1 Question

Q1 Representer sous la norme IEEE-754 32 bits le nombre suivant

مثل العدد الآتي حسب المعيار IEEE-754 32 bits

151.67

1.1 Correction

Q1 Representer sous la norme IEEE-754 32 bits le nombre suivant

مثل العدد الآتي حسب المعيار IEEE-754 32 bits

151.67 1001 0111.1010 1011 1011 0011 0011 0011 0011 00

- **Input:** $151.6700 = 1001\,0111.1010\,1011\,1011\,0011\,0011\,0011\,0011\,00$
- **Normalized form:** $1.001\,0111\,1010\,1011\,1011\,0011 \times 2^{7}$
- **Sign bit:** $+ \Rightarrow 0$
- **Exponent:** $7 + 127 = 134 \Rightarrow 1000\,0110$
- **Pseudo-mantissa:** $001\,0111\,1010\,1011\,1011\,0011$
- **Final binary representation:** $0100\,0011\,0001\,0111\,1010\,1011\,1011\,0011$
- **Hexadecimal form:** $4317\,ABB3$

Q1 Donner les intervalles qu'on peut représenter en nombre positifs, valeur absolue, complément à 1 et complément à 2 sur 46 bits

Give the intervals which can be represented in posiitve numbers, absolute value, 1's complement and 2's complement on 46 bits

حدد المجالات التي يمكن تمثيلها لأعداد الموجبة والتمثيل بالقيمة المطلقة والمتمم إلى 1 و 2 على : 46 بت

1.2 Correction

Q1 Donner les intervalles qu'on peut représenter en nombre positifs, valeur absolue, complément à 1 et complément à 2 sur 46 bits

Give the intervals which can be represented in posiitve numbers, absolute value, 1's complement and 2's complement on 46 bits

حدد المجالات التي يمكن تمثيلها لأعداد الموجبة والتمثيل بالقيمة المطلقة والمتمم إلى 1 و 2 على : 46 بت

- **Positifs**: $[0; 2^{46-1}] = [0; 70368744177663]$
- **Unsigned value** $[-(2^{45}-1); 2^{45}-1] = [-35184372088831, 35184372088831]$
- **One's compelement** $[-(2^{45}-1); 2^{45}-1] = [-35184372088831, 35184372088831]$
- **Two's compelement** $[-2^{45}; 2^{45}-1] = [-35184372088832, 35184372088831]$

Q1 Represent in 1's and 2's complement, the following number
Representer en complément à 1 et à 2 le nombre suivant :
مثل العدد الآتي في المتمم إلى الواحد وإلى الاثنين :

108

1.3 Correction

Q1 Represent in 1's and 2's complement, the following number
Representer en complément à 1 et à 2 le nombre suivant :

مثل العدد الآتي في المتمم إلى الواحد وإلى الاثنين :

108

- $-108 = (-110\,1100)_2$
- $(1001\,0011)_{c1}$
- $+1$
- $(1001\,0100)_{c2}$

Q1 Simplifier l'expression suivant.
Simpilfy the following expression

بسّط العبارة الآتية

$S = \overline{a}.\overline{b}.d + a.b.\overline{c}.d + a.\overline{b}.\overline{c}.\overline{d} + \overline{a}.b.\overline{c}.\overline{d} + \overline{a}.\overline{b}.d + a.b.\overline{c}.d + a.\overline{b}.\overline{c}.\overline{d} + \overline{a}.b.\overline{c}.\overline{d}$

1.4 Correction

Q1 Simplifier l'expression suivant.
Simpilfy the following expression

بسّط العبارة الآتية

$S = \overline{a}.\overline{b}.d + a.b.\overline{c}.d + a.\overline{b}.\overline{c}.\overline{d} + \overline{a}.b.\overline{c}.\overline{d} + \overline{a}.\overline{b}.d + a.b.\overline{c}.d + a.\overline{b}.\overline{c}.\overline{d} + \overline{a}.b.\overline{c}.\overline{d}$

Karnaugh Table جدول كارنوف

AB \ CD	00	01	11	10
00	0	1	1	0
01	1	0	0	0
11	0	1	0	0
10	1	0	0	0

Simplified Sum of products :

$Simplifiedproductofsums$:

Q1 Simplify the following Karnaugh table

بسّط الدوال الآتية باستعمال جدول كارنوف.

AB \ CD	00	01	11	10
00	1	0	0	1
01	0	0	0	1
11	1	0	0	0
10	0	0	1	1

AB \ CD	00	01	11	10
00	0	0	1	0
01	1	0	0	1
11	1	1	1	1
10	0	1	1	1

AB \ CD	00	01	11	10
00	0	0	0	1
01	0	1	1	1
11	1	1	0	0
10	1	1	0	1

1.5 Correction

AB \ CD	00	01	11	10
00	1	0	0	1
01	0	0	0	1
11	1	0	0	0
10	0	0	1	1

Q1

Simplified Sum of products : $a.\overline{b}.c + \overline{a}.c.\overline{d} + \overline{a}.\overline{b}.\overline{d} + a.b.\overline{c}.\overline{d}$

AB \ CD	00	01	11	10
00	0	0	1	0
01	1	0	0	1
11	1	1	1	1
10	0	1	1	1

Simplified product of sums : $(a+\overline{d}).(c+\overline{d}).(a+\overline{b}+c).(\overline{a}+b+c).(\overline{a}+\overline{b}+\overline{c})$
Simplified Sum of products : $a.c + a.d + b.\overline{d} + \overline{b}.c.d$

AB \ CD	00	01	11	10
00	0	0	0	1
01	0	1	1	1
11	1	1	0	0
10	1	1	0	1

Simplified product of sums : $(a+b+c).(a+b+d).(b+c+d).(a+\overline{b}+\overline{d})$
Simplified Sum of products : $a.\overline{c} + \overline{a}.b.d + \overline{a}.c.\overline{d} + \overline{b}.c.\overline{d}$
Simplified product of sums : $(a+c+d).(a+b+\overline{d}).(b+\overline{c}+\overline{d}).(\overline{a}+\overline{b}+\overline{c})$

