7.22. The signal \( y(t) \) is generated by convolving a band-limited signal \( x_1(t) \) with another
band-limited signal \( x_2(t) \), that is,
\[
y(t) = x_1(t) \ast x_2(t)
\]
where
\[
X_1(j\omega) = 0 \quad \text{for } |\omega| > 1000\pi
\]
\[
X_2(j\omega) = 0 \quad \text{for } |\omega| > 2000\pi.
\]
Impulse-train sampling is performed on \( y(t) \) to obtain
\[
y_p(t) = \sum_{n=-\infty}^{+\infty} y(nT)\delta(t - nT).
\]
Specify the range of values for the sampling period \( T \) which ensures that \( y(t) \) is
recoverable from \( y_p(t) \).

7.23. Shown in Figure P7.23 is a system in which the sampling signal is an impulse train
with alternating sign. The Fourier transform of the input signal is as indicated in the
figure.
(a) For \( \Delta < \pi/(2\omega_M) \), sketch the Fourier transform of \( x_p(t) \) and \( y(t) \).
(b) For \( \Delta < \pi/(2\omega_M) \), determine a system that will recover \( x(t) \) from \( x_p(t) \).
(c) For \( \Delta < \pi/(2\omega_M) \), determine a system that will recover \( x(t) \) from \( y(t) \).
(d) What is the maximum value of \( \Delta \) in relation to \( \omega_M \) for which \( x(t) \) can be recov-
ered from either \( x_p(t) \) or \( y(t) \)?

![Diagram](image-url)