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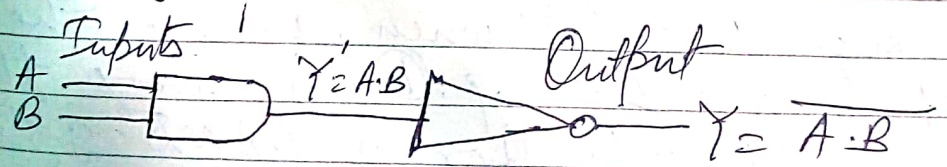
Different Combination of the Basic Logic Gates.

The OR, AND and NOT gates are the three basic circuits that make up all digital circuits.

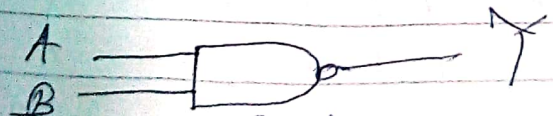
(i) NAND gate:



(i)

Inputs		Output	
A	B	AND (Y')	NAND (Y)
0	0	0	1
1	0	0	1
0	1	0	1
1	1	1	0

(22)



(iii)

Fig. (1).

NAND gate is a combination of AND and NOT gate. Output of AND gate is connected to the input of a NOT gate as in Fig. 1(i). The output of a NAND gate is opposite to the AND gate. This is clear from the truth table for the NAND gate.

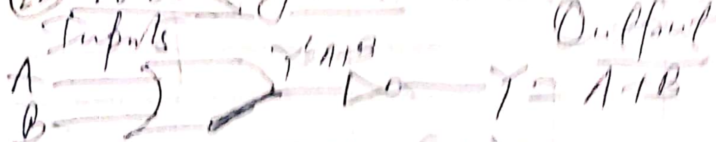
The truth table for NAND gate is developed by inverting the outputs of the AND gate.

The Boolean expression for NAND function is

$Y = A \cdot B$

The output from a NAND gate is always 1 except when all of the inputs are 1. Fig. 1(iii) shows the logic symbols for a NAND gate. The little bubble (small circle) on the right end of the symbol means to invert the AND gate.

(ii) NOR gate:



Inputs		Output	
A	B	OR (Y')	NOR (Y)
0	0	0	1
1	0	1	0
0	1	1	0
1	1	1	0

Fig 2

It is a ... NOT gate ... OR gate ... of a NOT ... the output ... inverted ... has been ... inverter ... OR gate ...

... for NOR

The output ... is high ... inputs are ... inputs is ... Fig (i). ... logic symbol ... the bubble ... Y output

It is a combination of OR gate and NOT gate. In other words, output of OR gate is connected to the input of a NOT gate as shown in Fig. 2(i). The output of OR gate is inverted to form NOR gate. Truth table for NOR gate has been developed by inverting the outputs of the OR gate.

The Boolean expression for NOR gate is

$$Y = \overline{A + B}$$

The output from a NOR gate is high (1) only when all the inputs are low (0). If any of the inputs is high (1) the output is low (0). Fig 2 (ii-iii) shows the logic symbol for a NOR gate. The bubble (small circle) at the Y output indicates inversion.