بسم الله الرحمن الرحيم

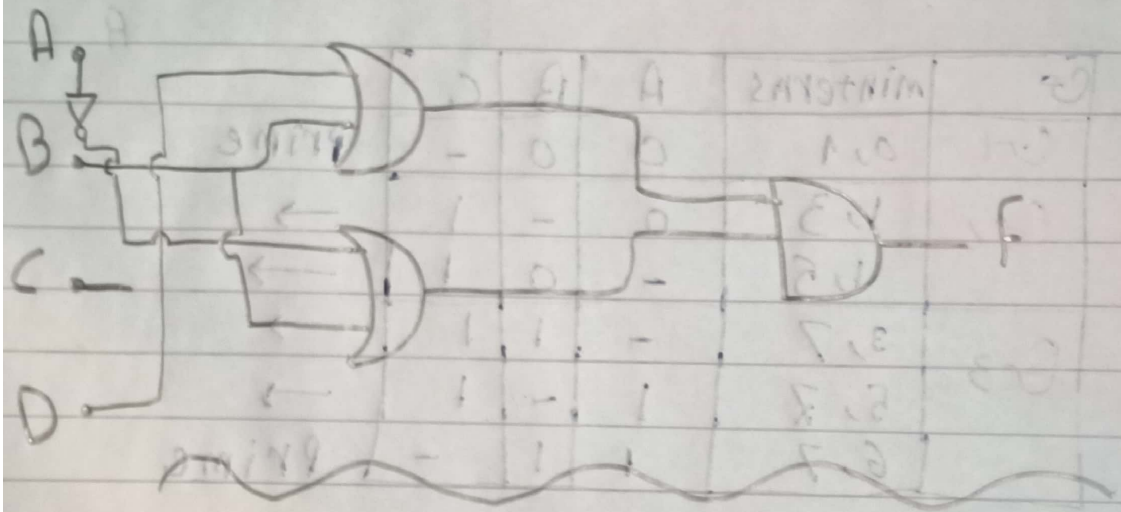
② @ $f(A,B,C,D) = \bar{B}\bar{C} + \bar{A}B + B\bar{C}\bar{D} + \bar{A}\bar{B}D + A\bar{B}CD$

Pos

هنمثلها كانها SoP عشان الـ F هي (+ - - + - - + -)

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

$PoS = (B+D)(\bar{A}+B)$



② (b) $F(A,B,C) = \sum m(1,3,5,6) + d(0,7)$

001 011 101 110 000 111

Group	minterms	A	B	C	
G1	0	0	0	0	→
G2	1	0	0	1	→
G3	3	0	1	1	→
	5	1	0	1	→
	6	1	1	0	→
G4	7	1	1	1	→

G	minterms	A	B	C	
G1	0, 1	0	0	-	Prime
G2	1, 3	0	-	1	→
	1, 5	-	0	1	→
G3	3, 7	-	1	1	→
	5, 7	1	-	1	→
	6, 7	1	1	-	Prime

G	minterms	A	B	C	
	1, 3, 5, 7	-	-	1	Prime
	~~1, 3, 5, 7~~	-	-	1	
	~~1, 5, 7~~	.			

Prime	1	3	5	6
$\bar{A}\bar{B}$	✓			
~~$A\bar{B}$~~				✓
~~C~~	✓	✓	✓	

$AB + C$

③ @

3 → input x, y, z

2 → output A, B

تعدد الوحايد

x	y	z	A	B
0	0	0	0	0
0	0	1	0	1
0	1	0	0	1
0	1	1	1	0
1	0	0	0	1
1	0	1	1	0
1	1	0	1	0
1	1	1	1	1

of (A)

