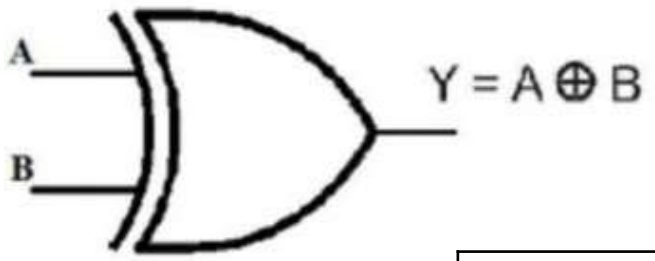
EX-OR

For two inputs, output will be high if and only if both the input values are different.

$a \oplus b = a'.b + a.b'$



Truth Table		
Input		Output
A	B	$Y = A \oplus B$
0	0	0
0	1	1
1	0	1
1	1	0

EX-OR with ZERO give SAME	→	$(a \oplus 0) = a$
EX-OR with ONE give COMPLEMENT	→	$(a \oplus 1) = a'$
EX-OR with SAME give ZERO	→	$(a \oplus a) = 0$
EX-OR with COMPLEMENT give ONE	→	$(a \oplus a') = 1$

EX-OR does not satisfy idempotent

- $(a \oplus a) \; != a$

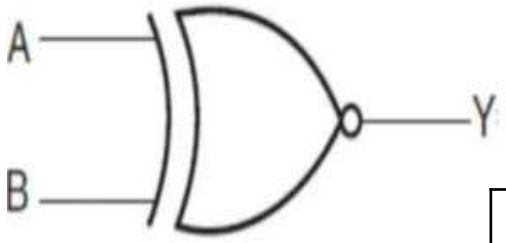
It satisfies associative and commutative law.

- $((a \oplus b) \oplus c) = (a \oplus (b \oplus c))$
- $(a \oplus b) = (b \oplus a)$

EX-NOR

For two input, output will be high if and only if both the input values are same

$a \odot b = a'.b' + a.b$



Truth Table		
Input		Output
A	B	$Y = A \odot B$
0	0	1
0	1	0
1	0	0
1	1	1

EX-NOR with ZERO give COMPLEMENT →(a ⊙ 0) = a'

EX-NOR with ONE give SAME →(a ⊙ 1) = a

EX-NOR with SAME give ONE →(a ⊙ a) = 1

EX-NOR with COMPLEMENT give ZERO →(a ⊙ a') = 0

EX-NOR does not satisfy idempotent

- (a ⊙ a) != a

it satisfies associative and commutative law.

- ((a ⊙ b) ⊙c) = (a ⊙ (b ⊙ c))
- (a ⊙ b) = (b ⊙ a)

Boolean Expressions

- Boolean expressions are the method using which we save the information about the Boolean function, that when we get value 1 and when we get value 0 as output.

- So, we convert the truth table of the function into an expression, reading which we can understand where the output is 1 and when it is zero.

Light	Day	Engine	Warning
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

- $W = a'b'c + ab'c' + abc' + abc$

- There are two popular approaches for writing these expressions.
  - Sum of Product (SOP) (which remember when we get 1)
  - Product of Sum (POS) (which remember when we get 0)

- Make a note of this as we are studying Boolean function remembering both 0 and 1 is not required, so we can either concentrate on 0 or 1.

Light	Day	Engine	Warning
0	0	0	0
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	1

- $W(L, D, E) = \sum_m (1, 4, 6, 7)$
- $W(L, D, E) = \prod_M (0, 2, 3, 5)$