{2e^{-2s}}{s^3}$

(c) $\frac{e^{-2s}}{s^3} + \frac{2-2e^{-2s}}{s^3}$

(d) $\frac{2-2e^{-2s}}{s^3}$

Q63. The inverse L.T of $F(s) = \frac{2s+3}{s^2+4s+13}$ is

(a) $e^{2t}(2\cos 3t - \frac{1}{3}\sin 3t)$

(b) $e^{-2t}(2\cos 3t - \frac{1}{3}\sin 3t)$

(c) $2\cos 3(t+2) - \frac{1}{3}\sin 3(t+2)$ (d) $2\cos 3(t-2) - \frac{1}{3}\sin 3(t-2)$

Q 64 Suppose that the function y(t) satisfies the differential equation $y'' - 2y' - y = 1$ with initial values $y(0) = -1, y'(0) = 1$. Then the L.T of y(t) is

(a) $\frac{1}{s^2-2s-1}$
(b) $\frac{1}{s(s^2-2s-1)}$
(c) $\frac{s+1}{s^2-2s-1} + \frac{1}{s(s^2-2s-1)}$
(d) $\frac{-s+3}{s^2-2s-1} + \frac{1}{s(s^2-2s-1)}$

Q.65 The L.T of the Function $f(t) = \begin{cases} 1 & if\ o < t < 1 \\ t, & t > 1 \end{cases}$ equals

(a) $\frac{1}{s} + e^{-s}(\frac{1}{s^2} - \frac{2}{s})$
(b) $-\frac{1}{s} + e^{-s}(-\frac{1}{s^2} + \frac{2}{s})$
(c) $-\frac{1}{s} - \frac{e^{-s}}{s^2}$
(d) $\frac{1}{s} + \frac{e^{-s}}{s^2}$

Q 66 At t=0, the inverse L.T of the function $\frac{1}{(s+1)(s^2-1)}$ is

(a) 0
(b) 1
(c) ½
(d) None of these

Q67. The L.T of the functions t u(t) and sint u(t) are respectively

(a) $\frac{1}{s^2}, \frac{s}{s^2+1}$
(b) $\frac{1}{s^2}, \frac{1}{s^2+1}$
(c) $\frac{1}{s}, \frac{s}{s^2+1}$
(d) $s, \frac{s}{s^2+1}$

Q 68. In what range should Re(s) remains so that the L.T of the function $e^{(a+2)t+5}$ exits?

(a) Re(s)> a+2
(b) Re(s) > a+7
(c) Re(s)<2
(d) Re(s)> a+5

Q 69. If $F(s) = L[f(t] = \frac{2(s+1)}{(s^2+4s+7}$, then the initial and final values are respectively

(a) 0,2
(b) 2,0
(c) 0,2/7
(d) 2/7,0

Q 70. Given $f(t) = L^{-1}\left[\frac{3s+1}{s^3+4s^2+(k-3)s}\right]. \lim_{n\to\infty} f(t) = 1$ then the value of k is

(a) 1
(b) 2
(c) 3
(d) 4

Q 71. Given that F(s) is a one sided L.T. of of f(t), the L.T. of $\int_0^t f(t)dt$ is

(a) sF(s) – f(0)

(b) $\frac{F(s)}{s}$

(c) $\int_s^\infty F(s)ds$

(d) $\frac{1}{s}[F(s) - f(0)]$

Q 72. Consider the function f(t) having the L.T. $F(s) = \frac{\omega_0}{s^2+\omega_0^2}$ Res(s) > 0, the final value of f(t) would be

(a) 0

(b) 1

(c) $-1 \leq f(\infty) \leq 1$

(d) ∞

Q 73. If L.T. of a signal y(t) is $y(s) = \frac{1}{s(s+1)}$, then its final value is

(a) -1

(b) 0

(c) 1

(d) Unbounded

Q 74. If the L.T. of f(t) is $\frac{\omega}{s^2+\omega^2}$, then the value of $\lim_{n\to\infty} f(t)$ is

(a) Cannot be determined

(b) Zero

(c) Unity

(d) Infinity

Q 75. The unit impulse response of a linear time invariant system is the unit step function u(t). For t > 0, the response of the system to an excitation $e^{-at}u(t)$, a > 0 will be

(a) ae^{-at}

(b) $\frac{1-e^{-at}}{a}$

(c) $a(1-e^{-at})$

(d) $1-e^{-at}$

Q 76. Let L[f(t)] = F(s), then L.T. of $e^{at}f(t)$ is

(a) F(s + a)

(b) F(s – a)

(c) F(a – s)

