Es 4

$$x[n] = x(nT)$$

$$x(t) \overset{TCF}{\Leftrightarrow} X(f)$$

$$\bar{X}(f) = \sum_{n=-\infty}^{+\infty} x[n]\, e^{-j2\pi f nT} = \sum_{n=-\infty}^{+\infty} x(nT)\, e^{-j2\pi f nT} =$$

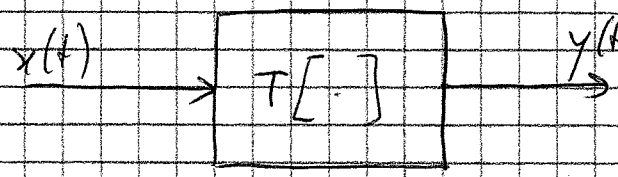
$$= \sum_{n=-\infty}^{+\infty} \int_{-\infty}^{+\infty} X(\nu)\, e^{j2\pi \nu nT}\, d\nu\; e^{-j2\pi f nT} =$$

$$= \int_{-\infty}^{+\infty} X(\nu) \sum_{n=-\infty}^{+\infty} e^{j2\pi(\nu - f)nT}\, d\nu =$$

$$= \int_{-\infty}^{+\infty} X(\nu)\, \frac{1}{T} \sum_{n=-\infty}^{+\infty} \delta\left(-\nu + f - \frac{n}{T}\right) d\nu =$$

$$= \frac{1}{T} \sum_{n=-\infty}^{+\infty} \int_{-\infty}^{+\infty} X(\nu)\, \delta\left(-\nu + f - \frac{n}{T}\right) d\nu = \frac{1}{T} \sum_{n=-\infty}^{+\infty} X\left(f - \frac{n}{T}\right)$$

Es 5



$$y(t) = T[x(t)] = T[x(t) \otimes \delta(t)] = T\left[\int_{-\infty}^{+\infty} x(\tau)\, \delta(t-\tau)\, d\tau\right]$$

$$= \int_{-\infty}^{+\infty} x(\tau)\, T[\delta(t-\tau)]\, d\tau = \int_{-\infty}^{+\infty} x(\tau)\, h(t-\tau)\, d\tau$$

$$= x(t) \otimes h(t)$$