FACULTY OF ENGINEERING & TECHNOLOGY

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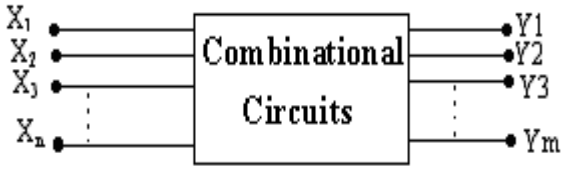
Combinational Circuits

The combinational circuits are the network of logic gates having a set of input independent variables, and outputs as the Boolean functions inputs. The output variables in these circuits depend only on the present value of the inputs and do not depend upon their previous values.

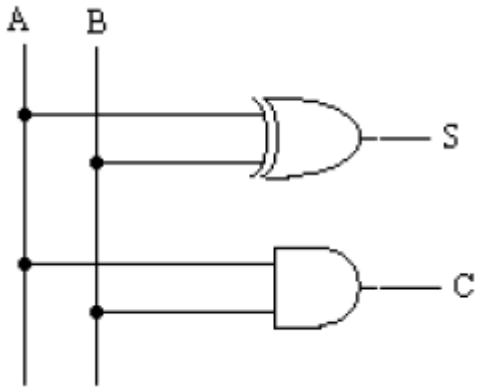


Half Adder

A half adder is combinational circuits which adds two binary digits simultaneously

Circuit Diagram
Truth Table

Inputs		Outputs	
A	B	S	C
0	0	0	0
0	1	1	0
1	0	1	0
1	1	1	1



Symbolic representation of the half adder

Sum S and Carry C are given by

$$S = \overline{A} \cdot B + A \cdot \overline{B}$$
$$= A \oplus B$$
$$C = A \cdot B$$

Q1: Design the half adder using NOR gates only.

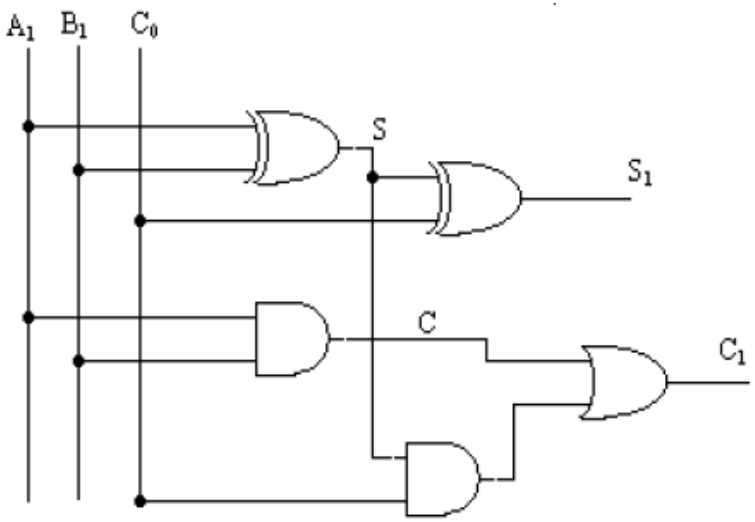
Full Adder

A Full adder is combinational circuits which adds three binary digits simultaneously

Circuit Diagram

Truth Table

A_1	B_1	C_0	S_1	C_1
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



Sum S1 & Carry C_1 are given by

$$S_1=A_1 \oplus B_1 \oplus C_0$$
$$C_1= (A_1 \oplus B_1)C_0+A_1B_1$$

It is clear that a full adder consists of two half adders and an OR gate