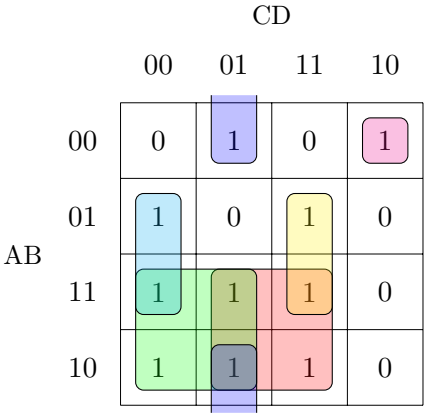
Q1 Soit la fonction donnée par sa forme canonique, Tracer la table de karnaugh et simplifier.
Let the function be given by its canonical form, Draw the Karnaugh table and simplify.
لتكن الدالة المعطاة بشكلها القانوني، ارسم جدول كارنو وبسطها

$F1(A,B,C,D) = \overline{A}.\overline{B}.\overline{C}.D + \overline{A}.\overline{B}.C.\overline{D} + \overline{A}.B.\overline{C}.\overline{D} + \overline{A}.B.C.D + A.\overline{B}.\overline{C}.\overline{D} + A.\overline{B}.\overline{C}.D + A.\overline{B}.C.D + A.B.\overline{C}.\overline{D} + A.B.\overline{C}.D + A.B.C.D$ $F2(A,B,C,D) = \overline{A}.\overline{B}.C.\overline{D} + \overline{A}.\overline{B}.C.D + \overline{A}.B.\overline{C}.\overline{D} + \overline{A}.B.\overline{C}.D + \overline{A}.B.C.\overline{D} + A.\overline{B}.\overline{C}.\overline{D} + A.\overline{B}.\overline{C}.D + A.\overline{B}.C.\overline{D} + A.B.\overline{C}.\overline{D} + A.B.\overline{C}.D + A.B.C.D$

1.6 Correction

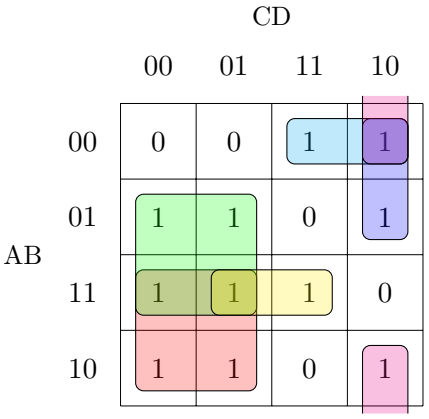
Q1 Soit la fonction donnée par sa forme canonique, Tracer la table de karnaugh et simplifier.
Let the function be given by its canonical form, Draw the Karnaugh table and simplify.
لتكن الدالة المعطاة بشكلها القانوني، ارسم جدول كارنو وبسطها

$F1(A,B,C,D) = \overline{A}.\overline{B}.\overline{C}.D + \overline{A}.\overline{B}.C.\overline{D} + \overline{A}.B.\overline{C}.\overline{D} + \overline{A}.B.C.D + A.\overline{B}.\overline{C}.\overline{D} + A.\overline{B}.\overline{C}.D + A.\overline{B}.C.D + A.B.\overline{C}.\overline{D} + A.B.\overline{C}.D + A.B.C.D$



Simplified Sum of products : $a.d + a.\overline{c} + b.c.d + b.\overline{c}.\overline{d} + \overline{b}.\overline{c}.d + \overline{a}.\overline{b}.c.\overline{d}$
Simplified product of sums : $(a+b+c+d).(\overline{a}+\overline{c}+d).(\overline{b}+\overline{c}+d).(a+b+\overline{c}+\overline{d}).(a+\overline{b}+c+\overline{d})$

$F2(A,B,C,D) = \overline{A}.\overline{B}.C.\overline{D} + \overline{A}.\overline{B}.C.D + \overline{A}.B.\overline{C}.\overline{D} + \overline{A}.B.\overline{C}.D + \overline{A}.B.C.\overline{D} + A.\overline{B}.\overline{C}.\overline{D} + A.\overline{B}.\overline{C}.D + A.\overline{B}.C.\overline{D} + A.B.\overline{C}.\overline{D} + A.B.\overline{C}.D + A.B.C.D$



Simplified Sum of products : $a.\overline{c} + b.\overline{c} + a.b.d + \overline{a}.\overline{b}.c + \overline{a}.c.\overline{d} + \overline{b}.c.\overline{d}$
Simplified product of sums : $(a+b+c).(a+\overline{b}+\overline{c}+\overline{d}).(\overline{a}+b+\overline{c}+\overline{d}).(\overline{a}+\overline{b}+\overline{c}+d)$

Q1 Etudier la fonction suivante:
Study the following function:

ادرس الدالة الآتية:

$F(A, B, C, D) = \overline{a}.\overline{b}.\overline{d} + \overline{a}.\overline{c}.\overline{d} + \overline{a}.\overline{b}.\overline{d} + \overline{a}.\overline{c}.\overline{d}$

1.7 Correction

Q1 Etudier la fonction suivante:
Study the following function:

ادرس الدالة الآتية:

$F(A,B,C,D) = \overline{a}.\overline{b}.\overline{d} + \overline{a}.\overline{c}.\overline{d} + \overline{a}.\overline{b}.\overline{d} + \overline{a}.\overline{c}.\overline{d}$
$F = [0, 2, 4]$
Don't Care
$F = []$
Truth Table جدول الحقيقة

A	B	C	D	F
0	0	0	0	1
0	0	0	1	0
0	0	1	0	1
0	0	1	1	0
0	1	0	0	1
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

Canonical Forms الأشكال القانونية

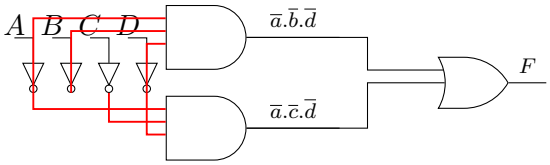
- $F(A,B,C,D) = \overline{A}.\overline{B}.\overline{C}.\overline{D} + \overline{A}.\overline{B}.C.\overline{D} + \overline{A}.B.\overline{C}.\overline{D}$
- $F(A,B,C,D) = (A+B+C+\overline{D}).(A+B+\overline{C}+\overline{D}).(A+\overline{B}+C+\overline{D}).(A+\overline{B}+\overline{C}+D).(A+\overline{B}+\overline{C}+\overline{D}).(\overline{A}+B+C+D).(\overline{A}+B+C+\overline{D}).(\overline{A}+B+\overline{C}+D).(\overline{A}+B+\overline{C}+\overline{D}).(\overline{A}+\overline{B}+C+D).(\overline{A}+\overline{B}+C+\overline{D}).(\overline{A}+\overline{B}+\overline{C}+D).(\overline{A}+\overline{B}+\overline{C}+\overline{D})$
- $F(A,B,C,D) = \sum(0,2,4)$
- $F(A,B,C,D) = \prod(1,3,5,6,7,8,9,10,11,12,13,14,15)$

Karnaugh Table جدول كارنوف

AB \ CD	00	01	11	10
00	1	0	0	1
01	1	0	0	0
11	0	0	0	0
10	0	0	0	0

Simplified Sum of products : $\overline{a}.\overline{b}.\overline{d} + \overline{a}.\overline{c}.\overline{d}$
Simplified product of sums : $(\overline{a}).(\overline{d}).(\overline{b}+\overline{c})$

Logic diagram المخطط المنطقي
STRUCTURED LOGIGRAM-FILE-TEMPLATE


A
B
C
D
$\overline{a}.\overline{b}.\overline{d}$
$\overline{a}.\overline{c}.\overline{d}$
F

Q1 Convert the following numbers, أنجز التحويلات الآتية

$(4b)_{16} = (.....)_2$

1.8 Correction

Q1 Convert the following numbers, أنجز التحويلات الآتية
$(4b)_{16} = (100\,1011)_2$

Convert from base 16 to base 2

Base 16	4	b
Base 2	0100	1011

Result (bottom→top remainders): 1001011

Q1 Calculate the following operations in base 8 : 8

```
  6620\,6645
- 5720\,5763
-------------------
=  ........
```

1.9 Correction

Q1 Calculate the following operations in base 8 : 8

```
  6620\,6645
- 5720\,5763
--------------------
=  700\,0662
```

Q1

Question

A file was downloaded in 2.00 minutes with a speed of 51200.00 KB/s. What was the file size in GB?

1.10 Correction

Q1

Question

A file was downloaded in 2.00 minutes with a speed of 51200.00 KB/s. What was the file size in GB?

Given

- Speed = 51200.00 KB/s
- Time = 0.08 minutes

Solution

Step	Operation	Expression
1	Convert time to seconds	2.00 minutes = 120 seconds
2	Convert speed to MB/s	51200.00 KB/s = 50.00 MB/s
3	Size = Speed × Time	50.00 × 120 = 6000.00 MB
4	Convert MB → GB	6000.00 × 0.000976562 = 5.86 GB

Final Answer

5.86 GB

Q1 Etudier la fonction suivante:
Study the following function:

ادرس الدالة الآتية:

$F(A, B, C, D) =$

1.11 Correction

Q1 Etudier la fonction suivante:
Study the following function:

ادرس الدالة الآتية:

$F(A, B, C, D) =$
$Fx0 = [1, 3, 12, 14, 15]$
Don't Care
$Fx0 = []$
Truth Table جدول الحقيقة

X	Y	Z	W	F
0	0	0	0	0
0	0	0	1	1
0	0	1	0	0
0	0	1	1	1
0	1	0	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	0
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	1
1	1	0	1	0
1	1	1	0	1
1	1	1	1	1

Canonical Forms الأشكال القانونية

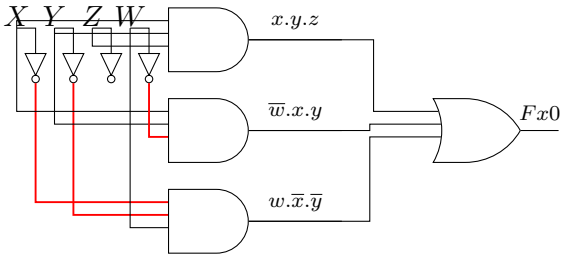
- $Fx0(A, B, C, D) = \overline{X}.\overline{Y}.\overline{Z}.W + \overline{X}.\overline{Y}.Z.W + X.Y.\overline{Z}.\overline{W} + X.Y.Z.\overline{W} + X.Y.Z.W$
- $Fx0(A, B, C, D) = (X+Y+Z+W).(X+Y+\overline{Z}+W).(X+\overline{Y}+Z+W).(X+\overline{Y}+Z+\overline{W}).(X+\overline{Y}+\overline{Z}+W).(X+\overline{Y}+\overline{Z}+\overline{W}).(\overline{X}+Y+Z+W).(\overline{X}+Y+Z+\overline{W}).(\overline{X}+Y+\overline{Z}+W).(\overline{X}+Y+\overline{Z}+\overline{W}).(\overline{X}+\overline{Y}+Z+\overline{W})$
- $Fx0(A, B, C, D) = \sum(1, 3, 12, 14, 15)$
- $Fx0(A, B, C, D) = \prod(0, 2, 4, 5, 6, 7, 8, 9, 10, 11, 13)$

Karnaugh Table جدول كارنوف

XY \ ZW	00	01	11	10
00	0	1	1	0
01	0	0	0	0
11	1	0	1	1
10	0	0	0	0

Simplified Sum of products : $x.y.z + \overline{w}.x.y + w.\overline{x}.\overline{y}$
Simplified product of sums : $(w + x).(x + \overline{y}).(\overline{x} + y).(\overline{w} + \overline{y} + z)$

Logic diagram المخطط المنطقي
STRUCTURED LOGIGRAM-FILE-TEMPLATE


X Y Z W
x.y.z
$\overline{w}.x.y$
$w.\overline{x}.\overline{y}$
Fx0

Q1 Etudier le circuit suivant:
Study the following circuit:

ادرس الدارة الآتية:

$Fx0 = [1, 3, 12, 14, 15]$
$F0 = [3, 5, 6, 7, 9, 10, 11, 12, 13, 14]$
$F1 = [1, 2, 4, 7, 8, 11, 13, 14]$
$F2 = [0, 1, 2, 3, 4, 5, 6, 7, 11, 12]$
$F3 = [0, 1, 2, 3, 4, 5, 6, 7]$
Don't Care $Fx0 = []$ $F0 = []$ $F1 = []$ $F2 = []$ $F3 = []$
$F(A, B, C, D) =$

1.12 Correction

Q1 Etudier le circuit suivant:
Study the following circuit:

ادرس الدارة الآتية:

$Fx0 = [1, 3, 12, 14, 15]$
$F0 = [3, 5, 6, 7, 9, 10, 11, 12, 13, 14]$
$F1 = [1, 2, 4, 7, 8, 11, 13, 14]$
$F2 = [0, 1, 2, 3, 4, 5, 6, 7, 11, 12]$
$F3 = [0, 1, 2, 3, 4, 5, 6, 7]$
Don't Care $Fx0 = []$ $F0 = []$ $F1 = []$ $F2 = []$ $F3 = []$
$F(A, B, C, D) =$
Inputs and Outputs المداخل والمخارج

- Inputs
  - $X = 0/1$
  - $Y = 0/1$
  - $Z = 0/1$
  - $W = 0/1$
- Outputs
  - $Fx0 = 0/1$
  - $F0 = 0/1$
  - $F1 = 0/1$
  - $F2 = 0/1$
  - $F3 = 0/1$

Truth Table جدول الحقيقة

X	Y	Z	W	Fx0	F0	F1	F2	F3
0	0	0	0	0	0	0	1	1
0	0	0	1	1	0	1	1	1
0	0	1	0	0	0	1	1	1
0	0	1	1	1	1	0	1	1
0	1	0	0	0	0	1	1	1
0	1	0	1	0	1	0	1	1
0	1	1	0	0	1	0	1	1
0	1	1	1	0	1	1	1	1
1	0	0	0	0	0	1	0	0
1	0	0	1	0	1	0	0	0
1	0	1	0	0	1	0	0	0
1	0	1	1	0	1	1	1	0
1	1	0	0	1	1	0	1	0
1	1	0	1	0	1	1	0	0
1	1	1	0	1	1	1	0	0
1	1	1	1	1	0	0	0	0

Canonical Forms الأشكال القانونية

- **First Canonical Forms الأشكال القانونية الأولى**
  - $Fx0(X, Y, Z, W) = \overline{X}.\overline{Y}.\overline{Z}.W + \overline{X}.\overline{Y}.Z.W + X.Y.\overline{Z}.\overline{W} + X.Y.Z.\overline{W} + X.Y.Z.W$
  - $F0(X, Y, Z, W) = \overline{X}.\overline{Y}.Z.W + \overline{X}.Y.\overline{Z}.W + \overline{X}.Y.Z.\overline{W} + \overline{X}.Y.Z.W + X.\overline{Y}.\overline{Z}.W + X.\overline{Y}.Z.\overline{W} + X.\overline{Y}.Z.W + X.Y.\overline{Z}.\overline{W} + X.Y.\overline{Z}.W + X.Y.Z.\overline{W}$
  - $F1(X, Y, Z, W) = \overline{X}.\overline{Y}.\overline{Z}.W + \overline{X}.\overline{Y}.Z.\overline{W} + \overline{X}.Y.\overline{Z}.\overline{W} + \overline{X}.Y.Z.W + X.\overline{Y}.\overline{Z}.\overline{W} + X.\overline{Y}.Z.W + X.Y.\overline{Z}.W + X.Y.Z.\overline{W}$

- $F2(X,Y,Z,W) = \overline{X}.\overline{Y}.\overline{Z}.\overline{W} + \overline{X}.\overline{Y}.\overline{Z}.W + \overline{X}.\overline{Y}.Z.\overline{W} + \overline{X}.\overline{Y}.Z.W + \overline{X}.Y.\overline{Z}.\overline{W} + \overline{X}.Y.\overline{Z}.W + \overline{X}.Y.Z.\overline{W} + \overline{X}.Y.Z.W + X.\overline{Y}.Z.W + X.Y.\overline{Z}.\overline{W}$
- $F3(X,Y,Z,W) = \overline{X}.\overline{Y}.\overline{Z}.\overline{W} + \overline{X}.\overline{Y}.\overline{Z}.W + \overline{X}.\overline{Y}.Z.\overline{W} + \overline{X}.\overline{Y}.Z.W + \overline{X}.Y.\overline{Z}.\overline{W} + \overline{X}.Y.\overline{Z}.W + \overline{X}.Y.Z.\overline{W} + \overline{X}.Y.Z.W$

- **Second Canonical Forms الأشكال القانونية الثانية**

- $Fx0(X,Y,Z,W) = (X+Y+Z+W).(X+Y+\overline{Z}+W).(X+\overline{Y}+Z+W).(X+\overline{Y}+Z+\overline{W}).(X+\overline{Y}+\overline{Z}+W).(X+\overline{Y}+\overline{Z}+\overline{W}).(\overline{X}+Y+Z+W).(\overline{X}+Y+Z+\overline{W}).(\overline{X}+Y+\overline{Z}+W).(\overline{X}+Y+\overline{Z}+\overline{W}).(\overline{X}+\overline{Y}+Z+\overline{W})$
- $F0(X,Y,Z,W) = (X+Y+Z+W).(X+Y+Z+\overline{W}).(X+Y+\overline{Z}+W).(X+\overline{Y}+Z+W).(\overline{X}+Y+Z+W).(\overline{X}+\overline{Y}+\overline{Z}+\overline{W})$
- $F1(X,Y,Z,W) = (X+Y+Z+W).(X+Y+\overline{Z}+\overline{W}).(X+\overline{Y}+Z+\overline{W}).(X+\overline{Y}+\overline{Z}+W).(\overline{X}+Y+Z+\overline{W}).(\overline{X}+Y+\overline{Z}+W).(\overline{X}+\overline{Y}+Z+W).(\overline{X}+\overline{Y}+\overline{Z}+\overline{W})$
- $F2(X,Y,Z,W) = (\overline{X}+Y+Z+W).(\overline{X}+Y+Z+\overline{W}).(\overline{X}+Y+\overline{Z}+W).(\overline{X}+\overline{Y}+Z+\overline{W}).(\overline{X}+\overline{Y}+\overline{Z}+W).(\overline{X}+\overline{Y}+\overline{Z}+\overline{W})$
- $F3(X,Y,Z,W) = (\overline{X}+Y+Z+W).(\overline{X}+Y+Z+\overline{W}).(\overline{X}+Y+\overline{Z}+W).(\overline{X}+Y+\overline{Z}+\overline{W}).(\overline{X}+\overline{Y}+Z+W).(\overline{X}+\overline{Y}+Z+\overline{W}).(\overline{X}+\overline{Y}+\overline{Z}+W).(\overline{X}+\overline{Y}+\overline{Z}+\overline{W})$

