

Assignment #3

1. Write equation for Fourier series representation. Obtain polar form and rectangular form of Fourier series.
2. Describe dirichlet condition for existence of Fourier series.
3. Enlist all properties of fourier transform.(without proof)
4. Write Synthesis equation and analysis equation for Discrete Time Fourier Transform.
5. Give definition of bilateral Laplace Transform and its ROC.
6. Enlist all the properties of z-Transform.
7. Calculate Fourier series co-efficients of continuous time periodic signals, also calculate frequency spectrum of the signal as shown in Fig.1.
8. Find the trigonometric fourier series for the waveform shown in Fig. 2.
9. Find the fourier transform of the gate function shown in Fig.3
10. Determine the z-Transform of $f(nT) = a^n \sin(\frac{\pi}{2}n)$ for $n \geq 0$, where a is a real constant.

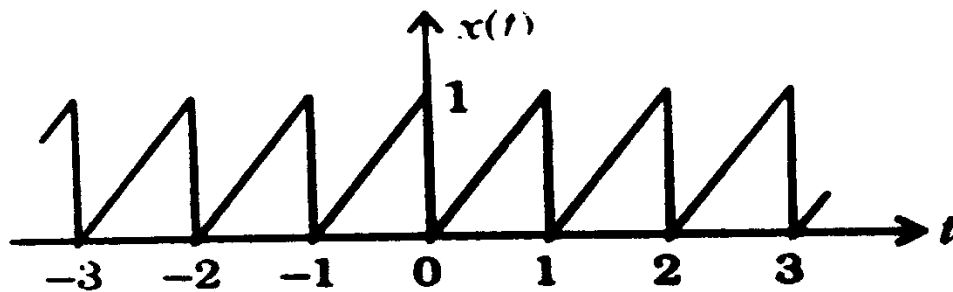


Figure 1

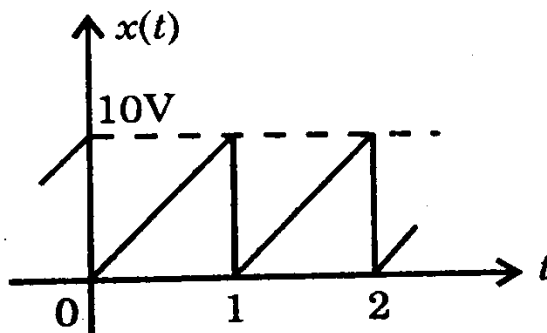


Figure 2

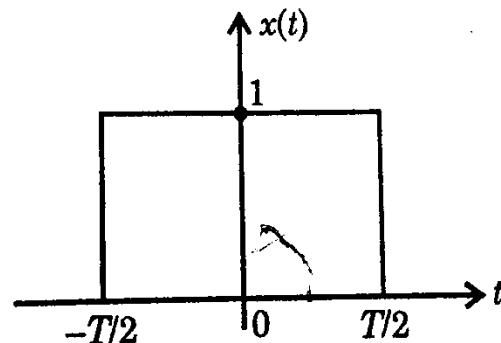


Figure 3

Answers

7. $a_k = -\frac{1}{j2\pi k}; k \neq 0, a_0 = \frac{1}{2}, |a_k| = \frac{1}{2\pi k}, \angle a_k = \begin{cases} 90^\circ; k > 0 \\ -90^\circ; k < 0 \end{cases}$
8. $a_0 = 5, A_k = 0, B_k = -\frac{10}{k\pi}$
9. $T \frac{\sin \omega T/2}{\omega T/2}$
10. $F(z) = \frac{az^{-1}}{1+a^2z^{-2}}; |a^2z^{-2}| < 1 \text{ or } |z| > |a|$