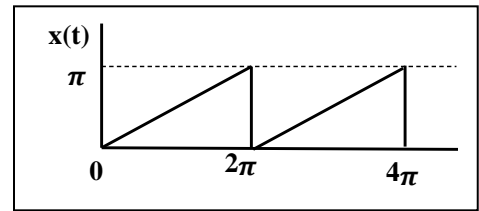
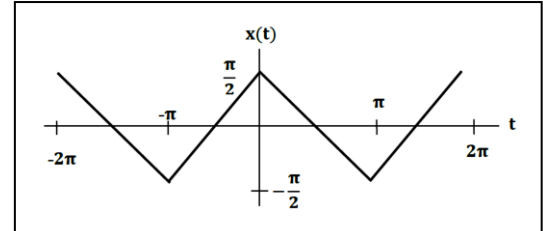


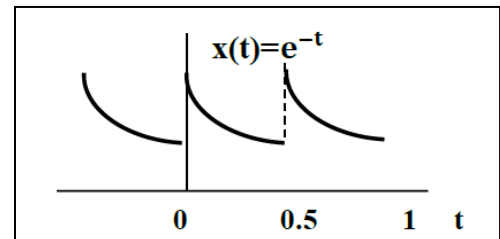
Q1. Find the trigonometric Fourier series for the function shown.



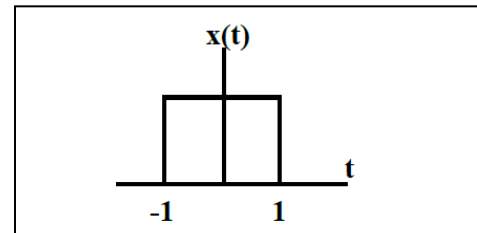
Q2. Find the trigonometric Fourier series for the function shown



Q3. Find the exponential Fourier series for the function shown



Q4. Find and plot the spectrum for the gate function shown



Q5. Find $\mathcal{F}\{e^{-a|t|}\}$

Q6. Find $u(t) \otimes u(t)$

Q7. Find $x(t)$ using the convolution property if $X(W) = \frac{1}{(a+jW)^2}$

Q8. Plot the functions: a) $3u(-t+7)$, b) $4 \text{ sint } \{ u(t-1) - u(t-3) \}$

Q9. Given a sequence $x(n)$ for $0 \leq n \leq 3$ where $x(0)= 2$, $x(1)= 1$, $x(2)= -1$ and $x(3)= -2$ Evaluate its DFT $X(k)$.

Q10. In Question 9, find DFT using decimation in frequency FFT (DIF FFT). Compare the results with Q9.

Q11. Find $X(k)$ using DIF FFT, if $x(n)=[1 \ -1 \ 0 \ -1 \ 2 \ 3 \ -2 \ 4]$ for $0 \leq n \leq 7$.

Q12. Given a sequence $X(K)=[7 \ 4+4i \ 3 \ 3-4i]$ for $0 \leq n \leq 3$. Find its $x(n)$ using IDFT.

Q13. In Question 12, find $x(n)$ using DIF IFFT. Compare the results with Q12.

Q14. Find the number of complex multiplications of DFT and the number of complex multiplications of FFT, if $N=16$.

Q15. Find the Fourier Cosine transform of $f(x) = \begin{cases} x, & 0 < x < 1 \\ 2 - x, & 1 < x < 2 \\ 0, & x > 2 \end{cases}$

Q16. Find the function $f(t)$, if its sine transform is given by e^{aW} .

Q17. Show that $\int_{-\infty}^{\infty} \delta(t - a) f(t) dt = f(a)$

Q18. Show that $\mathfrak{F}\{\delta(t - t_0)\} = e^{-jWt_0}$

Q19. Show that $\mathfrak{F}\{x(at)\} = \frac{1}{|a|} X\left(\frac{W}{a}\right)$

Q20. Show that $\mathfrak{F}\{x(t - t_0)\} = e^{-jWt_0} X(W)$

Q21. Find $\mathcal{L}\{f(t)\}$ $f(t) = \begin{cases} 0, & 0 \leq t < 1 \\ t - 1, & 1 \leq t < 2 \\ 0, & t \geq 2. \end{cases}$ if

Q22. Show that $\mathcal{L}\{\cosh at\} = \frac{s}{s^2 - a^2}$

Q23. Find $\mathcal{L}\{6 \sin 2t + 4 \cos 6t\}$

Q24. Find $\mathcal{L}\{2 \cosh 2t - \sinh 3t\}$

Q25. Find $\mathcal{L}\{2 t^4 e^{3t}\}$

Q26. Find $\mathcal{L}\{4e^{3t} \cos 5t\}$

Q27. Verify the initial value theorem for the voltage function $(5 + 2 \cos 3t)$ volts.