- **First Canonical Forms الأشكال القانونية الأولى**

- $Fx0(X,Y,Z,W) = \sum(1,3,12,14,15)$
- $F0(X,Y,Z,W) = \sum(3,5,6,7,9,10,11,12,13,14)$
- $F1(X,Y,Z,W) = \sum(1,2,4,7,8,11,13,14)$
- $F2(X,Y,Z,W) = \sum(0,1,2,3,4,5,6,7,11,12)$
- $F3(X,Y,Z,W) = \sum(0,1,2,3,4,5,6,7)$

- **Second Canonical Forms الأشكال القانونية الثانية**

- $Fx0(X,Y,Z,W) = \prod(0,2,4,5,6,7,8,9,10,11,13)$
- $F0(X,Y,Z,W) = \prod(0,1,2,4,8,15)$
- $F1(X,Y,Z,W) = \prod(0,3,5,6,9,10,12,15)$
- $F2(X,Y,Z,W) = \prod(8,9,10,13,14,15)$
- $F3(X,Y,Z,W) = \prod(8,9,10,11,12,13,14,15)$

NAND forms بوابات نفي الوصل

1. $Fx0 = (x \uparrow y \uparrow z)\big\uparrow(\overline{w} \uparrow x \uparrow y)\big\uparrow(w \uparrow \overline{x} \uparrow \overline{y})$

   Explanation

   - $Fx0 = x.y.z + \overline{w}.x.y + w.\overline{x}.\overline{y}$
   - $Fx0 = \overline{\overline{x.y.z + \overline{w}.x.y + w.\overline{x}.\overline{y}}}$
   - $Fx0 = \overline{\overline{x.y.z}.\overline{\overline{w}.x.y}.\overline{w.\overline{x}.\overline{y}}}$
   - $Fx0 = (x \uparrow y \uparrow z)\big\uparrow(\overline{w} \uparrow x \uparrow y)\big\uparrow(w \uparrow \overline{x} \uparrow \overline{y})$

2. $F0 = (w \uparrow x \uparrow \overline{y})\big\uparrow(w \uparrow y \uparrow \overline{z})\big\uparrow(w \uparrow \overline{x} \uparrow z)\big\uparrow(x \uparrow y \uparrow \overline{z})\big\uparrow(x \uparrow \overline{y} \uparrow z)\big\uparrow(\overline{w} \uparrow y \uparrow z)$

   Explanation

   - $F0 = w.x.\overline{y} + w.y.\overline{z} + w.\overline{x}.z + x.y.\overline{z} + x.\overline{y}.z + \overline{w}.y.z$
   - $F0 = \overline{\overline{w.x.\overline{y} + w.y.\overline{z} + w.\overline{x}.z + x.y.\overline{z} + x.\overline{y}.z + \overline{w}.y.z}}$
   - $F0 = \overline{\overline{w.x.\overline{y}}.\overline{w.y.\overline{z}}.\overline{w.\overline{x}.z}.\overline{x.y.\overline{z}}.\overline{x.\overline{y}.z}.\overline{\overline{w}.y.z}}$
   - $F0 = (w \uparrow x \uparrow \overline{y})\big\uparrow(w \uparrow y \uparrow \overline{z})\big\uparrow(w \uparrow \overline{x} \uparrow z)\big\uparrow(x \uparrow y \uparrow \overline{z})\big\uparrow(x \uparrow \overline{y} \uparrow z)\big\uparrow(\overline{w} \uparrow y \uparrow z)$

3. $F1 = (w \uparrow x \uparrow y \uparrow \overline{z})\big\uparrow(w \uparrow x \uparrow \overline{y} \uparrow z)\big\uparrow(w \uparrow \overline{x} \uparrow y \uparrow z)\big\uparrow(\overline{w} \uparrow x \uparrow y \uparrow z)\big\uparrow(w \uparrow \overline{x} \uparrow \overline{y} \uparrow \overline{z})\big\uparrow(\overline{w} \uparrow x \uparrow \overline{y} \uparrow \overline{z})\big\uparrow(\overline{w} \uparrow \overline{x} \uparrow y \uparrow \overline{z})\big\uparrow(\overline{w} \uparrow \overline{x} \uparrow \overline{y} \uparrow z)$

   Explanation

- $F1 = w.x.y.\overline{z} + w.x.\overline{y}.z + w.\overline{x}.y.z + \overline{w}.x.y.z + w.\overline{x}.\overline{y}.\overline{z} + \overline{w}.x.\overline{y}.\overline{z} + \overline{w}.\overline{x}.y.\overline{z} + \overline{w}.\overline{x}.\overline{y}.z$
- $F1 = \overline{\overline{w.x.y.\overline{z} + w.x.\overline{y}.z + w.\overline{x}.y.z + \overline{w}.x.y.z + w.\overline{x}.\overline{y}.\overline{z} + \overline{w}.x.\overline{y}.\overline{z} + \overline{w}.\overline{x}.y.\overline{z} + \overline{w}.\overline{x}.\overline{y}.z}}$
- $F1 = \overline{\overline{w.x.y.\overline{z}}.\overline{w.x.\overline{y}.z}.\overline{w.\overline{x}.y.z}.\overline{\overline{w}.x.y.z}.\overline{w.\overline{x}.\overline{y}.\overline{z}}.\overline{\overline{w}.x.\overline{y}.\overline{z}}.\overline{\overline{w}.\overline{x}.y.\overline{z}}.\overline{\overline{w}.\overline{x}.\overline{y}.z}}$
- $F1 = (w \uparrow x \uparrow y \uparrow \overline{z}) \big\uparrow (w \uparrow x \uparrow \overline{y} \uparrow z) \big\uparrow (w \uparrow \overline{x} \uparrow y \uparrow z) \big\uparrow (\overline{w} \uparrow x \uparrow y \uparrow z) \big\uparrow (w \uparrow \overline{x} \uparrow \overline{y} \uparrow \overline{z}) \big\uparrow (\overline{w} \uparrow x \uparrow \overline{y} \uparrow \overline{z}) \big\uparrow (\overline{w} \uparrow \overline{x} \uparrow y \uparrow \overline{z}) \big\uparrow (\overline{w} \uparrow \overline{x} \uparrow \overline{y} \uparrow z)$

4. $F2 = (x) \big\uparrow (w \uparrow \overline{y} \uparrow z) \big\uparrow (\overline{w} \uparrow y \uparrow \overline{z})$