$$A(x,y,z) = \sum_m (3,5,6,7)$$

$D_3 OR D_5 OR D_6 OR D_7$

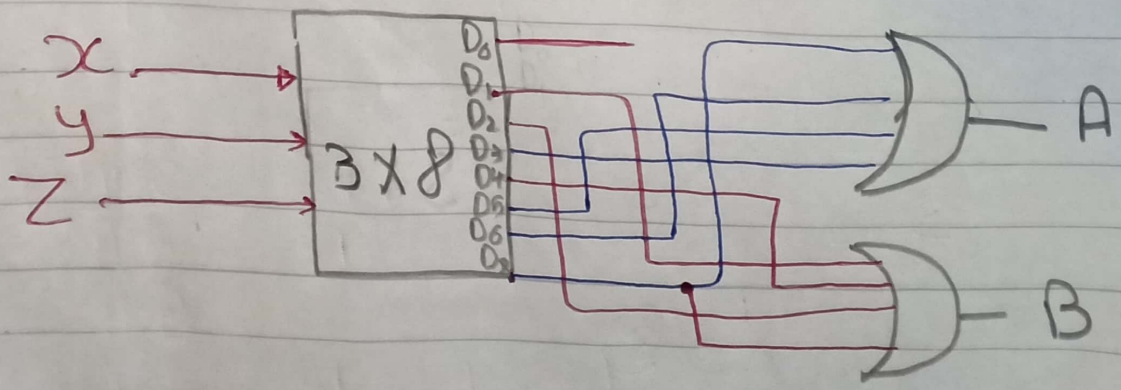
of (B)

$$B(x,y,z) = \sum_m (1,2,4,7)$$

$D_1 OR D_2 OR D_4 OR D_7$

Decoder $N \longrightarrow 2^N$

$3 \longrightarrow 8$



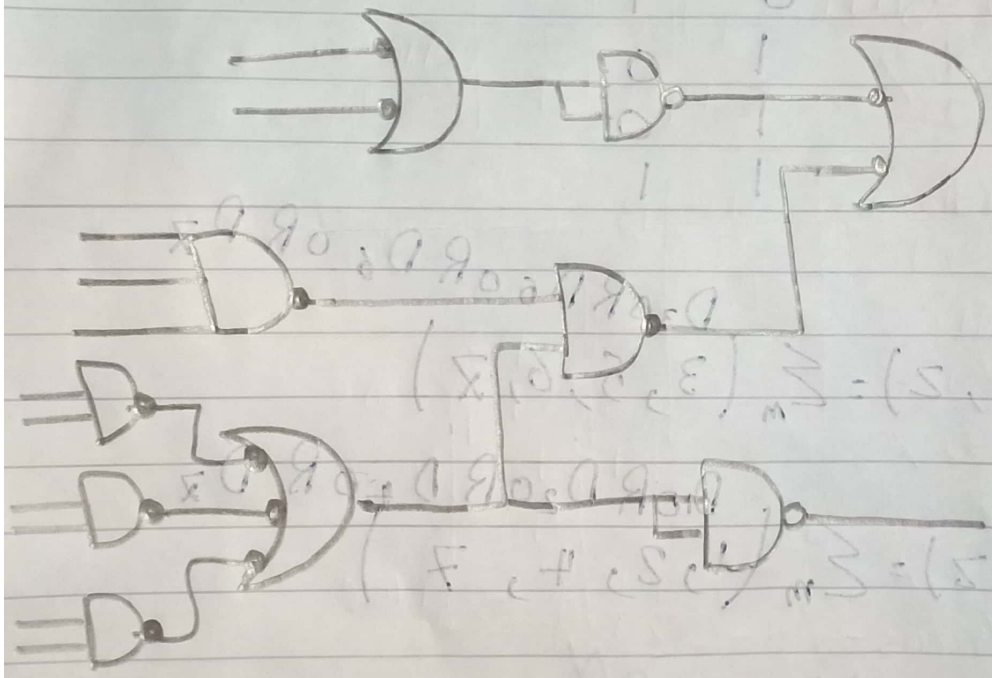
(3)(b)

