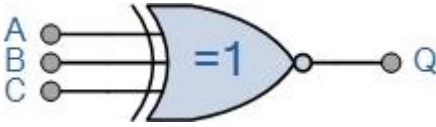


Giving the Boolean expression of: $Q = AB + AB$

The logic function implemented by a 2-input Ex-NOR gate is given as “when both A AND B are the SAME” will give an output at Q. In general, an Exclusive-NOR gate will give an output value of logic “1” ONLY when there are an EVEN number of 1’s on the inputs to the gate (the inverse of the Ex-OR gate) except when all its inputs are “LOW”.

Then an Ex-NOR function with more than two inputs is called an “even function” or modulo-2-sum (Mod-2-SUM), not an Ex-NOR. This description can be expanded to apply to any number of individual inputs as shown below for a 3-input Exclusive-NOR gate.

3-input Ex-NOR Gate

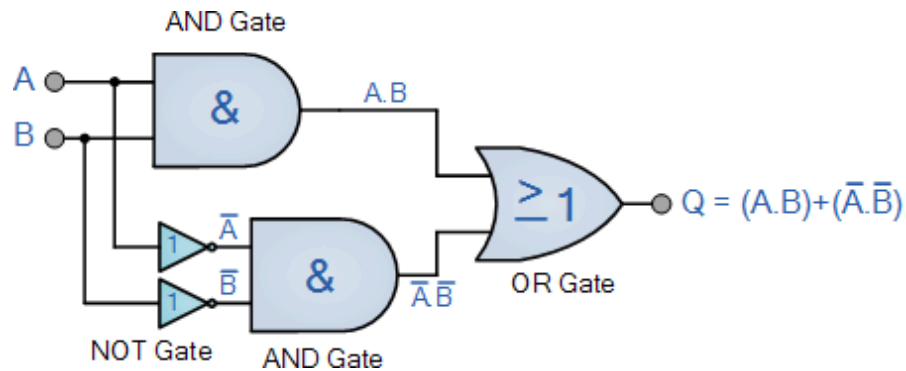
Symbol	Truth Table			
 <p>3-input Ex-NOR Gate</p>	C	B	A	Q
	0	0	0	1
	0	0	1	0
	0	1	0	0
	0	1	1	1
	1	0	0	0
	1	0	1	1
	1	1	0	1
	1	1	1	0
Boolean Expression $Q = A \oplus B \oplus C$	Read as “any EVEN number of Inputs” gives Q			

Giving the Boolean expression of: $Q = ABC + ABC + ABC + ABC$ We said previously that the Ex-NOR function is a combination of

different basic logic gates Ex-OR and a NOT gate, and by using the 2- input truth table above, we can expand the Ex-NOR function

to: $Q = A \oplus B = (A.B) + (\bar{A}.\bar{B})$ which means we can realise this new expression using the following individual gates.

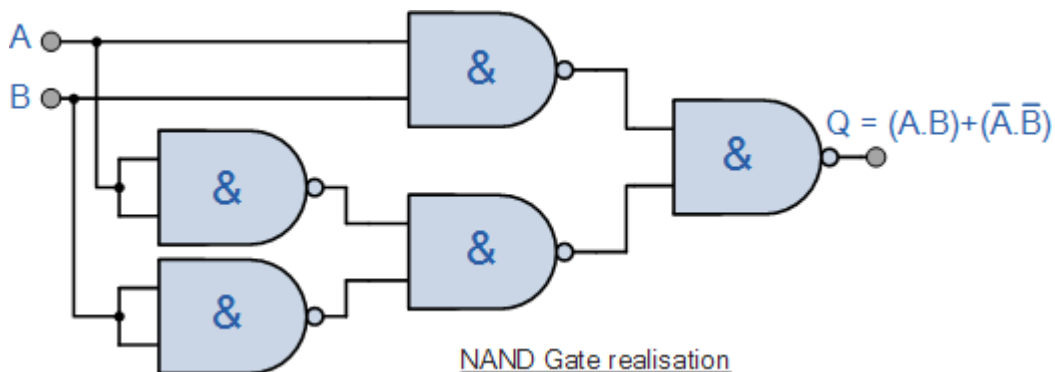
Ex-NOR Gate Equivalent Circuit



One of the main disadvantages of implementing the Ex-NOR function above is that it contains three different types logic gates

the AND, NOT and finally an OR gate within its basic design. One easier way of producing the Ex-NOR function from a single gate type is to use NAND gates as shown below.

Ex-NOR Function Realisation using NAND gates



Ex-NOR gates are used mainly in electronic circuits that perform arithmetic operations and data checking such

as *Adders*, *Subtractors* or *Parity Checkers*, etc. As the Ex-NOR gate gives an output of logic level "1" whenever its two inputs are equal it can be used to compare the magnitude of two binary digits or numbers and so Ex-NOR gates are used in Digital Comparator circuits.

Commonly available digital logic Exclusive-NOR gate IC's include:

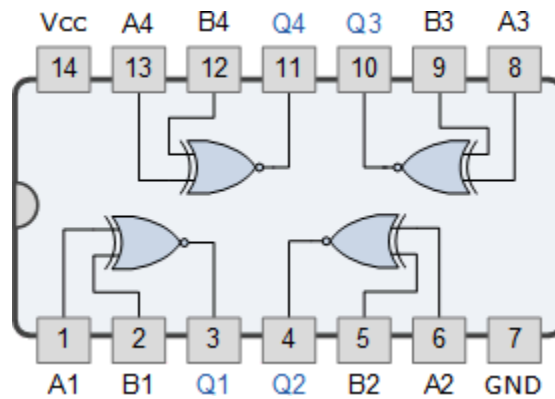
TTL Logic Ex-NOR Gates

- 74LS266 Quad 2-input

CMOS Logic Ex-NOR Gates

- CD4077 Quad 2-input

74266 Quad 2-input Ex-NOR Gate



7400 Quad 2-input Logic NAND Gate