(d) 1/s F(a + s)

TOPIC- Z- TRANSFORM

Q77. The Z-Transform of the function $\sum_{k=0}^{\infty} \delta(n-k)$ is

(a). $\frac{z-1}{z}$

(b). $\frac{z}{(z-1)^2}$

(c). $\frac{z}{z-1}$

(d). $\frac{(z-1)^2}{z}$

Q78. The Z-Transform of the sequence x[n] is given by $x[z] = \frac{0.5}{1-2z^{-1}}$. It is given that the region of convergence of x[z] includes the unit circle. The value of x[0] is

(a). -0.5 (c). 0.25

(b). 0 (d). 0.5

Q79. The region of convergence of the Z- Transform of a unit step function is

(a). $|z|>1$ (c). (Real part of z)>0

(b). $|z|<1$ (d). (Real part of z)<0

Q80. The region of convergence of the Z-Transform of the signal $2^n u(n) - 3^n u(-n-1)$ is

(a). $|z|>1$ (c). $2<|z|<3$

(b). $|z|<1$ (d). Does not exist

Q81. The bilateral Z-Transform of sequence $x[n] = -a^n u[-n-1]$ is

(a). $\frac{1}{1-az^{-1}}$ (c). $\frac{-1}{1-az^{-1}}$

(b). $\frac{a}{z-a}$ (d). $\frac{1}{z-a}$

Q82. The unilateral Z-Transform of sequence x[n] = {1,2,2,1} is

(a). $1 + 2z + 2z^2 + z^3$ (c). $z^3 + 2z^2 + 2z + \frac{1}{z}$

(b). $1 + \frac{2}{z} + \frac{2}{z^2} + \frac{1}{z^3}$ (d). $1 + \frac{1}{z} + \frac{2}{z^2} + \frac{2}{z^3} + \frac{1}{z^4}$

Q83. The region of convergence of the Z-Transform of the sequence $x[n] = -a^n u[-n-1]$ is

(a). $|z| > |a|$ (c). $|z| < |a|$

(b). $|z|>0$ (d). $|z| < 0$

Q84. The region of convergence of the Z-Transform of the sequence $x[n] = a^n u[n]$ is

(a). $|z| < |a|$ (c). $|z|>0$

(b). $|z|>|a|$ (d). entire Z-plane

Q85. The region of convergence of the Z-Transform of the sequence

$x[n] = \left(\frac{1}{2}\right)^n u[-n-1] + \left(-\frac{1}{3}\right)^n u[n]$ is

(a). $|z| < \frac{1}{3}$ (c). $|z| > \frac{1}{2}$

(b). $\frac{1}{2} < |z| < \frac{1}{3}$ (d). $|z| < \frac{1}{2}$

Q86. The region of convergence of the Z-Transform of the sequence

$x[n] = \left(-\frac{1}{2}\right)^n u[-n-1] - \left(-\frac{1}{3}\right)^n u[-n-1]$ is

(a). $|z| < \frac{1}{3}$ (c). $|z| > \frac{1}{2}$

(b). $\frac{1}{2} < |z| < \frac{1}{3}$ (d). $|z| < \frac{1}{2}$

Q87. The time sequence x[n], corresponding to Z-Transform $x[n] = (1 + z^{-1})^3$, $|z| > 0$ is

(a). $\{\underset{\uparrow}{3}, 3, 1, 1\}$ (c). $\{1, 3, 1, \underset{\uparrow}{1}\}$

(b). $\{\underset{\uparrow}{1}, 3, 3, 1\}$ (d). $\{1, \underset{\uparrow}{3}, 3, 1\}$

Q88. The Z-Transform of the sequence $x[n] = (2)^{n+1}u[n] + (3)^{n+1}u[-n-1]$ is

(a). $\frac{5+12z^{-1}}{1-5z^{-1}+6z^{-2}}$

(b). $\frac{z^{-1}}{1-5z^{-1}+6z^{-2}}$

(c). $\frac{5}{1-5z^{-1}+6z^{-2}}$

(d). $\frac{-1}{1-5z^{-1}+6z^{-2}}$

Q89. Let x[z] be the bilateral Z-Transform of a sequence x[n] given as $x[z] = \frac{1}{z^2-4}$,

ROC : $|z| < 2$. The Z-Transform of signal x[n – 2] is

(a). $\frac{z^2}{z^2-4}$

(b). $\frac{1}{(z-2)^2-4}$

(c). $\frac{z^{-2}}{z^2-4}$

(d). $\frac{z^2}{(z+2)^2-4}$

Q90. Let $\alpha^n u[n] \overset{z}{\leftrightarrow} \frac{1}{(1-\alpha z^{-1})}$, then what will be the Z-Transform of sequence $\alpha^{-n}u[-n]$?