3 10 10

Not/OR/and

Propagation Delay = 40 (S)

(NAND)



④ ⓐ

4 X1 Multiplexer

2^n X 1

4 input (I_3, I_2, I_1, I_0)

2 Selector (S_1, S_0)

1 output (y)

S_1	S_0	y
0	0	I_0
0	1	I_1
1	0	I_2
1	1	I_3

$$y = I_0 \bar{S}_1 \bar{S}_0 + I_1 \bar{S}_1 S_0 + I_2 S_1 \bar{S}_0 + I_3 S_1 S_0$$

④ ⓑ

A	B
0	0
0	0
0	0
0	0
0	1
0	1
0	1
0	1
1	0
1	0
1	0
1	0
1	1
1	1
1	1
1	1

S_1	S_0	F
0	0	1
0	1	0
1	0	0
1	1	1
0	0	1
0	1	1
1	0	1
1	1	0
0	0	0
0	1	1
1	0	1
1	1	1
0	0	0
0	1	0
1	0	0
1	1	0

S_1 S_0	
0 0	$\rightarrow \bar{A}$
0 1	$\rightarrow A+B$
1 0	$\rightarrow A-B$
1 1	$\rightarrow \bar{B}$

$F = A \oplus B$

$F = \bar{A} + \bar{B}$

borrow

$F = A + B$

ignore Carry

$F = 0$

* عشان ابنى ال F محتاج 15
Full Adder

4X1 Multiplixer

A \ B	0	1
0	1	0
1	0	1

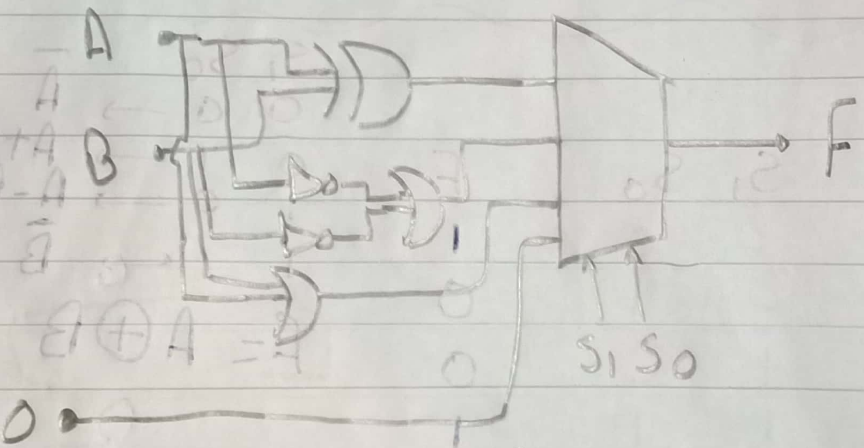
$\bar{A}\bar{B} + AB = A \oplus B$

A \ B	0	1
0	1	1
1	1	0

$\bar{A} + \bar{B}$

A \ B	0	1
0	0	1
1	1	1

$A + B$



④ (c)

$J_A = \overline{(A \oplus X)}$

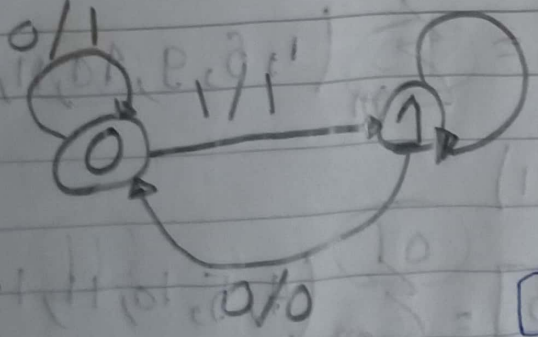
$K_A = X\bar{B}$

$T_B = \bar{B} + A$

④ (d)

present state A	input X	J_A	K_A	next state A(t+1)	y
0	0	0	1	0	1
0	1	1	1	1	1
1	0	1	1	0	0
1	1	0	0	1	0

