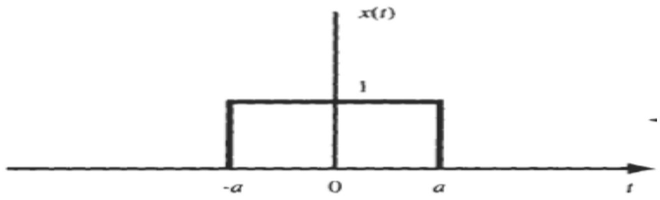
Sohag university
3^{th} year

Faculty of Engineering
Signals and systems

SHEET NO (4)

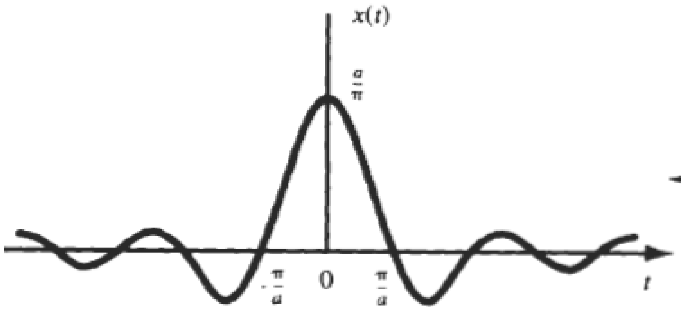
5.19. Find the Fourier transform of the rectangular pulse signal $x(t)$ [Fig. 5-16(a)] defined by

$$x(t) = p_a(t) = \begin{cases} 1 & |t| < a \\ 0 & |t| > a \end{cases} \tag{5.135}$$



(a)

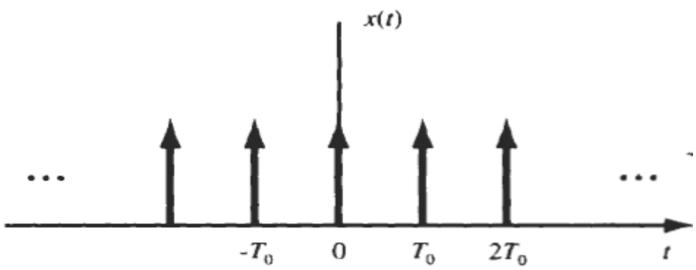
5.20. Find the Fourier transform of the signal [Fig. 5-17(a)]



(a)

5.25. Find the Fourier transform of the periodic impulse train [Fig. 5-22(a)]

$$\delta_{T_0}(t) = \sum_{k=-\infty}^{\infty} \delta(t - kT_0)$$



(a)

5.26. Show that

$$x(t)\cos\omega_0 t \leftrightarrow \tfrac{1}{2}X(\omega-\omega_0)+\tfrac{1}{2}X(\omega+\omega_0) \qquad (5.148)$$

and

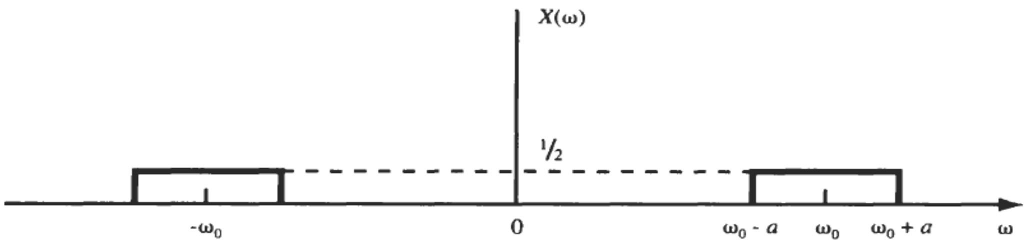
$$x(t)\sin\omega_0 t \leftrightarrow -j\left[\tfrac{1}{2}X(\omega-\omega_0)-\tfrac{1}{2}X(\omega+\omega_0)\right] \qquad (5.149)$$

Equation (*5.148*) is known as the *modulation theorem*.

5.27. The Fourier transform of a signal $x(t)$ is given by [Fig. 5-23(a)]

$$X(\omega)=\tfrac{1}{2}p_a(\omega-\omega_0)+\tfrac{1}{2}p_a(\omega+\omega_0)$$

Find and sketch $x(t)$.



(a)

5.67. Using the differentiation technique, find the Fourier transform of the triangular pulse signal shown in Fig. 5-38.

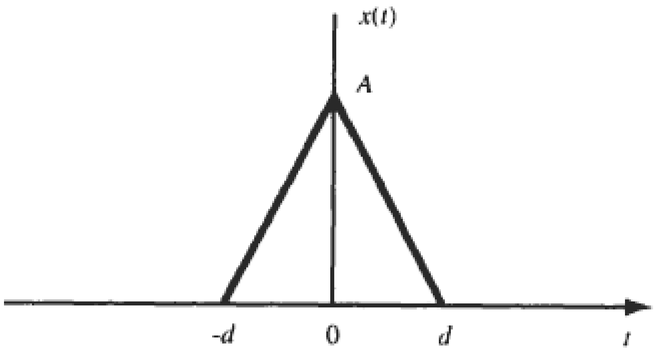


Fig. 5-38