University Kasdi Merbah of Ouargla
Faculty of new technologies for information and communication
Department of Electronics and Telecommunications
Master 2 S3: Electronics of Embedded systems

Janvier 2024 — A — 2023/2024 — Farid KADRI — 45 min

Information Coding and Security

EXAM

Nom : ……

Prénom : ……

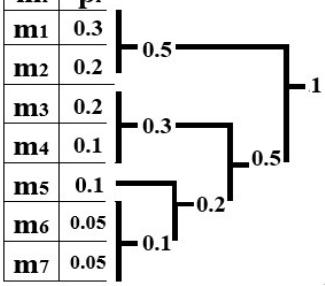
07pts. Exercise 1: Consider the following codes:

(a)

mi	pi	I	II	III	IV
m1	0.3	1	1		
m2	0.2	1	0		
m3	0.2	0	1		
m4	0.1	0	0	1	1
m5	0.1	0	0	1	0
m6	0.05	0	0	0	1
m7	0.05	0	0	0	0

(b)

mi	pi
m1	0.3
m2	0.2
m3	0.2
m4	0.1
m5	0.1
m6	0.05
m7	0.05

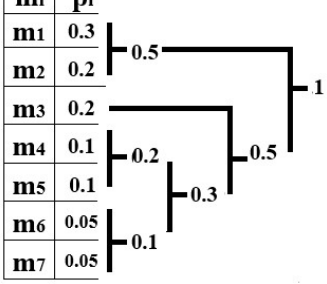


(c)

mi	pi	I	II	III	IV
m1	0.3	1	1		
m2	0.2	1	0		
m3	0.2	0	1	1	
m4	0.1	0	1	0	
m5	0.1	0	0	1	
m6	0.05	0	0	0	1
m7	0.05	0	0	0	0

(d)

mi	pi
m1	0.3
m2	0.2
m3	0.2
m4	0.1
m5	0.1
m6	0.05
m7	0.05



1 ✓ The maximum of Entropy is :……

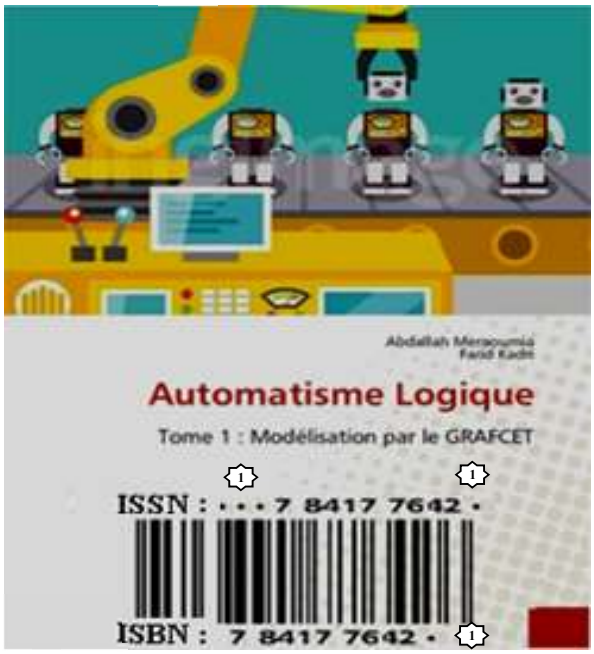
1 ✓ The invalid code is :……

1 ✓ The efficient *Shannon Fano* code is : ……, and it's variance is : ……

1 ✓ The efficient *Huffman* code is : ……, and it's average length is : ……

1 ✓ The least efficient code is : ……, and it's variance is : ……

07pts. Exercise 2: Complete to create a valid code ?



06pts. Exercise 3:

✓ Consider a *Hamming* code, and fill in the tables below?

Information : *mi*				Code word : *Ci*						
1	1	1	0	1	.	1	.	0	0	0
0	1	1	1	0	1	1	1	.	.	0
0	1	0	1	0	1	0	1	.	1	.
0	1	1	0	0	1	1	0	.	.	1
1	0	0	0	.	0	.	0	0	1	1
1	0	1	1	1	0	1	1	.	1	.

6 x 0.5

Received code word *Ci*							Corrected code word *Ci*
1	0	1	1	0	1	1	. . . . .
0	0	0	0	1	1	0	. . . . .
1	1	1	0	1	1	1	. . . . .
1	1	0	0	1	0	1	. . . . .
1	0	1	0	0	0	1	. . . . .
1	1	1	0	0	0	0	. . . . .

