Using Eulers identity :

$$\cos(2\pi[f_c + f_2]t) = 1/2\ \{ e^{j2\pi(fc + f2)t} + e^{-j2\pi(fc+f2)t} \}$$

and the fact that the Fourier Transform of :
m(t) is the well known sinc x function :

$$m(t) = \text{rect}\ (t / T_b) \qquad M(f) = \frac{\sin(\pi * f * T_b) * e^{-j\pi fTb}}{(\pi * f)}$$

$$M(f) = \frac{T_b * \sin(\pi * f * T_b) * e^{-j\pi fTb}}{(\pi * f * T_b)} \qquad M(f) = T_b * \text{sinc}\ (\pi * f * T_b) * e^{-j\pi fTb}$$

It also important to know the shifting property of the Fourier Transform to allow the Fourier Transform of y(t) to be calculated :

x(t) transforms to X(F), then

$e^{j2\pi fct} * x(t)$ transforms to X(F - Fc)

Fourier Transform, Y(F) :

$$Y(F) = a/2\ \{ \frac{\sin(\pi (f - f_c - f_2)\ T_b) * e^{-j\pi(f - fc - f2)Tb}}{\pi(f - f_c - f_2)} + \frac{\sin(\pi (f + f_c + f_2)\ T_b) * e^{-j\pi(f + fc + f2)Tb}}{\pi(f + f_c + f_2)} -$$

$$\frac{\sin(\pi(f - f_c + f_1)T_b) * e^{-j\pi(f - fc + f1)Tb}}{\pi(f - f_c + f_1)} - \frac{\sin(\pi(f + f_c - f_1)T_b) * e^{-j\pi(f + fc - f1)Tb}}{\pi(f + f_c - f_1)} +$$

$$\partial(f - f_c + f_1) + \partial(f + f_c - f_1)$$

}

Not sure about the minus signs and the last 2 delta terms.