UIT2304 - Digital Logic & Computer Organization

Assignment - 1

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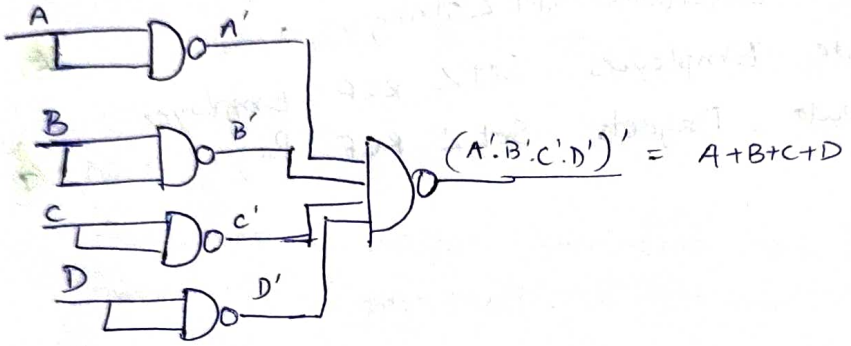
IT-A

1.



2. $A(B' + AC')'$

$= A(B.(AC')')$

$= A(B.(A'+C))$ De-Morgan's

$= A(A'B + BC)$

$= AA'B + ABC$ $[A.A' = 0]$

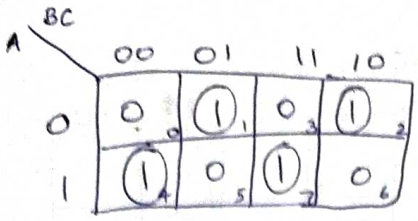
$= ABC$

It can be implemented using one 3-input And gate

3.

I/P A	B	C	O/P
0	0	0	0
0	0	1	1
0	1	0	1
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	0
1	1	1	1

K-Map:



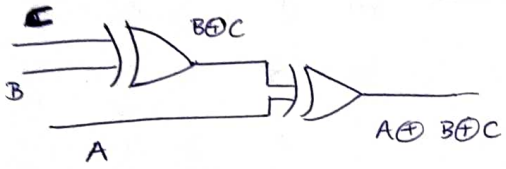
$= A'B'C + A'BC' + AB'C' + ABC$

$= A'(B'C + BC') + A(B'C' + BC)$

$= A'(B \oplus C) + A(B \oplus C)'$

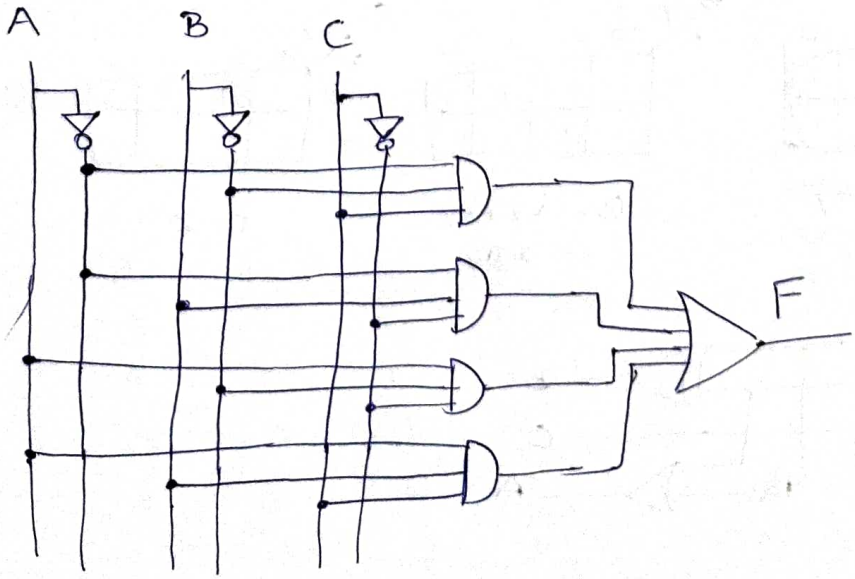
$= A \oplus (B \oplus C)$

Circuit:



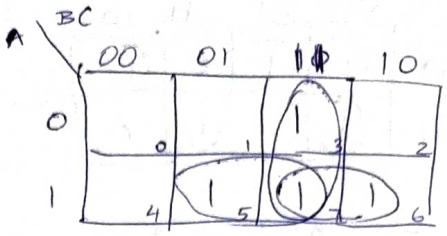
4.