   Explanation

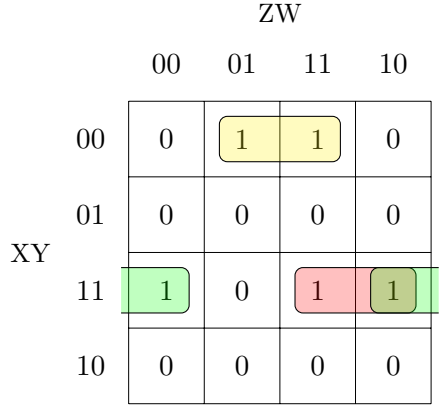
   - $F2 = \overline{x} + w.\overline{y}.z + \overline{w}.y.\overline{z}$
   - $F2 = \overline{\overline{\overline{x} + w.\overline{y}.z + \overline{w}.y.\overline{z}}}$
   - $F2 = \overline{\overline{\overline{x}}.\overline{w.\overline{y}.z}.\overline{\overline{w}.y.\overline{z}}}$
   - $F2 = (x) \big\uparrow (w \uparrow \overline{y} \uparrow z) \big\uparrow (\overline{w} \uparrow y \uparrow \overline{z})$

5. $F3 = \overline{x}$

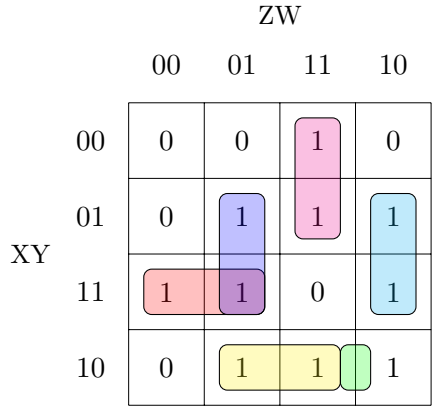
   Explanation

   - $F3 = \overline{x}$
   - $F3 = \overline{x}$

Karnaugh Table جدول كارنوف



Simplified Sum of products : $Fx0 = x.y.z + \overline{w}.x.y + w.\overline{x}.\overline{y}$
Simplified product of sums : $Fx0 = (w + x).(x + \overline{y}).(\overline{x} + y).(\overline{w} + \overline{y} + z)$



Simplified Sum of products : $F0 = w.x.\overline{y} + w.y.\overline{z} + w.\overline{x}.z + x.y.\overline{z} + x.\overline{y}.z + \overline{w}.y.z$
Simplified product of sums : $F0 = (w + x + y).(w + x + z).(w + y + z).(x + y + z).(\overline{w} + \overline{x} + \overline{y} + \overline{z})$

XY \ ZW	00	01	11	10
00	0	1	0	1
01	1	0	1	0
11	0	1	0	1
10	1	0	1	0

Simplified Sum of products : $F1 = w.x.y.\overline{z} + w.x.\overline{y}.z + w.\overline{x}.y.z + \overline{w}.x.y.z + w.\overline{x}.\overline{y}.\overline{z} + \overline{w}.x.\overline{y}.\overline{z} + \overline{w}.\overline{x}.y.\overline{z} + \overline{w}.\overline{x}.\overline{y}.z$
Simplified product of sums : $F1 = (w + x + y + z).(w + x + \overline{y} + \overline{z}).(w + \overline{x} + y + \overline{z}).(w + \overline{x} + \overline{y} + z).(\overline{w} + x + y + \overline{z}).(\overline{w} + x + \overline{y} + z).(\overline{w} + \overline{x} + y + z).(\overline{w} + \overline{x} + \overline{y} + \overline{z})$

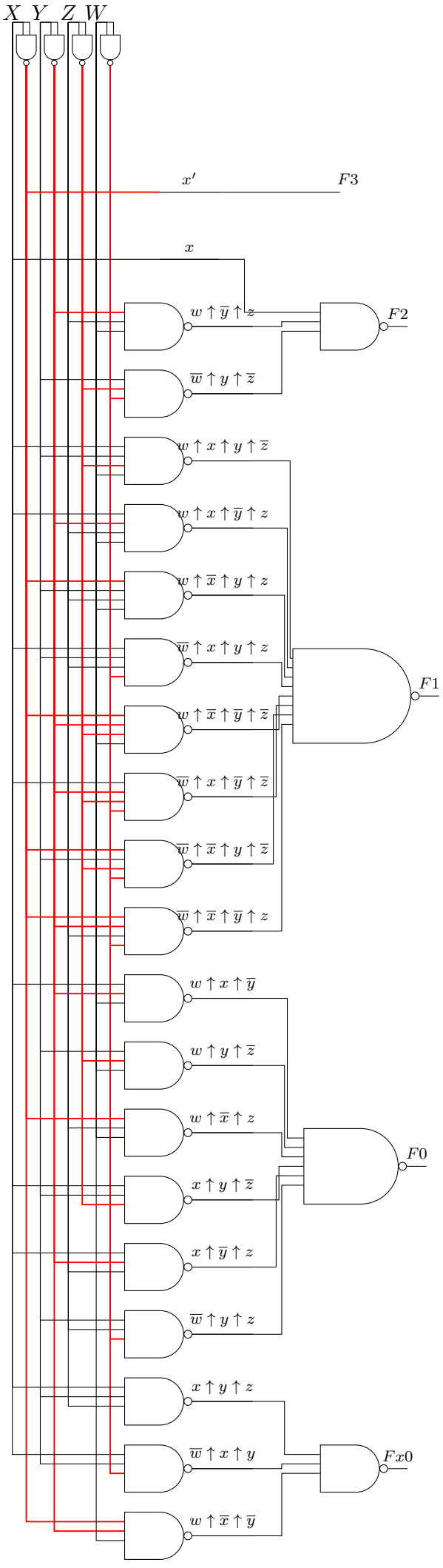
XY \ ZW	00	01	11	10
00	1	1	1	1
01	1	1	1	1
11	1	0	0	0
10	0	0	1	0

Simplified Sum of products : $F2 = \overline{x} + w.\overline{y}.z + \overline{w}.y.\overline{z}$
Simplified product of sums : $F2 = (\overline{x} + y + z).(w + \overline{x} + \overline{z}).(\overline{w} + \overline{x} + \overline{y})$

XY \ ZW	00	01	11	10
00	1	1	1	1
01	1	1	1	1
11	0	0	0	0
10	0	0	0	0

Simplified Sum of products : $F3 = \overline{x}$
Simplified product of sums : $F3 = (\overline{x})$