(a). $\frac{1}{1-\alpha z}$

(b). $\frac{\alpha}{z-1}$

(c). $\frac{z}{z-\alpha}$

(d). $\frac{1}{z-\alpha}$

Q91. Which of the following corresponds to Z-Transform of the sequence $x[n] = (n+1)a^n u[n]$?

(a). $\frac{az^{-1}}{(1-az^{-1})^2}$

(b). $\frac{z^{-1}}{(1-az^{-1})^2}$

(c). $\frac{1}{(1-az^{-1})^2}$

(d). $\frac{(1+az^{-1})}{(1-az^{-1})}$

Q92. If the Z-Transform of the unit step sequence is given as $u[n] \overset{z}{\leftrightarrow} \frac{1}{(1-z^{-1})}$, then the Z-Transform of the sequence $\left(\frac{1}{3}\right)^n u[n]$ is

(a). $\frac{3}{1-z^{-1}}$

(b). $\frac{1}{3(1-z^{-1})}$

(c). $\frac{1}{1-\frac{1}{3}z^{-1}}$

(d). $\frac{1}{1-3z^{-1}}$

Q93 Let x[z] be Z-Transform of a DT sequence $x[n] = (-0.5)^n u[n]$. Consider another signal y[n] and its Z-Transform y[z] given as $y[z] = x(z^2)$. What is the value of y[n] at n = 4?

(a). 2

(b). 4

(c). ½

(d). ¼

Q94. If the Z-Transform of the unit step sequence is given as $u[n] \overset{z}{\leftrightarrow} \frac{1}{(1-z^{-1})}$, then the Z-Transform of the sequence $au[n] - bu[n-1]$ is

(a). $\frac{b-az^{-1}}{1-z^{-1}}$

(b). $\frac{a}{1-bz^{-1}}$

(c). $\frac{a-bz^{-1}}{1-z^{-1}}$

(d). $\frac{b}{1-az^{-1}}$

Q95. Consider a sequence $x[n] = x_1[n] * x_2[n]$ and its Z-Transform is x[z]. it is given that $x_1[n] = \{1,2,2\}$, $x_2[n] = \begin{cases} 1, & 0 \le z \le 2 \\ 0, & \text{elswhere} \end{cases}$, then $x[z]|_{z=1}$ is

(a). 8
(b). 15
(c). 7
(d). 4
(e).

Q96. The Z-Transform of a causal system is given as $x[z] = \frac{2-1.5z^{-1}}{1-1.5z^{-1}+0.5z^{-2}}$. The value of x[0] is

(a). -1.5
(b). 2
(c). 1.5
(d). 0

Q97. Given the Z-Transform $x[z] = \frac{z(8z-7)}{4z^2-7z+3}$. The limit of $x[\infty]$ is

(a). 1
(b). 2
(c). ∞
(d). 0

Q98. A discrete time system has the following input – output relationship $y[n] - \frac{1}{2}y[n] = x[n]$. If an input $x[n] = u[n]$ is applied to the system, then its zero state response is

(a). $\left[\frac{1}{2} - (2)^n\right]u[n]$
(b). $\left[2 - \left(\frac{1}{2}\right)^n\right]u[n]$
(c). $\left[\frac{1}{2} - \left(\frac{1}{2}\right)^n\right]u[n]$
(d). $[2 - (2)^n]u[n]$

Q99. A system is described by the differential equation $y[n] - \frac{1}{2}y[n-1] = 2x[n-1]$. The impulse response of the system is

(a). $\frac{1}{2^{n-2}}u[n-1]$
(b). $\frac{1}{2^{n-2}}u[n+1]$
(c). $\frac{1}{2^{n-2}}u[n-2]$
(d). $-\frac{1}{2^{n-2}}u[n-2]$

Q100. If the Z-Transform of a sequence $x[n] = \{1,1,-1,\underset{\uparrow}{-1}\}$ is x[z], then the value of x[1/2] is

(a). 9
(b). -1.125
(c). 1.875
(d). 15

Q101. For a signal $x[n] = [\alpha^n + \alpha^{-n}]u[n]$, the ROC of its Z-Transform is

(a). $|z| > min\left(|\alpha|, \frac{1}{|\alpha|}\right)$
(b). $|z| > |\alpha|$
(c). $|z| > max\left(|\alpha|, \frac{1}{|\alpha|}\right)$
(d). $|z| < |\alpha|$