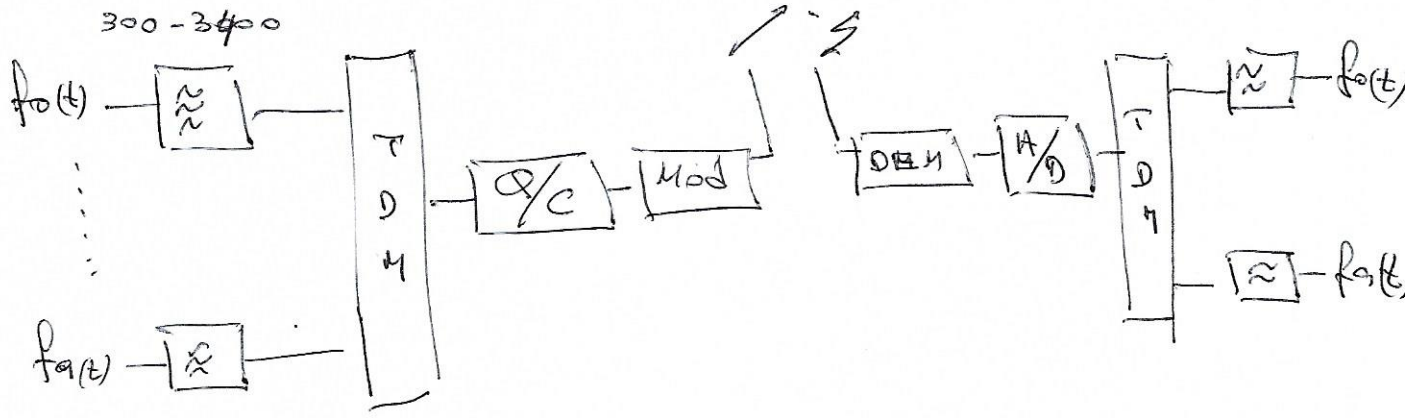
Ejercicio Guía 7

7.1

A)



B)

$$V_{PAM} = \frac{N^{\circ}\ mv}{T_r} \cdot \frac{T_r}{S} = 10 \cdot 8000 = 80\ \frac{k\ mv}{s}$$

$$V_{PAM} = f_s \cdot N^{\circ}\ canales = 8000 \times 10 = 80\ \frac{k\ mv}{s}$$

$$V_{PAM} = \frac{1}{\tau_{PAM}} = \frac{1}{12,5\ \mu s} = 80\ \frac{k\ mv}{s} \quad ; \quad B_{PAM} = \frac{V_{PAM}}{2} = \frac{80\ k\ mv}{s} = 40\ kHz$$

C)

$$V_{PCM} = N^{\circ}\ \frac{bits}{tr} \cdot \frac{Tr}{s} = 80\ \frac{bits}{Tr} \cdot \frac{8000\ Tr}{s} = 640\ \frac{k\ bits}{s}$$

$$V_{PCM} = V_{PAM} \times N^{\circ}\ bits = 80\ k\ \frac{mv}{s} \times 8 = 640\ \frac{k\ bits}{s}$$

$$V_{PCM} = \frac{1}{\tau_{PAM}} = \frac{1}{\frac{12,5}{8}} = \frac{8}{12,5} = 640\ \frac{k\ bits}{s} \quad ; \quad B_{PCM} = \frac{V_{PCM}}{2}(1+\rho)$$