J_1	K	Q_{Next}
0	0	Q
0	1	0
1	0	1
1	1	$\bar{Q}$



MooRe

mealy	moore
depend	depend
current	current
state and	state
input	only

Q	QNext	D
0	0	0
0	1	1
1	0	0
1	1	1

Q	QNext	t
0	0	0
0	1	1
1	0	1
1	1	0

A → D flip flop
B → T flip flop

(5)

Present State		input		from excitation table		Next State		y
A	B	x	y	D_A	T_B	A(t+1)	B(t+1)	
0	0	0	0	0	0	0	0	0
0	0	0	1	1	0	1	0	0
0	0	1	0	0	0	0	0	0
0	0	1	1	0	0	0	0	0
0	1	0	0	0	0	0	1	1
0	1	0	1	1	0	1	1	1
0	1	1	0	0	1	0	0	1
0	1	1	1	0	1	0	0	1
1	0	0	0	0	0	1	0	0
1	0	0	1	1	0	1	0	0
1	0	1	0	0	0	1	0	0
1	0	1	1	0	0	1	0	0
1	1	0	0	0	1	1	1	0
1	1	0	1	1	1	1	1	0
1	1	1	0	0	1	1	1	0
1	1	1	1	0	1	1	1	0

minterms of A(t+1)

$$A(t+1)[A,B] = \sum_m (1,5,9,10,11,13,14,15)$$

minterms of B(t+1)

$$A(t+1)[A,B] = \sum_m (4,5,10,11,12,13,14,15)$$

minterms of (y)

$$y(A,B) = \sum_m (4,5,6,7,12,13,14,15)$$

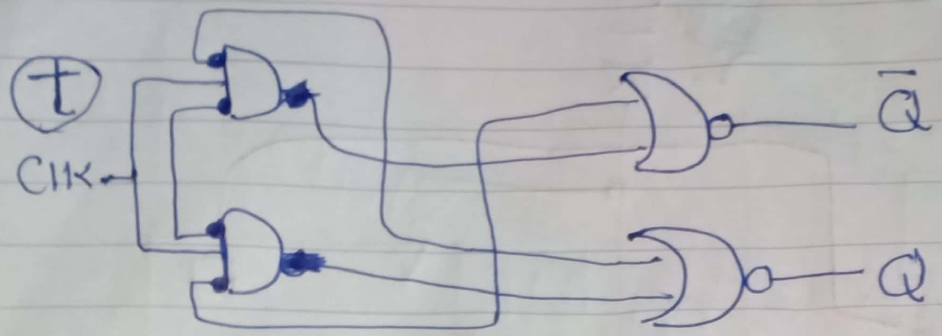
SOP الدوال في صيغة ومثلها

(8)