Q28. Verify the final value theorem for the function $(2 + 3e^{2t} \sin 4t)$ cm, which represents the displacement of a particle

Q29. Find $\mathcal{L}\{\sin^2 t\}$

Q30. Find $\mathcal{L}\{4e^{-2t} \cosh 3t\}$

Q31. Find $\mathcal{L}\{3e^{-2(t-2)} u(t - 2)\}$

Q32. Find $\mathcal{L}\{\cos t u(t - 4)\}$

Q33. Find $\mathcal{L}^{-1}\left\{\frac{s+1}{s^2+s-6}\right\}$

Q34. Find $\mathcal{L}^{-1}\left\{\frac{3}{s^2-4s+13}\right\}$

Q35. Solve the D.E using L.T: $y'' + 4y' - 5y = 0$, $y(0) = 1, y'_0 = 0$.

Q36. Find $\mathcal{L}^{-1}\left\{\frac{1}{s^2(s+1)}\right\}$ using properties.

Q37. Solve Q.36 using partial fraction method. Compare the results.

Q38. Solve Q.36 using convolution theorem. Compare the results.

Q39. Find $\mathcal{L}^{-1}\left\{\frac{1}{(s^2+1)^2}\right\}$ using convolution theorem.

Q40. Find $\mathcal{L}^{-1}\left\{\frac{1+e^{-s}}{s^2}\right\}$ using properties.

Q41. Find $\mathcal{L}^{-1}\left\{\frac{4e^{-2s}}{s^2+16}\right\}$ using properties.

Q42. Find $\mathcal{L}^{-1}\left\{\frac{s^2+9s+2}{(s-1)^2(s+3)}\right\}$ using residue theorem.

Q43. Solve the D.E using L.T: $y'' - y' = 2t$, $y(0) = 1, y'_0 = -2$.

Q44. Solve the D.E using L.T: $y'' + y = 4\delta(t - 2\pi)$, $y(0) = 0, y'_0 = 0$.

Q45. Find $\mathcal{L}^{-1}\left\{\ln\left(\frac{s+1}{s-1}\right)\right\}$ using properties

Q46. Find $\mathcal{L}\left\{e^{-3t} \int_0^t t \sin 2t dt\right\}$

Q47. Find $\mathcal{L}\left\{\int_0^t t e^{-3t} \sin 2t dt\right\}$

Q48. Find $\mathcal{L}\left\{\frac{1-\cos 3t}{t}\right\}$

Q49. Find $\mathcal{L}\left\{\frac{e^{-3t} \sin 2t}{t}\right\}$

Q50. Find $\mathcal{L}\left\{\int_0^t \frac{e^t - \cos 2t}{t} dt\right\}$

Q51. Find the Fourier expansion of the periodic function whose definition in one period is:

$$f(t) = \begin{cases} t - 1 & -1 < t < 0 \\ t + 1 & 0 < t < 1 \end{cases}$$

Q52. Find the complex form of F.S for the periodic function whose definition in one period is:

$$f(t) = \begin{cases} 1 & 0 < t < 1 \\ 2 & 1 < t < 3 \end{cases}$$

Q53. Find the complex form of F.S for the periodic function whose definition in one period is:

$$f(t) = e^{-t} \quad -1 < t < 1$$

Q54. Plot the spectrum for $p = 2, 4$ and 8 for the periodic function whose definition in one period is:

$$f(t) = \begin{cases} 0 & -p < t < -1 \\ -1 & -1 < t < 0 \\ 1 & 0 < t < 1 \\ 0 & 1 < t < p \end{cases}$$

Q55. Plot the spectrum for $p = 2, 4$ and 8 for the periodic function whose definition in one period is:

$$f(t) = \begin{cases} 0 & -p \leq t \leq -1 \\ 1 - t^2 & -1 \leq t \leq 1 \\ 0 & 1 \leq t \leq p \end{cases}$$

Q56. Plot the functions: **a)** $2u(t-1)$, **b)** $2u(t+1)$, **c)** $2u(-t-1)$, **d)** $2u(-t+1)$,

Q57. Given a sequence $x(n)$ for $0 \leq n \leq 3$ where $x(0)=1$, $x(1)=0$, $x(2)=2$ and $x(3)=-2$ Evaluate its DFT $X(k)$.