$$\frac{640\ k\ \frac{bits}{s}}{2}(1+0,291) = 413,12$$

D) $B_{AM} = 2B = 2 \cdot 413,12\ kHz = 826,240\ kHz$

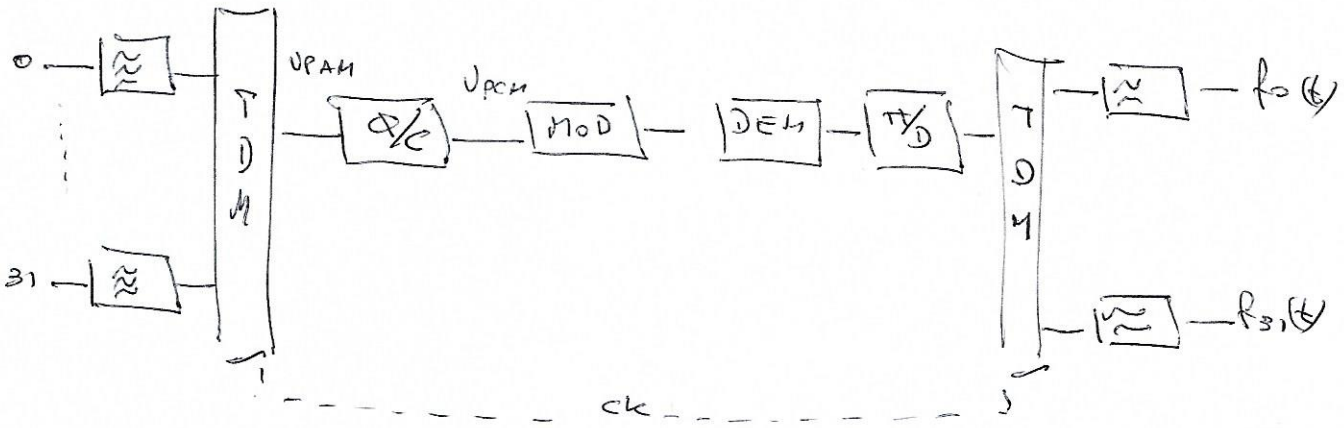
E) $B_{BLU} = B = 413,12\ kHz$.

7.2

- ASK - NASK
- FSK - NSK - GMSK
- PSK - DPSK - QPSK - DQPSK
- OQPSK - $\frac{\pi}{4}$ QPSK - NPSK
- NQAM

7.6

A)

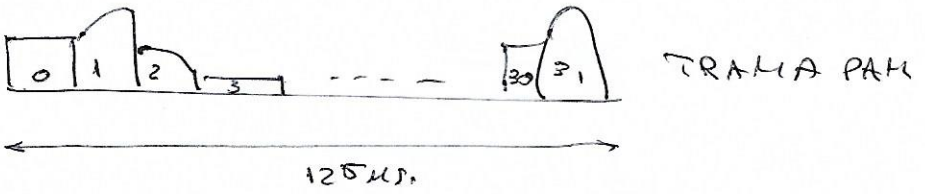


B)

$V_{PAM} = 32 \cdot 8000 = 256000 \frac{bits}{s}$

$B_{PAM} = \frac{V_{PAM}}{2} = 128\ kHz$

C)

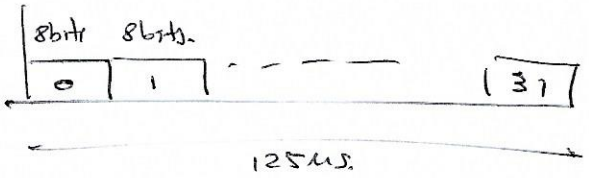


D)

$V_{PCM} = V_{PAM} \cdot 8\ bits = 256\ k\frac{bits}{s} \cdot 8 bits = 2{,}048\ \frac{Mbits}{s}$

$B_{PCM} = \frac{V_{PCM}}{2}(1+\rho) = \frac{2{,}048\ Mbits}{2\ s} \cdot (1+0{,}4) =$

E)



F)

$B_{ASK} = 2B = 2\left[\frac{V_{PCM}}{2}(1+\rho)\right] = 2{,}048 \cdot (1+0{,}4) = 2{,}8672\ kHz.$

7.15

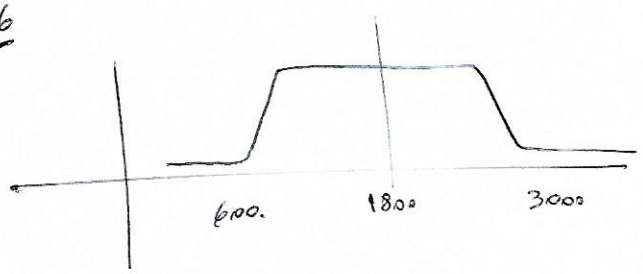
a) $B_{FSK} = 2(\Delta f + B) = 2B(mf + 1) \Rightarrow B = \frac{B_{FSK}}{2} - 500$

