Esercizio 2 FILA A

$$x(t) = -\frac{B}{2}\,\mathrm{sinc}(2Bt)$$

$$p(t) = 2\,\mathrm{sinc}(2Bt)$$

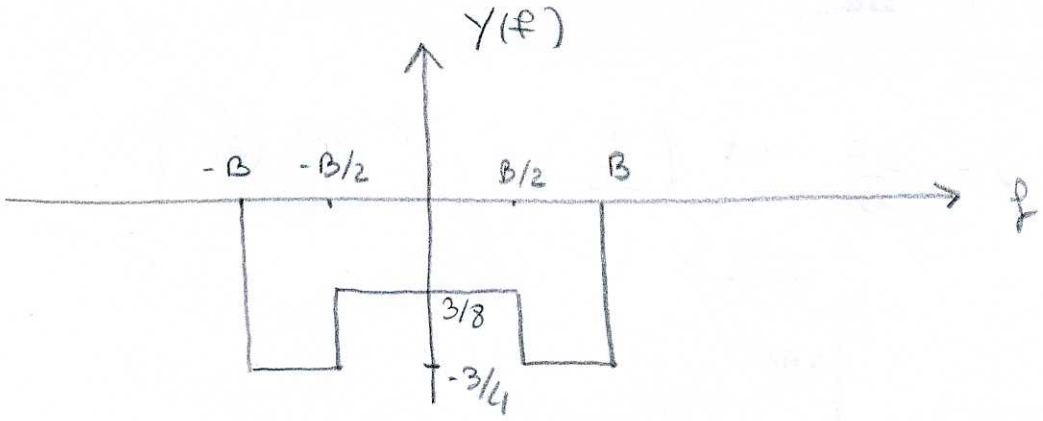
$$T_c = \frac{2}{3B}$$

$$X(f) = -\frac{1}{4}\,\mathrm{rect}\left(\frac{f}{2B}\right)$$

$$P(f) = \frac{1}{B}\,\mathrm{rect}\left(\frac{f}{2B}\right)$$

$$\bar{X}(f) = \frac{3B}{2}\sum_{k=-\infty}^{+\infty} X\left(f - k\frac{3B}{2}\right)$$

$$Y(f) = \bar{X}(f)\,P(f) = -\frac{3}{4}\,\mathrm{rect}\left(\frac{f}{2B}\right) + \frac{3}{8}\,\mathrm{rect}\left(\frac{f}{B}\right)$$



$$y(t) = -\frac{3B}{2}\,\mathrm{sinc}(2Bt) + \frac{3B}{8}\,\mathrm{sinc}(Bt)$$

$$E_y = \frac{9}{16}\frac{B}{2} + \frac{9}{64}B + \frac{9}{16}\frac{B}{2} = B\left(\frac{9}{64} + \frac{9}{16}\right) = B \cdot \frac{45}{64}$$

$$P_y = 0$$

$$T_{c,MAX} = \frac{1}{2B} \quad \Rightarrow \quad T_c \leq \frac{1}{2B}$$

Esercizio 2 FILA B

$$x(t) = 2AB\,\mathrm{sinc}(2Bt)$$

$$p(t) = \mathrm{sinc}(2Bt)$$

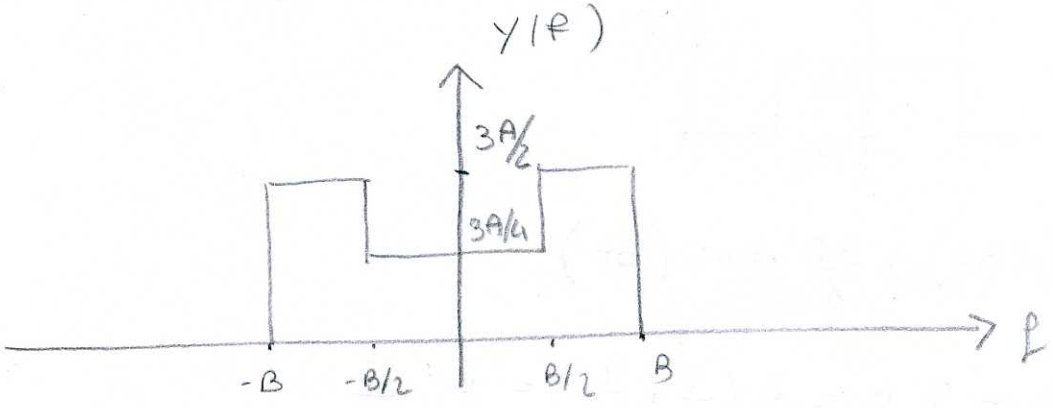
$$T_c = \frac{2}{3B}$$

$$X(f) = 2AB\,\frac{1}{2B}\,\mathrm{rect}\left(\frac{f}{2B}\right) = A\,\mathrm{rect}\left(\frac{f}{2B}\right)$$

$$P(f) = \frac{1}{2B}\,\mathrm{rect}\left(\frac{f}{2B}\right)$$

$$\bar{X}(f) = \frac{3B}{2}\sum_{k=-\infty}^{+\infty} X\left(f - \frac{k3B}{2}\right)$$

$$Y(f) = P(f)\,\bar{X}(f) = \frac{3A}{2}\,\mathrm{rect}\left(\frac{f}{2B}\right) - \frac{3A}{4}\,\mathrm{rect}\left(\frac{f}{B}\right)$$



$$y(t) = 3AB\,\mathrm{sinc}(2Bt) - \frac{3AB}{4}\,\mathrm{sinc}(Bt)$$

$$E_y = \frac{9}{4}A^2\cdot\frac{B}{2} + \frac{9}{16}A^2B + \frac{9A^2}{4}\frac{B}{2} = \frac{9}{16}A^2B + \frac{9A^2B}{4} = A^2B\cdot\frac{45}{16}$$

$$P_y = 0 \qquad T_{c,MAX} = \frac{1}{2B} \qquad T_c \leq \frac{1}{2B}$$