Q58. In Question 57, find DFT using decimation in frequency FFT (DIF FFT). Compare the results with Q57.

Q59. Given a sequence $X(K)=[20 \quad -4+4i \quad -4 \quad -4-4i]$ for $0 \leq n \leq 3$. Find its $x(n)$ using IDFT.

Q60. In Question 59, find $x(n)$ using DIF IFFT. Compare the results with Q59.

Q61. A) Plot the function $f(t) = 5 \{u(t-2) - u(t-4)\}$, **B)** Find and plot its Fourier transform spectrum

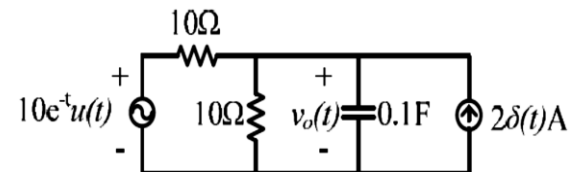
Q62. Find $x(n)$ using DIF IFFT, if $X(K) = [4 \quad 9.6569 - 4i \quad -4 + 4i \quad -1.6569 + 4i \quad -4 \quad -1.6569 - 4i \quad -4 - 4i \quad 9.6569 + 4i]$ for $0 \leq n \leq 7$.

Q63. Find $\mathfrak{F}\{\delta(5t)\}$

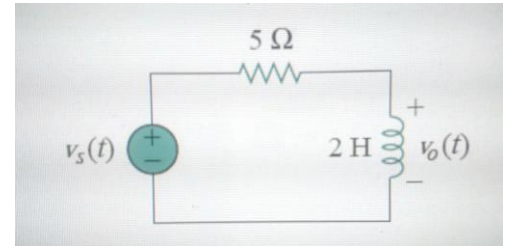
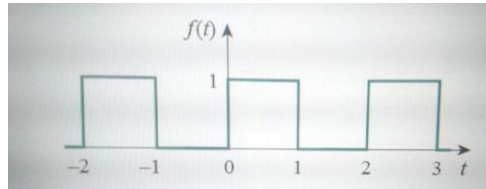
Q64. Find $\mathfrak{F}\{\delta(t-3)\}$

Q65. Find $\mathfrak{Z}\{\delta(t - 2) \cos 3(t - 2)\}$

Q66. Find $v_o(t)$ for the circuit shown using LT, if $v_o(0) = 5V$



Q67. Let the function $f(t)$ be the voltage source $v_s(t)$ for the circuit shown. Find $v_o(t)$ using FS of the circuit.



Q68. Find the z-transform $X(z)$ of the sequence $x(n) = nu(n)$ and the ROC.

Q69. Show that $Z\{a^n \cos bn u(n)\} = \frac{z^2 - z \cos b}{z^2 - 2z \cos b + 1}$

Q70. Plot $x(n) = u(n - 2) - u(n - 7)$, then find its Z.T.

Q71. Plot: a) $3u(n - 2)$, b) $3u(n + 2)$, c) $3u(-n - 2)$, d) $3u(-n + 2)$

Q72. Find $Z\{(n - 3)e^{4(n-3)} \cos 5(n - 3)u(n - 3)\}$

Q74. Find a) $Z\{n 4^n u(n)\}$, b) $Z\{4^n n u(n)\}$, compare the results

Q75. Find $x(n)$ using partial fraction method if $X(Z) = \frac{3z}{(z-1)(z+2)(z-3)}$

Q76. Find $x(n)$ using the residue method if $X(Z) = \frac{5}{(z-2)^2(z+6)}$

Q77. Solve the following DE using Z.T: $y(n) - 0.5y(n - 1) = 5(0.2)^n u(n)$, $y(-1) = 1$

Q78. Solve the following DE using Z.T:

$$y(n) + 0.1 y(n - 1) - 0.2 y(n - 2) = x(n) + x(n - 1), \text{ if } x(n) = \delta(n)$$

Q79. Find $x(n)$ if $X(Z) = \frac{z^2}{(z-1)(z-0.5)^2}$

Q80. Find $x(n)$ if $X(Z) = \frac{1}{(1-z^{-1})(1-0.5z^{-1})^2}$