$B = \frac{2400}{2} - 500 = 700\ Hz.$

de ② $2400 = 2B(0,7 + 1) \Rightarrow B = \frac{2400}{2.1,7} = 705\ Hz.$

b) $B = \frac{V}{2}(1+\rho) \quad \therefore \rho = \frac{2.B}{V} - 1 = \frac{700.2}{1200} - 1 = 0,16$

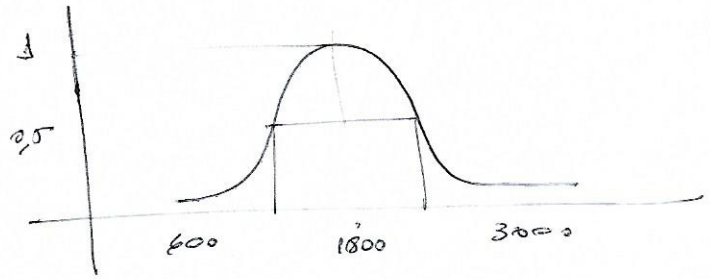
7.16



$B = 2400\ Hz.$

a) $B_{4PSK} = \frac{2\left[\frac{V}{2}(1+\rho)\right]}{Log_2 4} = \frac{2.\frac{2400}{2}(1+1)}{Log_2 4} = 1200\ Hz.$

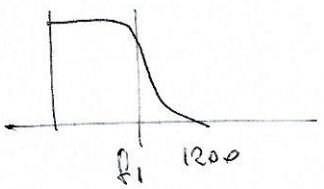
b)



$\rho = \frac{1200 - f_1}{f_1}$

$f_1 = \frac{1200}{1+\rho} = 600\ Hz.$

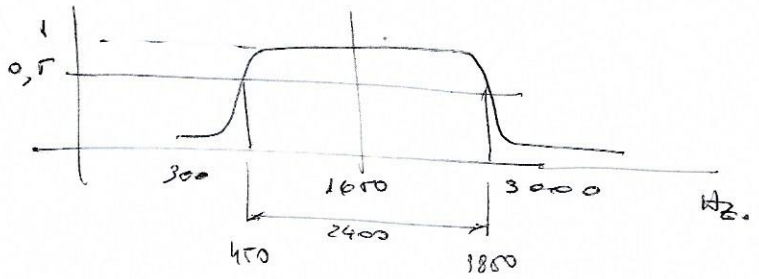
$B_{8PSK} = \frac{2\left[\frac{V}{2}(1+\rho)\right]}{Log_2 8} \Rightarrow \rho = \frac{2400.3}{4800} = 0,5$



$\rho = \frac{1200 - f_1}{f_1}$

$f_1 = \frac{1200}{1+\rho} = 800\ Hz$

7.17



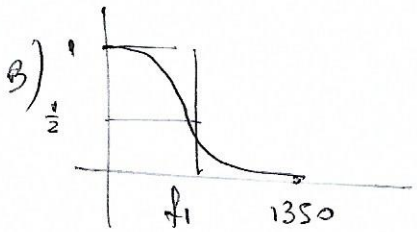
$B = 2400\ Hz.$

$V_{PCM} = 9600\ \frac{bits}{s}$

A) $B_{16QAM} = \frac{2\left[\frac{V}{2}(1+\rho)\right]}{\log_2 16} = \frac{9600(1+\rho)}{4}$

$= \rho = \frac{2700 \times 4}{9600} - 1 = \boxed{0,125}$

B)