6 x 0.5

Take courage

University Kasdi Merbah of Ouargla — Janvier 2024
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Information Coding and Security

EXAM

Nom : ……

Prénom : ……

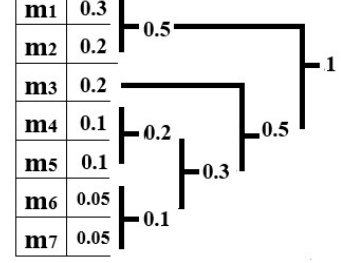
07 pts. Exercise 1: Consider the following codes:

(a)

m_i	p_i	I	II	III	IV
m_1	0.3	1	1		
m_2	0.2	1	0		
m_3	0.2	0	1	1	
m_4	0.1	0	1	0	
m_5	0.1	0	0	1	
m_6	0.05	0	0	0	1
m_7	0.05	0	0	0	0

(b)

m_i	p_i
m_1	0.3
m_2	0.2
m_3	0.2
m_4	0.1
m_5	0.1
m_6	0.05
m_7	0.05

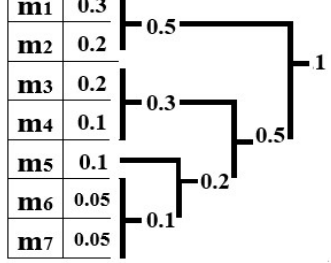


(c)

m_i	p_i	I	II	III	IV
m_1	0.3	1	1		
m_2	0.2	1	0		
m_3	0.2	0	1		
m_4	0.1	0	0	1	1
m_5	0.1	0	0	1	0
m_6	0.05	0	0	0	1
m_7	0.05	0	0	0	0

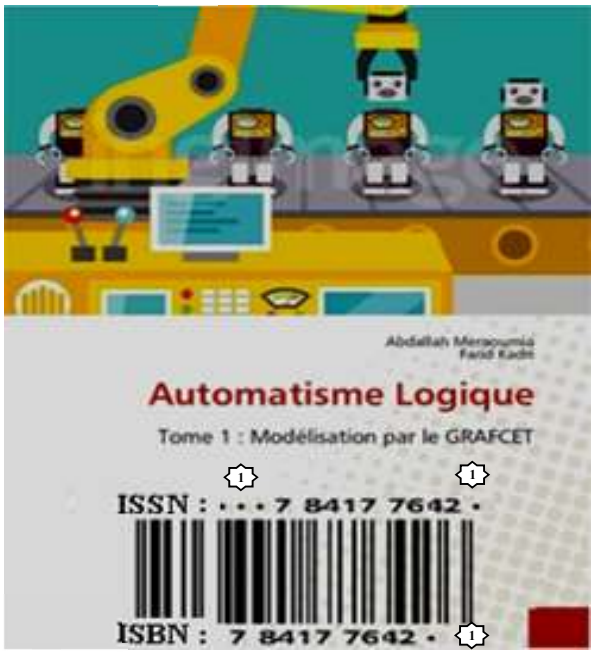
(d)

m_i	p_i
m_1	0.3
m_2	0.2
m_3	0.2
m_4	0.1
m_5	0.1
m_6	0.05
m_7	0.05



- (1) ✓ The maximum of Entropy is :……
- (1) ✓ The invalid code is :……
- (1) ✓ The efficient *Shannon Fano* code is : ……, and it's variance is : ……
- (1) ✓ The efficient *Huffman* code is : ……, and it's average length is : ……
- (1) ✓ The least efficient code is : ……, and it's variance is : ……

07 pts. Exercise 2: Complete to create a valid code ?



06 pts. Exercise 3:

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Information : *mi*				Code word : *Ci*						
0	1	0	1	0	1	0	1	.	1	.
0	1	1	0	0	1	1	0	.	.	1
1	1	1	0	1	.	1	.	0	0	0
0	1	1	1	0	1	1	1	.	.	0
1	0	0	0	.	0	.	0	0	1	1
1	0	1	1	1	0	1	1	.	1	.

6 x 0.5

Received code word *Ci*							Corrected code word *Ci*
1	1	1	0	1	1	1	. . . . .
1	1	0	0	1	0	1	. . . . .
1	0	1	1	0	1	1	. . . . .
0	0	0	0	1	1	0	. . . . .
1	0	1	0	0	0	1	. . . . .
1	1	1	0	0	0	0	. . . . .

6 x 0.5

Take courage