



FACULTY OF ENGINEERING & TECHNOLOGY

Dileep Kumar
Assistant Prof. EE Deptt

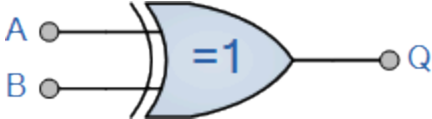
LOGIC GATE

3. Arithmetic Gate (EXOR & EXNOR)

- **EXOR Gate:**

These two “hybrid” logic gates are called the **Exclusive-OR (Ex-OR) Gate** and its complement the **Exclusive-NOR (Ex-NOR) Gate**.

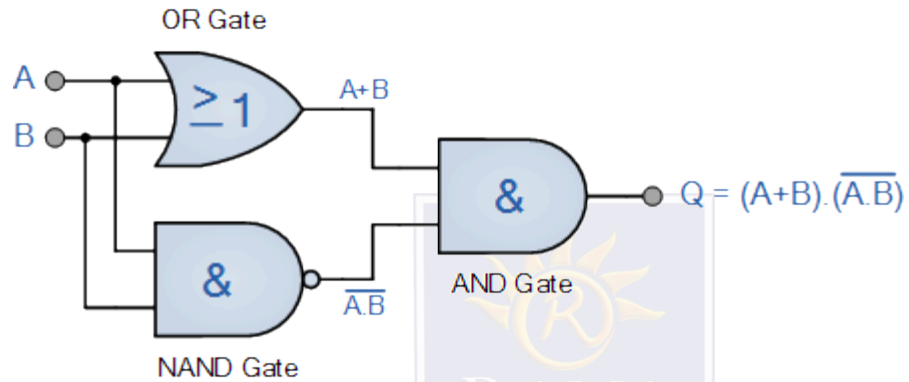
The **Exclusive-OR Gate** function, or **Ex-OR** for short, is achieved by combining standard logic gates together to form more complex gate functions that are used extensively in building arithmetic logic circuits, computational logic comparators and error detection circuits.

Symbol	Truth Table		
<p>2-input EXOR Gate</p> 	A	B	Y
	0	0	0
	0	1	1
	1	0	1
	1	1	0
Boolean Expression $Q = A \oplus B$	A OR B but NOT BOTH gives Q		

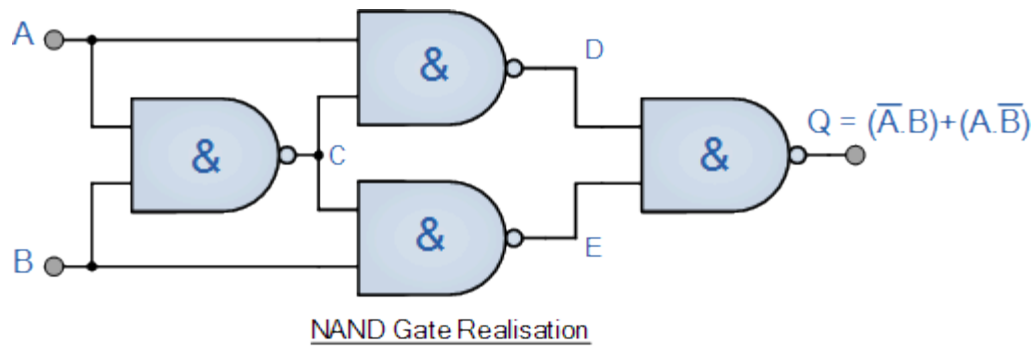
The Boolean expression of: $Q = A \oplus B = \bar{A}B + A\bar{B}$

LOGIC GATE

Ex-OR Gate Equivalent Circuit



Ex-OR Function Realisation using NAND gates



LOGIC GATE

Commonly available digital logic Exclusive-OR gate IC's include:

TTL Logic Ex-OR Gates

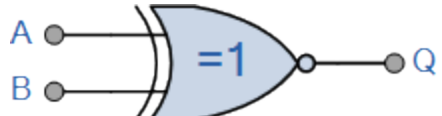
74LS86 Quad 2-input

CMOS Logic Ex-OR Gates

CD4030 Quad 2-input

- **EXNOR Gate:**

Basically the "Exclusive-NOR" gate is a combination of the Exclusive-OR gate and the NOT gate