$\rho = \frac{1350 - f_1}{f_1}$

$f_1 = \frac{1350}{1+\rho} = \frac{1350}{1+0,125} = \boxed{1200\ Hz}$

$B_{ESSB} = 2400\ Hz.$

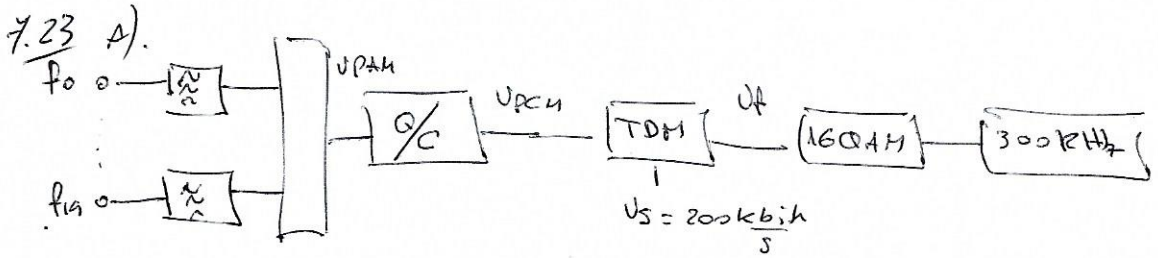
7.18

A) $f_s = 2.B = 2,5\ MHz = 10\ \frac{Mmu}{s}$

$\frac{S}{N}\Big|_{dB} = 4,8 + 6m = 50 \Rightarrow m = \frac{50 - 4,8}{6} = 7,53.$

elijo 7. $\therefore M = 2^7 = 128$ niveles.

7.23 A).



$V_f = V_{PCM} + V_s$

$V_{PAM} = 20 \times 8\ \frac{kmu}{seg} = 160\ \frac{kmu}{seg}$

$B_{16QAM} = \frac{2\left[\frac{V_f}{2}(1+\rho)\right]}{\log_2 16} \Rightarrow$

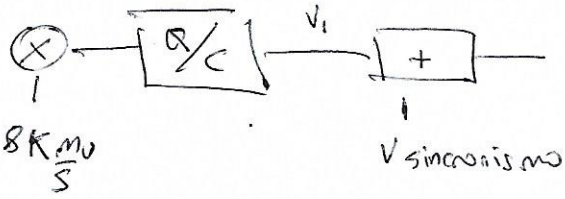
$V_f = \frac{B_{16QAM} \cdot \log 16}{1+\rho} = \frac{300kHz \cdot 4}{1+0,2} = 1\ \frac{Mbit}{seg.}$

$V_{PCM} = (1 - 0,2)\ MHz = 800\ \frac{kbits}{s}$

$V_{PCM} = V_{PAM} \times N\ bits \Rightarrow N_{bit} = \frac{V_{PCM}}{V_{PAM}} = \frac{800kbit/s}{160\ kmu} = \boxed{5\ bit}$

B) $B = \frac{V_b}{\log_2 16} = \frac{1\,MHz}{4} = 250$ kbaudios

7.20



$V_{PCM} = 8\frac{kmu}{s}$; $\frac{7\,bits}{mu}$ 32 bits | 224 bits dato $\rho = 0,2$

A) Book $2\left[\frac{V}{2}(1+\rho)\right] = 2B$ $64(1+0,2) =$ 76,8 kbits

B) B_{4PSK} $V_1 = V_{PAM} \times N^o$ bits. $= 8000\frac{mu}{s} \times \frac{7\,bits}{mu} = 56\frac{kbits}{s}$.

$V_b = V_1 + \frac{V_1}{224} \cdot 32 = 56\frac{kbits}{s} + \frac{56k}{224} \times 32 = 64k\frac{bits}{s}$.

C) B_{4QAM} $\frac{76,8k}{\log_2 4} =$ 38,4 kHz.

38,4 kHz

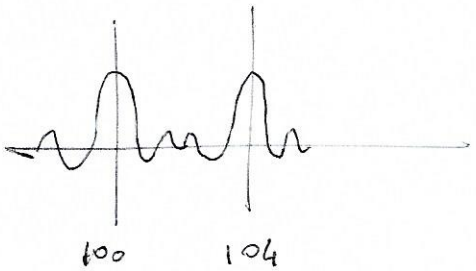
7.14

$V_{PCM} = 2$ mbits/s ; $\rho = 1$ A) Book $= \frac{V}{2}(1+\rho) = \frac{2\,Mbits/s}{2}(1+1) =$ 2 MHz.

B) $B_{FSK} = 2(\Delta f_c + B) = 2B(m_f + 1) = 2.(2M + 2M) = 8$ MHz

C) $B_{FSK} = 2(10M + 2M) = 24$ MHz.

D) $B_{4PSK} = 2$ MHz.



$B_{NASK/NPSK/NQAM} = \frac{2\left[\frac{V}{2}(1+\rho)\right]}{\log_2 N.}$