A	B	C	F	
0	0	0	0	} F = C
0	0	1	1	
0	1	0	1	} F = C'
0	1	1	0	
1	0	0	1	} F = C'
1	0	1	0	
1	1	0	0	} F = C
1	1	1	1	

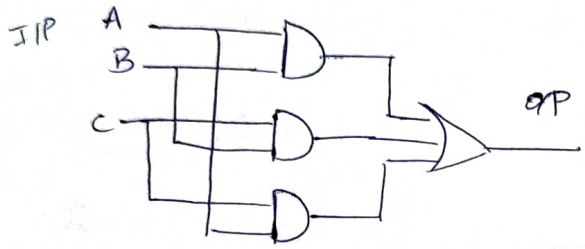


5.

I/P A	B	C	O/P
0	0	0	0
0	0	1	0
0	1	0	0
0	1	1	1
1	0	0	0
1	0	1	1
1	1	0	1
1	1	1	1

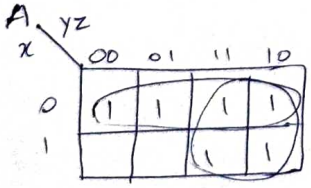


$= BC + AC + AB$

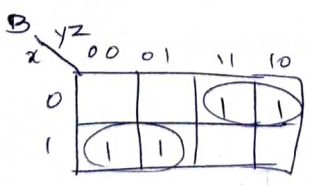


6.

	I/P x	y	z	O/P A	B	C
0	0	0	0	1	0	0
1	0	0	1	1	0	1
2	0	1	0	1	1	0
3	0	1	1	1	1	1
4	1	0	0	0	1	0
5	1	0	1	0	1	1
6	1	1	0	1	0	0
7	1	1	1	1	0	1

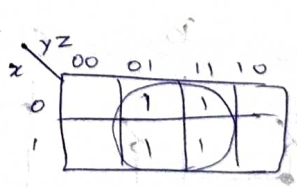


$A = \bar{x} + y$

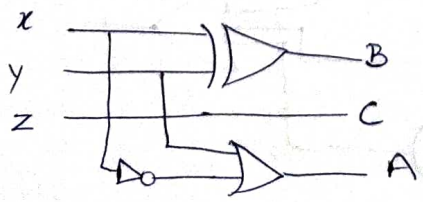


$B = \bar{x}y + x\bar{y}$

$= x \oplus y$



$C = Z$

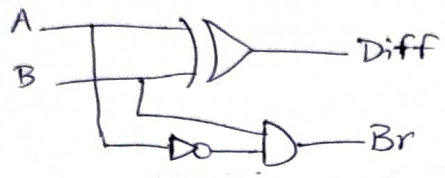


7. Half Subtractor:

A	B	Diff	Br
0	0	0	0
0	1	1	1
1	0	1	0
1	1	0	0

$Diff = A \oplus B$

$Br = A'B$

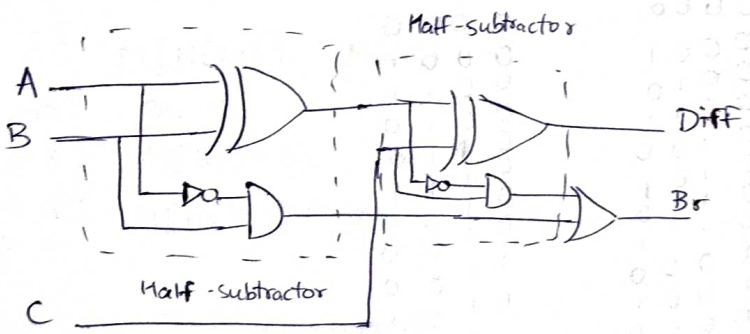


Full Subtractor:

A	B	C	D	Br
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	1
1	0	0	1	0
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1

$D = A \oplus B \oplus C$

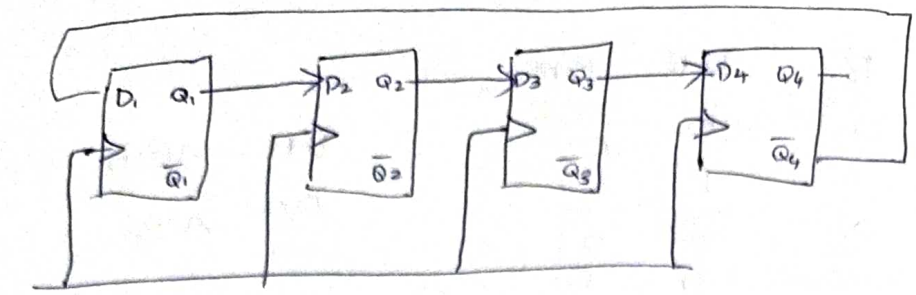
$Br = (A \oplus B)C + A'B$



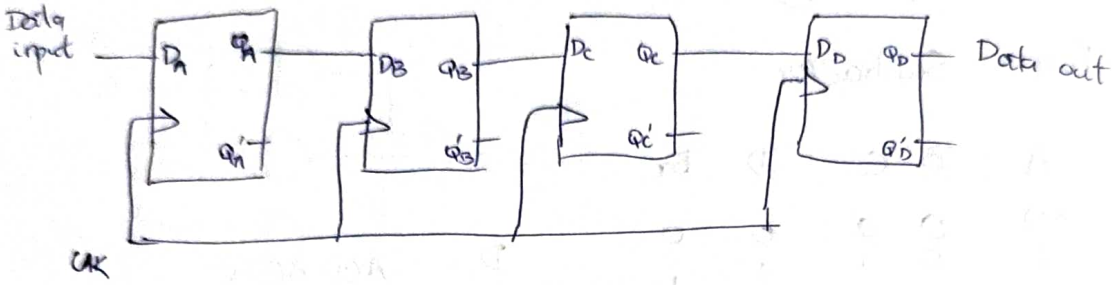
8.

CLK	Q_1	Q_2	Q_3	Q_4
0	0	0	0	0
1	1	0	0	0
2	1	1	0	0
3	1	1	1	0
4	1	1	1	1
5	0	1	1	1
6	0	0	1	1
7	0	0	0	1

Inverted output Q' of last flipflop is passed as input to the first flipflop.

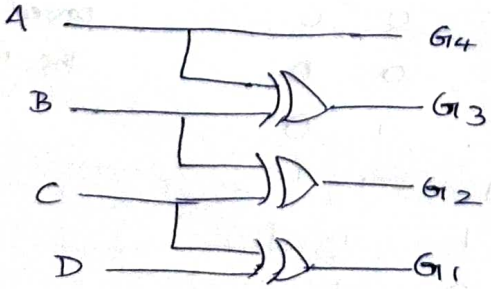


9.



10.

Decimal No.	Binary A B C D	Gray Code G1 G2 G3 G4
0	0 0 0 0	0 0 0 0
1	0 0 0 1	0 0 0 1
2	0 0 1 0	0 0 1 1
3	0 0 1 1	0 0 1 0
4	0 1 0 0	0 1 1 0
5	0 1 0 1	0 1 1 1
6	0 1 1 0	0 1 0 1
7	0 1 1 1	0 1 0 0
8	1 0 0 0	1 1 0 0
9	1 0 0 1	1 1 0 1
10	1 0 1 0	1 1 1 1
11	1 0 1 1	1 1 1 0
12	1 1 0 0	1 0 1 0
13	1 1 0 1	1 0 1 1
14	1 1 1 0	1 0 0 1
15	1 1 1 1	1 0 0 0



$G_1 = A$

$G_2 = A'B + AB' = A \oplus B$

$G_3 = BC' + B'C = B \oplus C$

$G_4 = C'D + CD' = C \oplus D$