

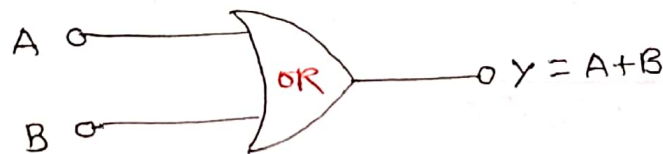
LECTURE SERIES-02

DATE 28-04-2020 B.Sc(H)-II * PHYSICS *
PAPER-IV ELECTRONICS

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Logic Gate: A logic gate is a digital circuit that can implement boolean algebraic equation.

(i) **OR-gate:** The output of the OR-gate is in the state 1 if one or more inputs assume the state 1

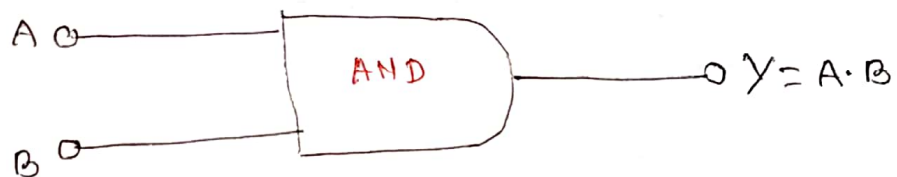


Symbol of OR-gate

Truth table

Input		output
A	B	$Y = A + B$
0	0	0
1	0	1
0	1	1
1	1	1

(ii) **AND-gate** The output of an AND gate is in the state 1 if and only if all the input assume the state 1.

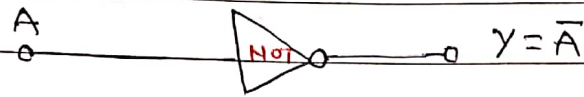


Symbol of AND-gate

Truth table

Input		output
A	B	$Y = A · B$
0	0	0
0	1	0
1	0	0
1	1	1

(iii) **NOT-gate**: The output of a NOT-gate is in the state 1 if the input is not in the state 1.

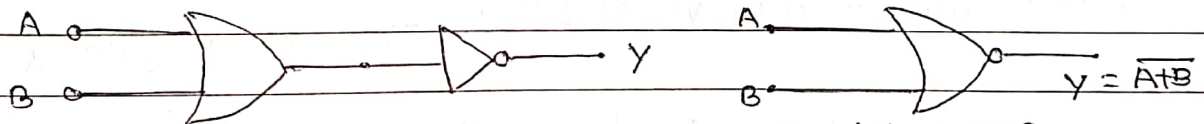


Symbol of NOT-gate

Truth table

Input		output
A		$Y = \bar{A}$
0		1
1		0

(iv) **NOR-gate** If NOT circuit follows the OR-gate, the combined circuit will act as NOT-OR circuit or if we combine the two words the circuit is called NOR-gate



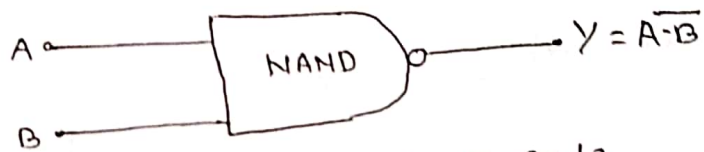
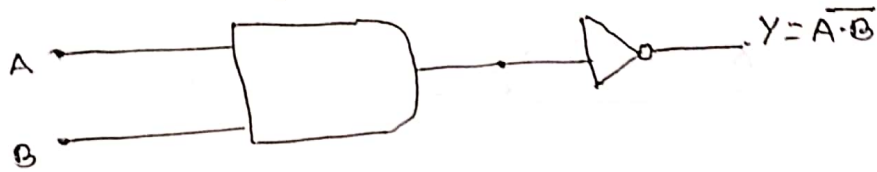
Symbol of NOR-gate

Truth table

Input		output
A	B	$Y = \bar{A + B}$
0	0	1
1	0	0
0	1	0
1	1	0

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(v) **NAND-gate:** If a NOT-circuit follows the AND-gate the combined circuit will work as NOT-AND circuit and the circuit will be called as NAND-gate.



Symbol of NAND-gate

Truth table

Input		Output
A	B	$Y = A \cdot \bar{B}$
0	0	1
0	1	1
1	0	1
1	1	0

The NAND-gate gives an output 1 if its both inputs are not 1, we can say that it gives an output 1 if either A or B or both are 0

NAND-gate is a universal gate:

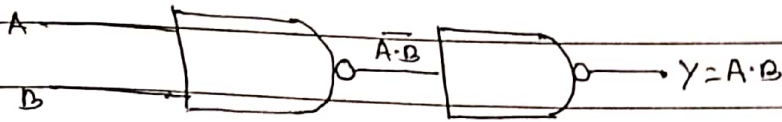
The NAND-gate is called

universal gate it can perform all the three logic function of an OR-gate, AND gate and inverter as shown in fig below

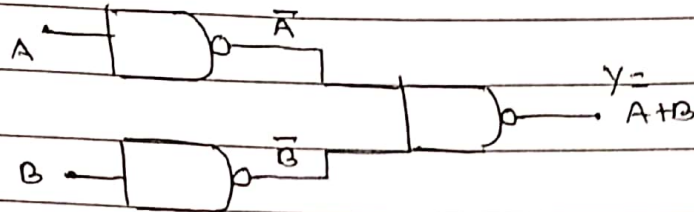


NOT-gate

NOT-gate can be made, but put of an NAND-gate by connecting its two input together



The use of two NAND-gates to produce an AND-gate

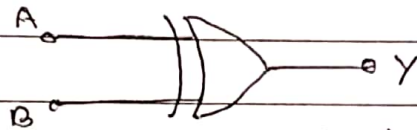


OR-gate can be made, output of three NAND-gates

Exclusive-OR gate (XOR-gate)

The output of the XOR gate takes the state 1 if either of the inputs but not both assume the state 1.

The Boolean expression $Y = A \oplus B$



Symbol of an XOR-gate

Truth table

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

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