Ligc diagram المخطط المنطقي
STRUCTURED LOGIGRAM-FILE-TEMPLATE


X Y Z W
x′
F3
x
w ↑ y ↑ z
F2
w ↑ y ↑ z
w ↑ x ↑ y ↑ z
w ↑ x ↑ y ↑ z
w ↑ x ↑ y ↑ z
w ↑ x ↑ y ↑ z
F1
w ↑ x ↑ y ↑ z
w ↑ x ↑ y ↑ z
w ↑ x ↑ y ↑ z
w ↑ x ↑ y ↑ z
w ↑ x ↑ y
w ↑ y ↑ z
w ↑ x ↑ z
F0
x ↑ y ↑ z
x ↑ y ↑ z
w ↑ y ↑ z
x ↑ y ↑ z
w ↑ x ↑ y
Fx0
w ↑ x ↑ y

Q1

Encode the following text into Ascii

Encode the following text into Ascii

Text: ” Mind Your Train ”

Decode the following Ascii codes into text

Codes: [’0x54’, ’0x72’, ’0x61’, ’0x69’, ’0x6e’, ’0x20’, ’0x59’, ’0x6f’, ’0x75’, ’0x72’, ’0x20’, ’0x4d’, ’0x69’, ’0x6e’, ’0x64’]

1.13 Correction

Q1

Encode the following text into Ascii

Encode the following text into Ascii
Text: Mind" Your "Train

Character	T	r	a	i	n	space	Y	o	u	r
Ascii Code Point	0x54	0x72	0x61	0x69	0x6e	0x20	0x59	0x6f	0x75	0x72

Character	space	M	i	n	d
Ascii Code Point	0x20	0x4d	0x69	0x6e	0x64

Decode the following Ascii codes into text
Codes: ['0x54', '0x72', '0x61', '0x69', '0x6e', '0x20', '0x59', '0x6f', '0x75', '0x72', '0x20', '0x4d', '0x69', '0x6e', '0x64']

Ascii Code Point	0x54	0x72	0x61	0x69	0x6e	0x20	0x59	0x6f	0x75	0x72
Character	T	r	a	i	n	space	Y	o	u	r

Ascii Code Point	0x20	0x4d	0x69	0x6e	0x64
Character	space	M	i	n	d

Q1

Encode the following numbers into BCD, then illustrate the addition in BCD:

A = 93952 **B =** 73439

Encode the following numbers into Excess3, then illustrate the addition in Excess3:

A = 93952 **B =** 73439

1.14 Correction

Q1 $(93952)_{10} = (10010011100101010010)_{BCD}$

$(93952)_{10} = (11000110110010000101)_{Excess\text{-}3}$

Explanation:

Base 10 to BCD:

Decimal to BCD

9	3	9	5	2
1001	0011	1001	0101	0010

Base 10 to Excess-3:

Decimal to X3

9	3	9	5	2
1100	0110	1100	1000	0101

BCD to Base 10:

BCD to Decimal

1001	0011	1001	0101	0010
9	3	9	5	2

Excess-3 to Base 10:

X3 to Decimal

1100	0110	1100	1000	0101
9	3	9	5	2

BCD Addition Explanation

Decimal calculation: $93952 + 73439 = 167391$

Carry In	1		1		1	
A (dec)	0	9	3	9	5	2
B (dec)	0	7	3	4	3	9
Final Digit (dec)	1	6	7	3	9	1

Addition in BCD

Carry In	1					
A (bin)	0000	1001	0011	1001	0101	0010
B (bin)	0000	0111	0011	0100	0011	1001
Carry Out			1		1	
Raw Sum (bin)	0001	0000	0110	1101	1000	1011
Correction		+110		+110		+110
Final Digit (bin)	0001	0110	0111	0011	1001	0001
Final Digit (dec)	1	6	7	3	9	1

EXCESS3 Addition Explanation

Decimal calculation: $93952 + 73439 = 167391$

Carry In	1		1		1	
A (dec)	0	9	3	9	5	2
B (dec)	0	7	3	4	3	9
Final Digit (dec)	1	6	7	3	9	1

Addition in EXCESS3

Carry In	1		1		1	
A (bin)	0011	1100	0110	1100	1000	0101
B (bin)	0011	1010	0110	0111	0110	1100
Raw Sum (bin)	0111	0110	1101	0011	1111	0001
Correction	-11	+11	-11	+11	-11	+11
Final Digit (bin)	0100	1001	1010	0110	1100	0100
Final Digit (dec)	1	6	7	3	9	1

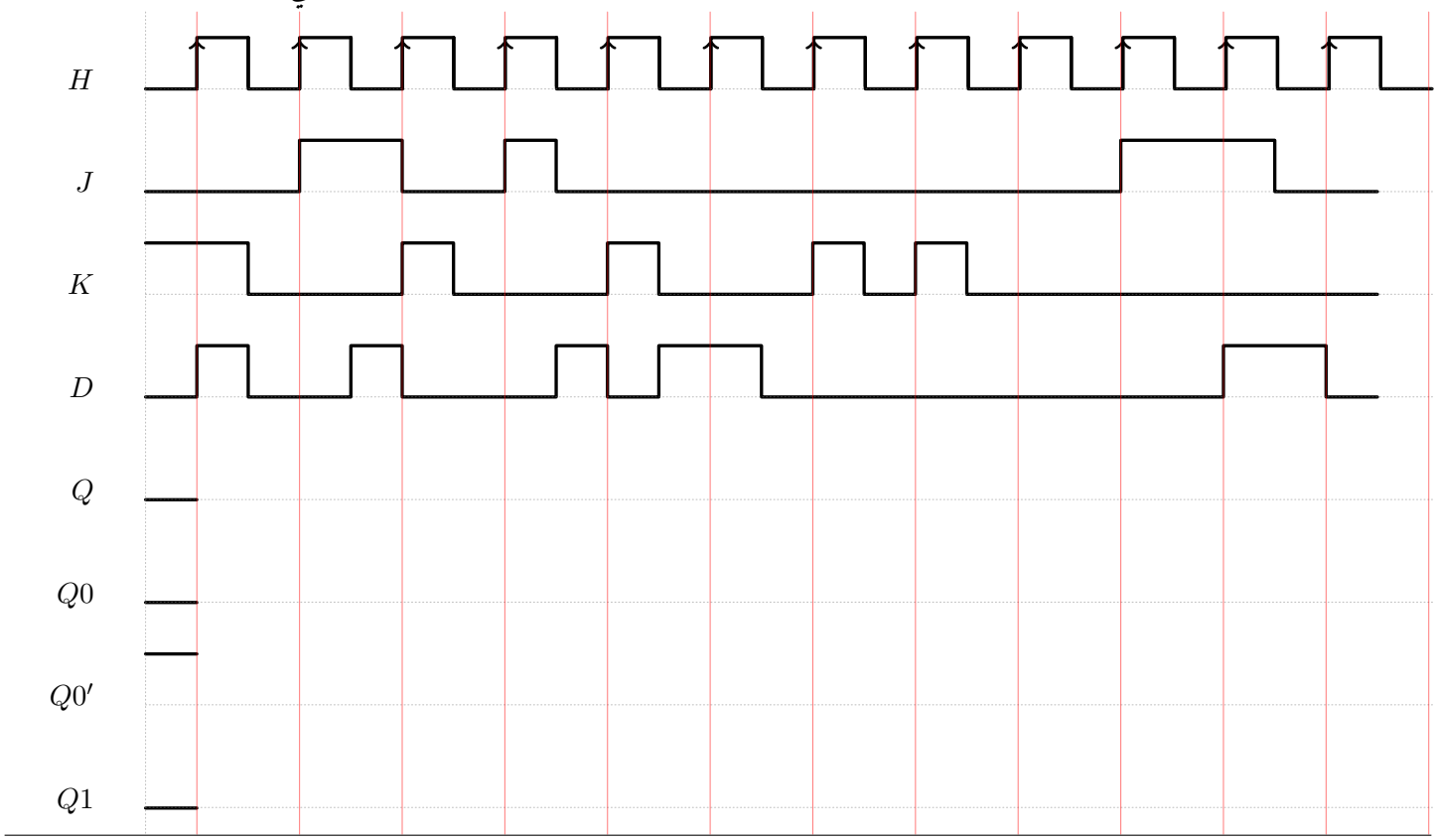
Q1 Unknown command category for 'gray'

