EPR Lab 2

Combinational circuits

It is made up with combining various logic gates.

1. Find number of inputs and outputs
2. Give symbols to inputs and outputs.
3. Design truth table which relates input and output.
4. Design function of output
5. Implement circuit using logic gates

And ➔ AB

OR→ A + B

NOT→A'

A	B	EX-or
0	0	0
0	1	1
1	0	1
1	1	0

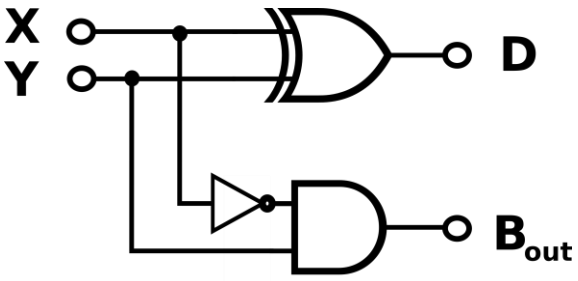
Half Subtractor:

1. 2 inputs and 2 outputs
2. Inputs→A, B outputs→S(subtraction), Bo(Borrow)
3.

A	B	S	Bo
0	0	0-0=0	0
0	1	0-1=1	1
1	0	1-0=1	0
1	1	1-1=10→0	0

   2 inputs = 2^2=4

4. S = A'B + AB' = A (EXOR) B
   Bo = A'B

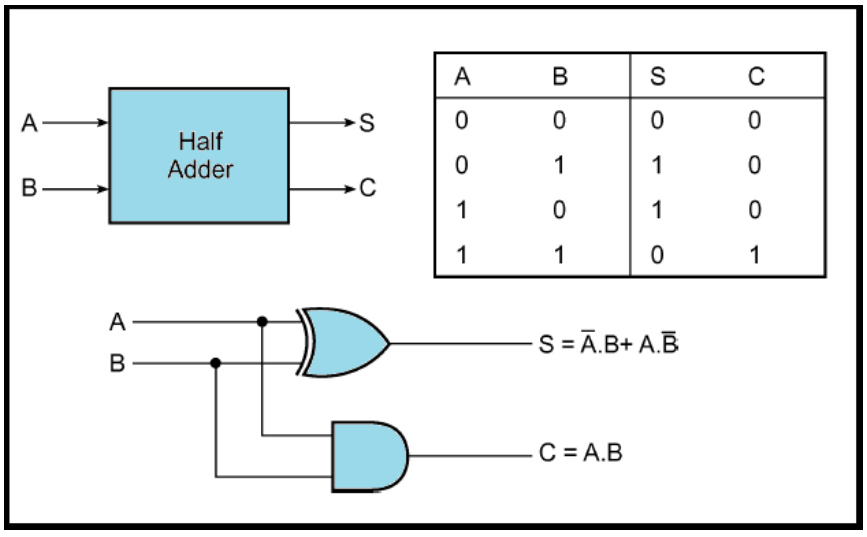
5. 

Half Adder:

1. 2 inputs and 2 outputs
2. Inputs→A, B outputs→S(sum), C(carry)
3.

A	B	S	C
0	0	0+0=0	0
0	1	0+1=1	0
1	0	1+0=1	0
1	1	1+1=10→0	1

2 inputs = 2^2=4

4. S = A'B + AB' = A (EXOR) B
   C = AB
5. 

A	B	S	C
0	0	0	0
0	1	1	0
1	0	1	0
1	1	0	1

Full adder:

1. 3 inputs and 2 outputs
2. A, B, Cin→S, Cout
   3 inputs = 2^3=8
3.

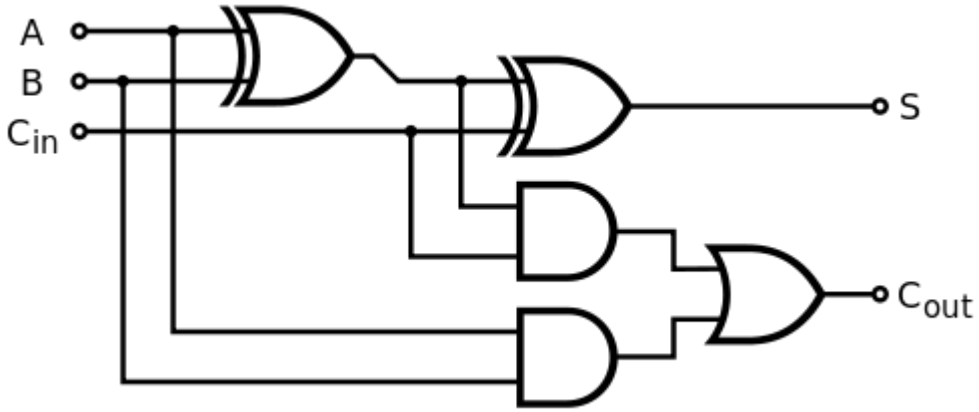
A	B	Cin	S	Cout
0	0	0	0	0
0	0	1	1	0
0	1	0	1	0
0	1	1	0	1
1	0	0	1	0
1	0	1	0	1
1	1	0	0	1
1	1	1	1	1

4. S
   = A'B'C + A'BC' + AB'C' + ABC
   = A'BC' + AB'C' + A'B'C + ABC
   = C'[A'B + AB'] + C[A'B' + AB]
   = C'[A (EXOR)B] + C[A (EXNOR) B]
   = C'[A (EXOR)B] + C[A (EXOR) B]'

   Assume A (EXOR) B=Y

   = C'Y + CY'
   =Y (EXOR) C
   = A (EXOR) B (EXOR) C

   C
   = A'BC + AB'C + ABC' + ABC
   = C [A'B + AB'] + AB [C + C']
   = C [A (EXOR) B] + AB
   = AB + C [A (EXOR) B]



Full Subtractor: