

بِسْمِ اللَّهِ الرَّحْمَنِ الرَّحِيمِ

جامعة الموصل – كلية علوم الحاسوب والرياضيات
قسم الامن السيبراني

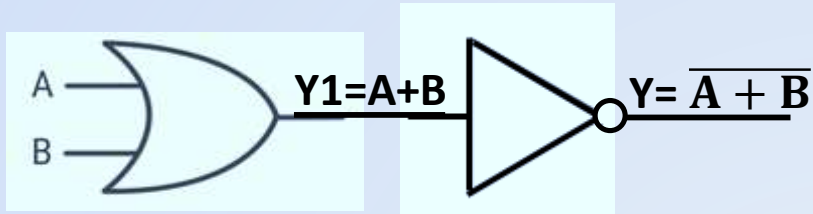
CIRCUTE DESIGN

المحاضرة الرابعة
Logic Gates

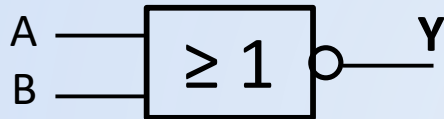
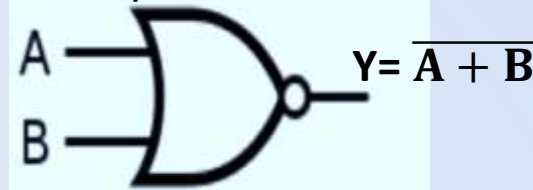
Sura Sabah I. Ahmed

NOR Gate

The NOR Gate: (OR gate + NOT gate)



The Logic symbol of Two inputs NOR Gate

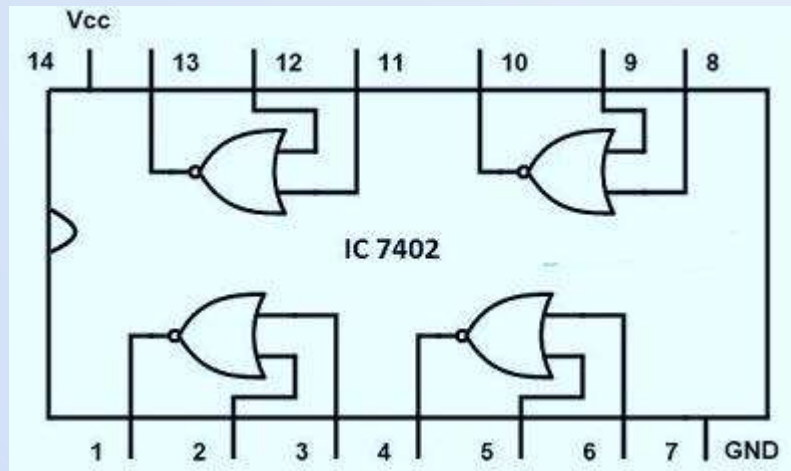


The output equation or output expression:

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

The truth table of two inputs OR gate:

A	B	$Y = \overline{A + B}$
0	0	1
0	1	0
1	0	0
1	1	0



The pin diagram of the chip (IC 7402)

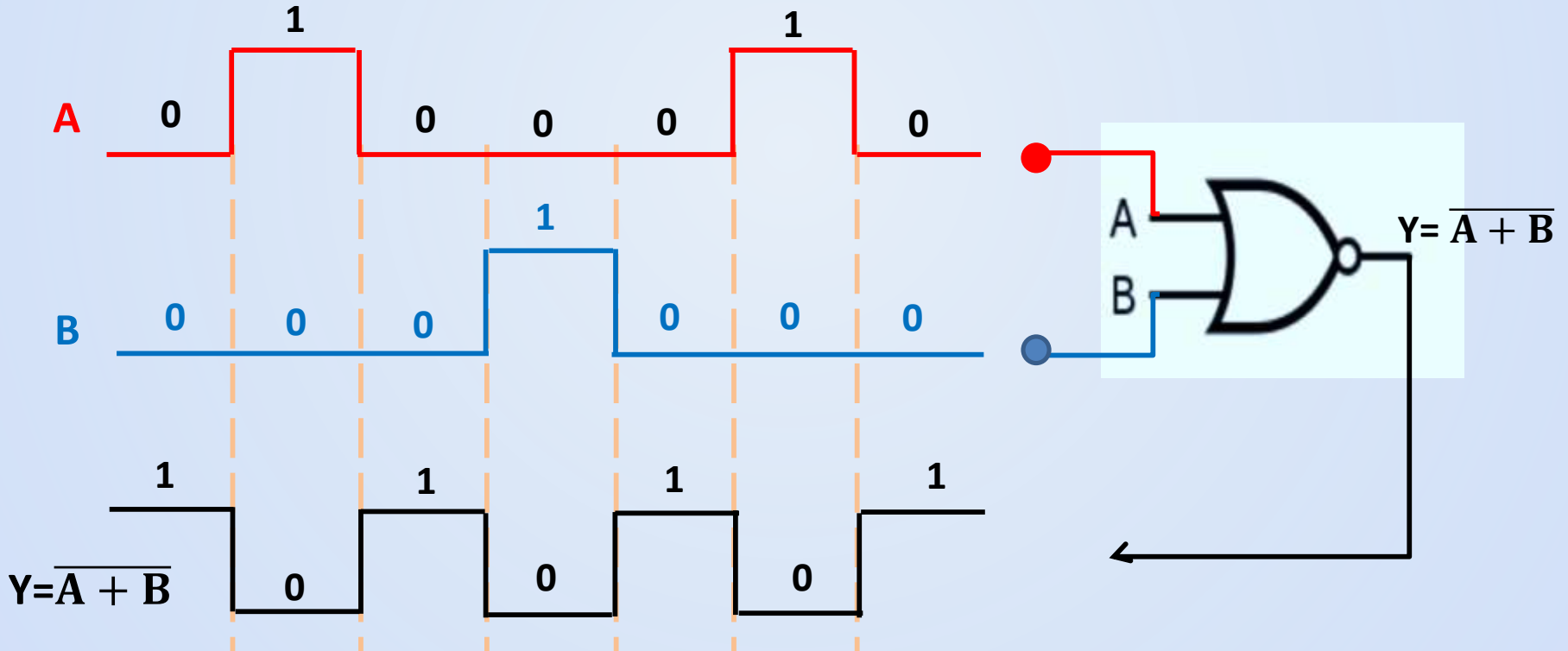
NOR Gate

Operation of NOR gate:

- ❖ A Nor gate produces a LOW output when any of its input is HIGH.
- ❖ The output is HIGH only when all inputs are LOW.

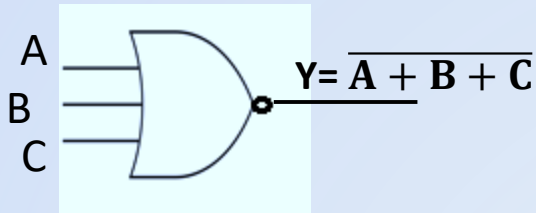
Pulsed operation:

Example: If the two waveforms shown below are applied to a NOR gate, what is the resulting output waveform?



NOR Gate

Three inputs NOR gate:

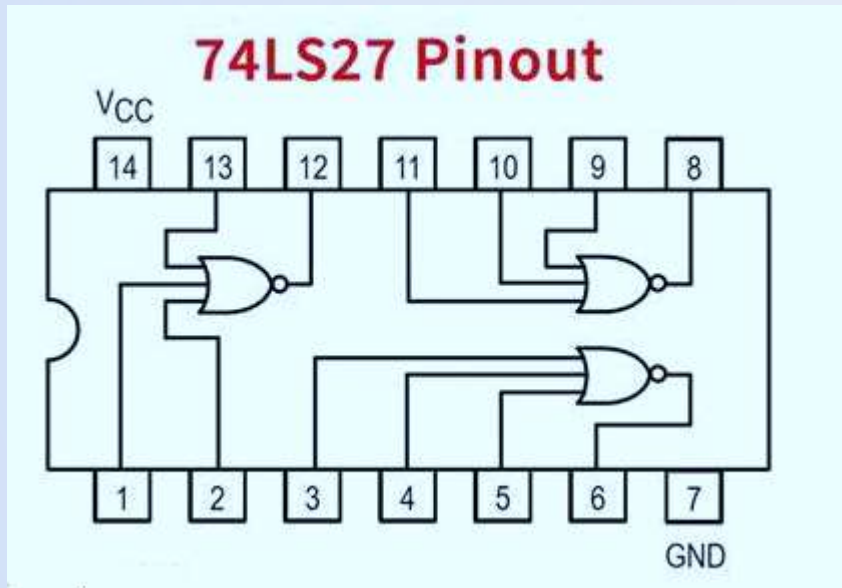


The output equation:

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

The truth table of three inputs NOR gate:

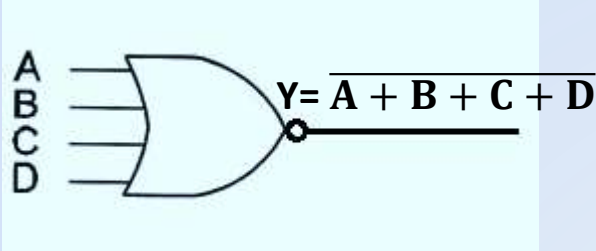
INPUTS			OUTPUT
A	B	C	$Y = \overline{A + B + C}$
0	0	0	1
0	0	1	0
0	1	0	0
0	1	1	0
1	0	0	0
1	0	1	0
1	1	0	0
1	1	1	0



The pin diagram of the three inputs NOR gate (7427)

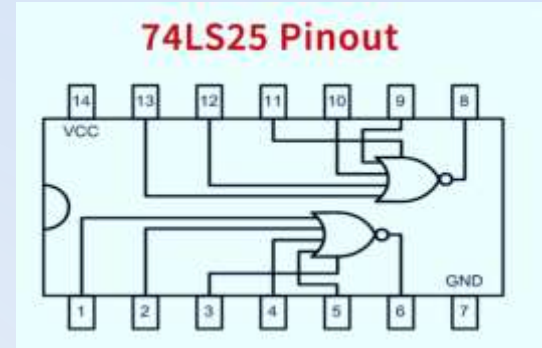
NOR Gate

Four inputs NOR gate:



The output equation:

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



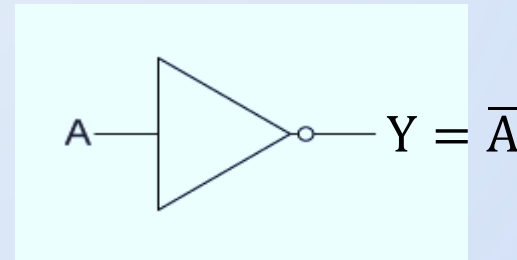
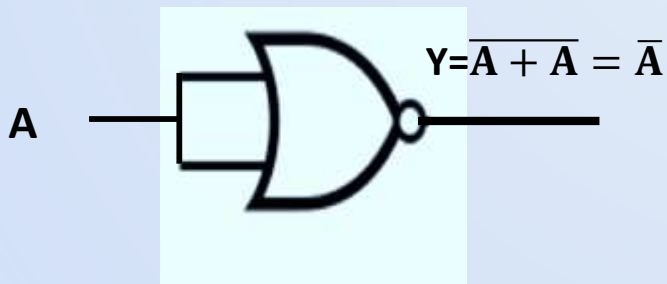
The pin diagram of the four inputs NOR gate (7425)

H.W:

Write the truth table and the output equation of the 4-inputs OR gate?

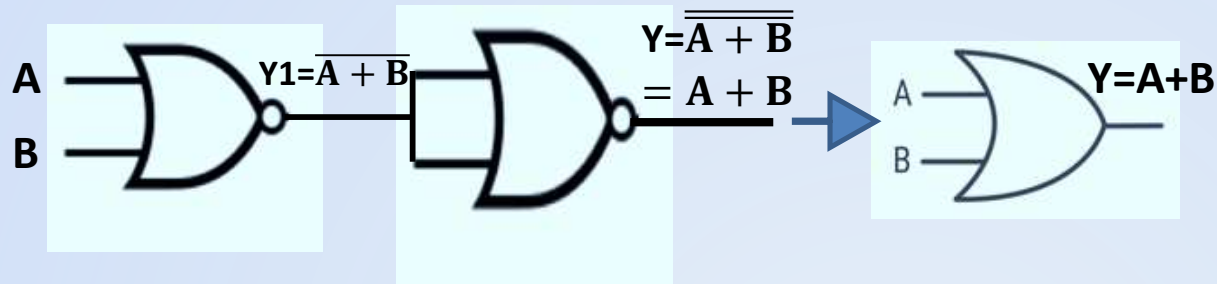
Universal properties of NOR gate:

1) NOR gate used as not (Inverter):-



NOR Gate

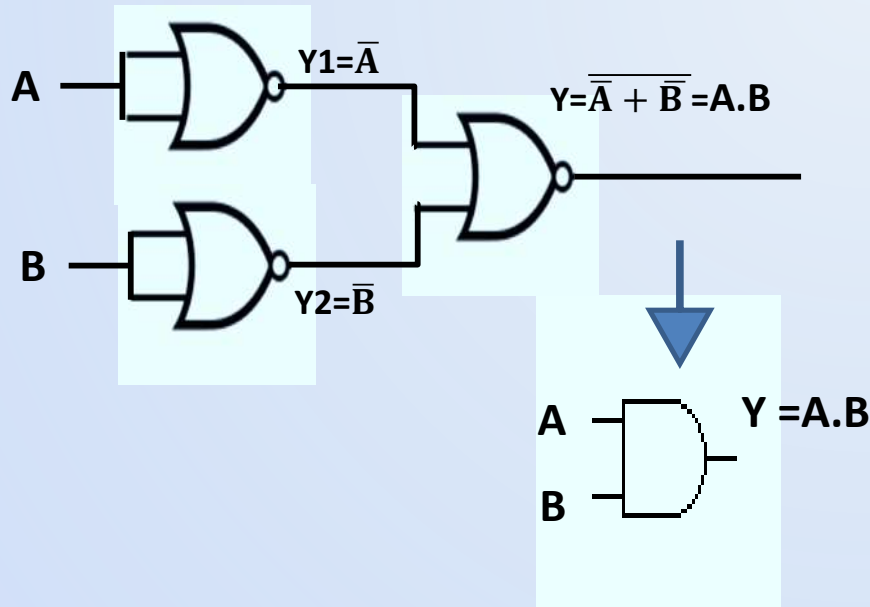
2) NOR gate used as OR:-



The truth table

A	B	$Y1 = \overline{A + B}$	$Y = \overline{\overline{A + B}}$
0	0	1	0
0	1	0	1
1	0	0	1
1	1	0	1

3) NOR gate used as AND:-

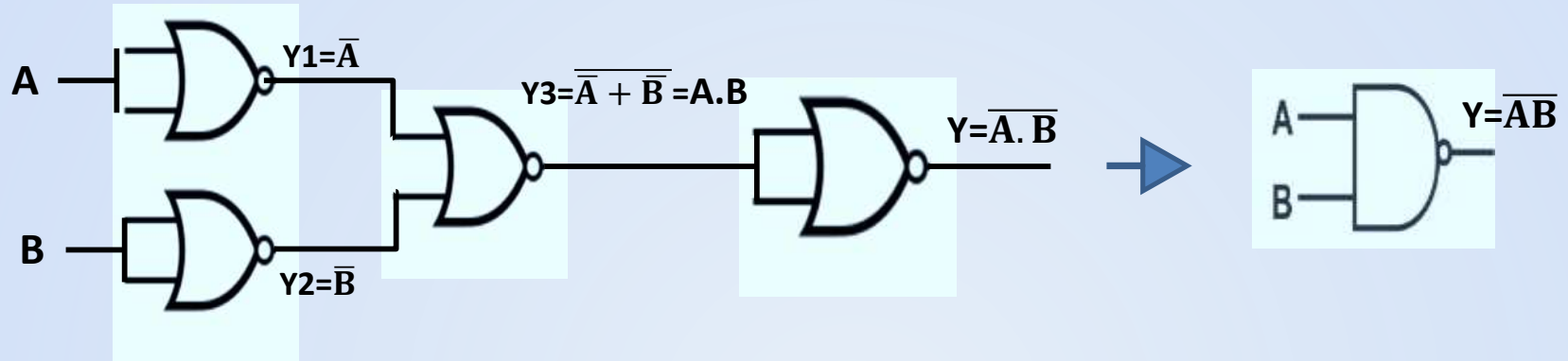


The truth table

A	B	$Y1 = \overline{A}$	$Y2 = \overline{B}$	$Y = \overline{\overline{A} + \overline{B}}$
0	0	1	1	0
0	1	1	0	0
1	0	0	1	0
1	1	0	0	1

NOR Gate

4) NOR gate used as NAND:-



The truth table

A	B	$Y1 = \bar{A}$	$Y2 = \bar{B}$	$Y3 = A.B$	$Y = \bar{A}.\bar{B}$
0	0	1	1	0	1
0	1	1	0	0	1
1	0	0	1	0	1
1	1	0	0	1	0

Thank you