1.15 Correction

Q1 Answer

Q1 Complete the following timing diagram : أكمل المخطط الزمني الآتي

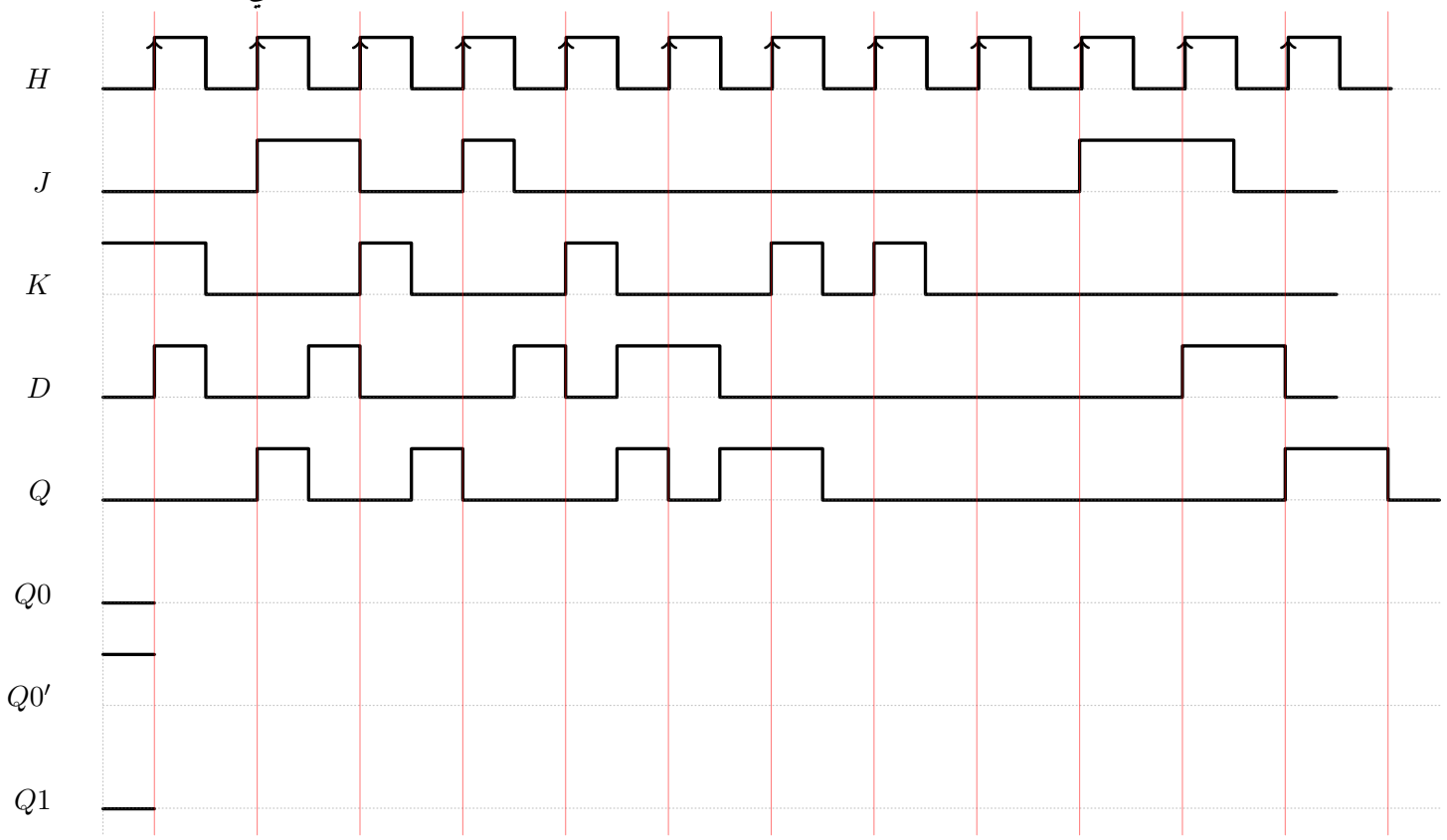
Timing diagram المخطط الزمني



1.16 Correction

Q1 Complete the following timing diagram : أكمل المخطط الزمني الآتي

Timing diagram المخطط الزمني



Q1 Unknown command category for 'flip'

1.17 Correction

Q1 Answer

Q1 Unknown command category for 'counter'

1.18 Correction

Q1 Answer

Q1 Unknown command category for 'register'

1.19 Correction

Q1 Answer