T

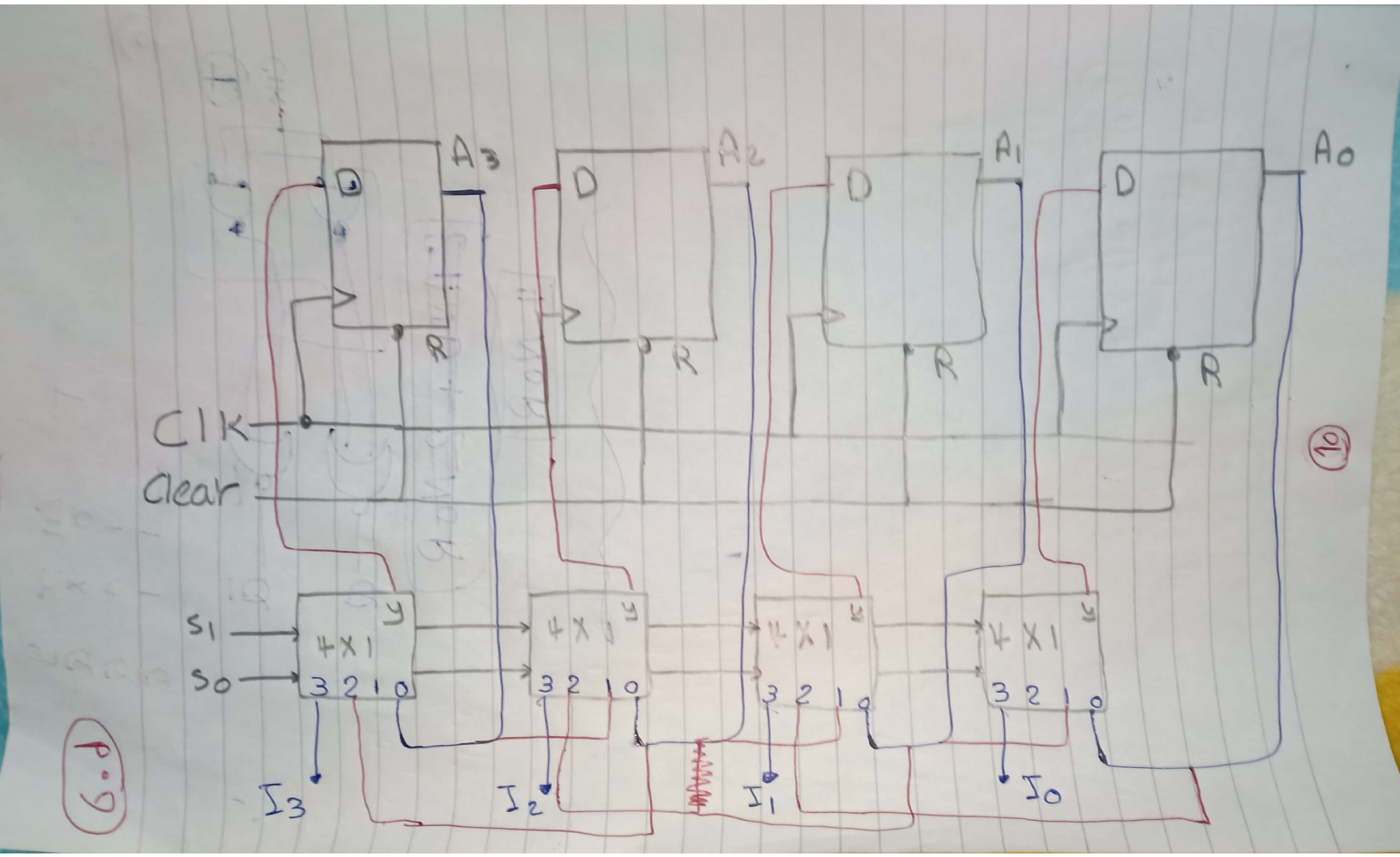
En	x	y
0	X	Q
1	0	$\bar{Q}$
1	1	$\bar{Q}$

(6)



~~2 AND + 2 NOR~~

4 NOR


A3
A2
A1
A0
D
R
Clk
clear
S1
S0
4X1
3 2 1 0
I3
I2
I1
I0
6.d
10

7.a X

7.b

Present State	Next State X=0	Next State X=1	F X=0	F X=1
A	A	E	0	0
B	B	A	1	0
C	A	G	0	0
D	E	F	1	1
E	E	G	1	1
F	E	H	1	1
G	G	H	1	1
H	B	C	1	0
I	B	C	1	0
J	D	A	1	0

A	A	E	0	0
B	B	A	1	0
C	A	G E	0	0
D	E F	C A	1	1
E	E G	H B	1	1
F	E	H B	1	1
G	G	H	1	1
H	B	C A	1	0

A	A	E	0	0
B	B	A	1	0
D	E	A	1	1
E	E	B	1	1