Symbol	Truth Table		
<p>2-input EXNOR Gate</p> 	A	B	Y
	0	0	1
	0	1	0
	1	0	0
	1	1	1
Boolean Expression $Q = \overline{A \oplus B}$	Read if A AND B the SAME gives Q		

The Boolean expression $Q = \overline{(A \oplus B)} = \overline{A \cdot B} + A \cdot B$

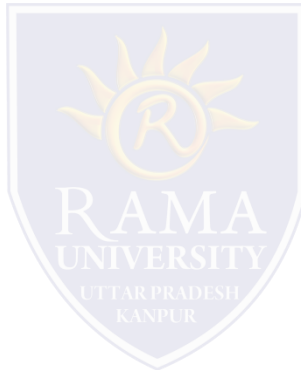
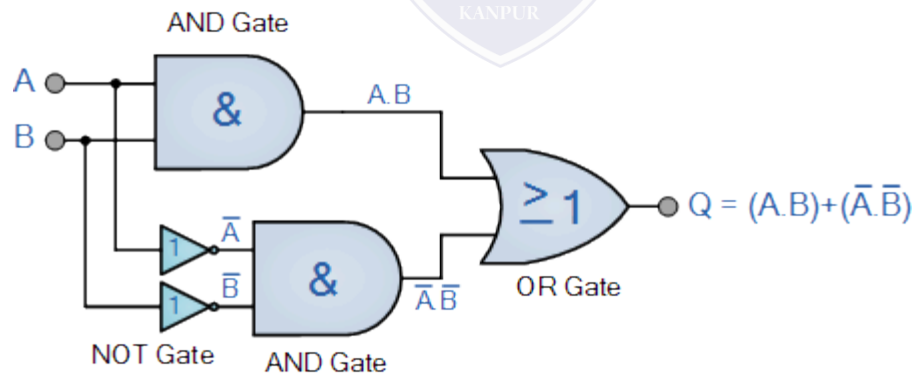
LOGIC GATE

Ex-NOR Gate Equivalent



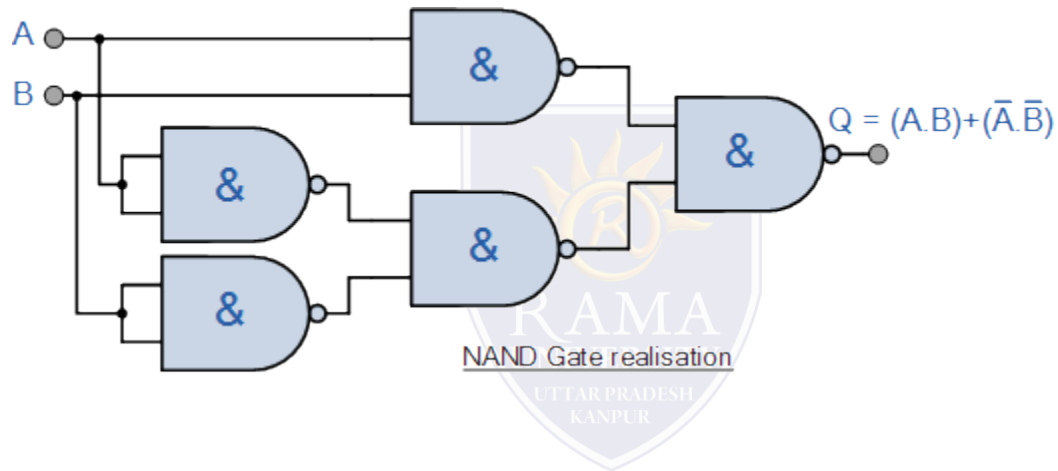
2-input "Ex-OR" gate plus a "NOT" gate

Ex-NOR Gate Equivalent Circuit



LOGIC GATE

Ex-NOR Function Realisation using NAND gates



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