

c) (MODO PRINCIPAL)

FUENTE	EXTENDIDO	PROB
A	A	$p(AA) = p(A) \cdot p(A) = 0'4 \cdot 0'5 = 0'2$
A	B	$= 0'4 \cdot 0'25 = 0'1$
A	C	$= 0'4 \cdot 0'25 = 0'1$
B	A	$= 0'2 \cdot 0'5 = 0'1$
B	B	$0'2 \cdot 0'5 = 0'1$
B	C	$0'2 \cdot 0 = 0$
C	A	$= 0'4 \cdot 0'25 = 0'1$
C	B	$= 0'4 \cdot 0 = 0$
C	C	$= 0'4 \cdot 0'75 = 0'3$

SIM	PROB
CC	0'3
AA	0'2
AB	0'1
AC	0'1
BA	0'1
BB	0'1
CA	0'1

Diagram showing a tree structure for the extended source with probabilities: 0'3, 0'2, 0'1, 0'1, 0'1, 0'1, 0'1. Branches are marked with 'X' and 'Y' to show the resulting probabilities for the final symbols: 0'6, 0'4, 0'3, 0'2, 0'2.

$$\bar{L} = 2'7 \text{ bits/simbolo}$$

$$H(F^2) = 2 H(F) = 2 \cdot 1'1245 \approx 2'249$$

$$\boxed{E} = \frac{H}{\bar{L}} \approx \boxed{0'83} \quad \underline{2P}$$



Titulació _____

Assignatura _____

Cognoms _____

Nom _____

Pàgina _____ de _____

b) 1 1 2 4 6 7 0

DICCIONARIO

DIC	PASO	PC	Punt	AÑ DIC	SALIDA
0 A	1	1	1	-	B
1 B	2	2	1	(3) BB	B
2 C	3	3	2	(4) BC	C
	4	4	4	(5) CB	B C
	5	5	6	(6) BCB	B C B
	6	6	7	(7) BCBB	B C B B
	7	7	0	(8) BCBA	A

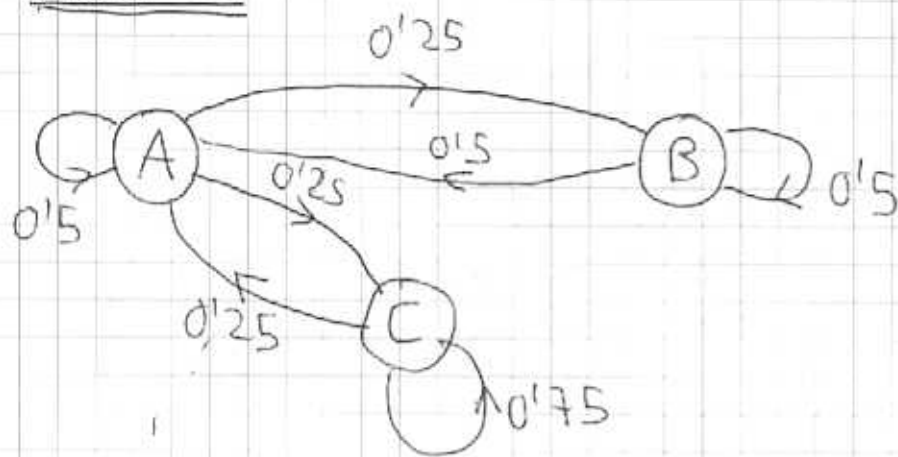
BB, C B B B C B B C B B A

"DESCAFEEIN"

LIMIT.- $L_{max} = 127$

= LONG TEXTO < LONG MAX (1'S P)

PROB 2



$$P_A = P_C$$

$$0.25 P_A = 0.5 P_B$$

$$P_A + P_B + P_C = 1$$

$$P_A = 0.4$$

$$P_B = 0.2$$

$$P_C = 0.4$$

$$H_A = -0.5 \log_2 0.5 - 2 \cdot 0.25 \log_2 0.25 = 0.5 + 1 = 1.5$$

$$H_B = 1$$

$$H_C = 0.25 \cdot 2 + 0.75 \cdot 0.415 = 0.81$$

$$H(F) = P(A) \cdot H_A + P(B) H_B + P(C) H(C) = 1.1245 \text{ bits/symbol}$$

$$10.000 \text{ símbolos fuente} \Rightarrow 11.245 \text{ bits info}$$

$$R_t = \frac{I}{t} = \frac{11.245 \text{ bits}}{2 \text{ s}} = 5622.5 \text{ bps}$$

$$C \geq R_t$$

$$C = W \log_2 (1 + \text{SNR})$$

$$\text{SNR} + 1 = 2^{\frac{C}{W}} = 2^{5.6225}$$

$$\boxed{\text{SNR}_{min} = 2^{5.6225} - 1 = 48.26} \text{ 1'S P}$$

Titulació

Assignatura

CONTROL C. 10

Cognoms

Nom

Pàgina _____ de _____

11-12-2003

1) a) $X = 397^{1982} \pmod{991}$

991 primo $\Rightarrow \phi(991) = 990$

$\gcd(397, 991) = 1 \Rightarrow 397^{\phi(991)} \pmod{991} = 1$
 $397^{k \cdot 990} \pmod{991} = 1$

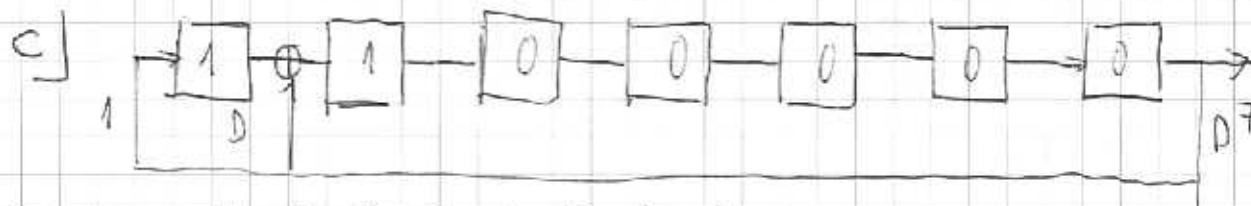
$397^{1982} \pmod{991} = 397^{2 \cdot 990} \cdot 397^2 \pmod{991} =$
 $= 397^2 \pmod{991} = \boxed{40 = X} \quad (1'S P)$

b) $N = 7663 = 79 \cdot 97$ (tabla primos)
 $\phi(N) = 78 \cdot 96 = 7488$

$e = 4831 \Rightarrow d = e^{-1} \pmod{\phi(N)} = 31$ (ALG EUCLIDES EXT)

$M = C^d \pmod{N} = 5^{31} \pmod{7663} = \boxed{7476}$

(en binario) $M = \boxed{1110100110100} \quad (2P)$



SALIDA: 0 0 0 0 0 1 1 0

MENSAGE @ 1 1 0 1 1 1 1 0 (222)

CRIPTOGRAMA $\boxed{1 1 0 1 1 0 0 0}$