

ECE111|Digital Circuits

Dr. Vish Visweswaran

Lab_7:

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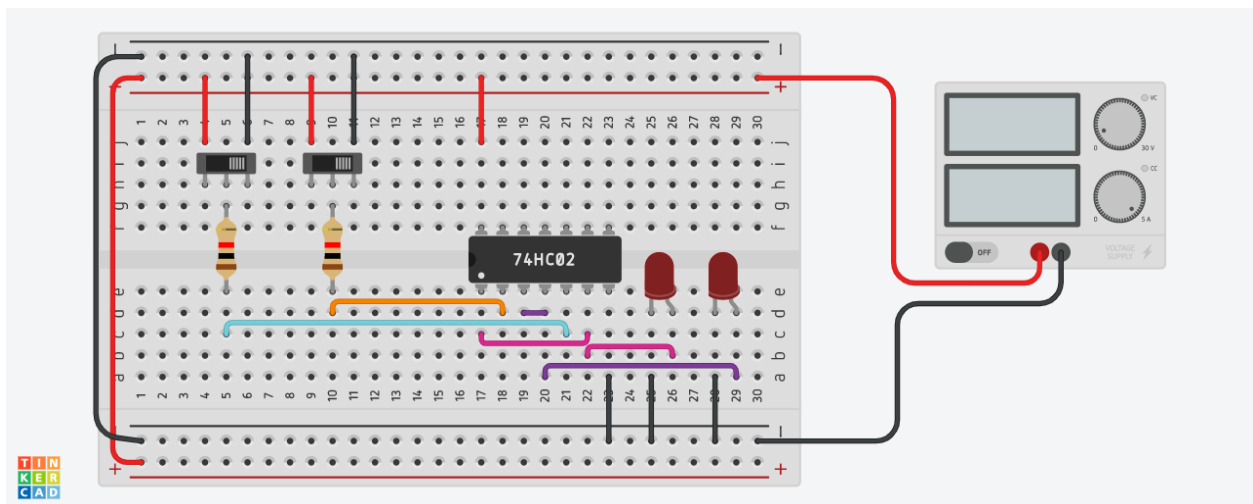
AIM 1 : NOR Latch using 74HC02 Quad 2- input NOR Gate

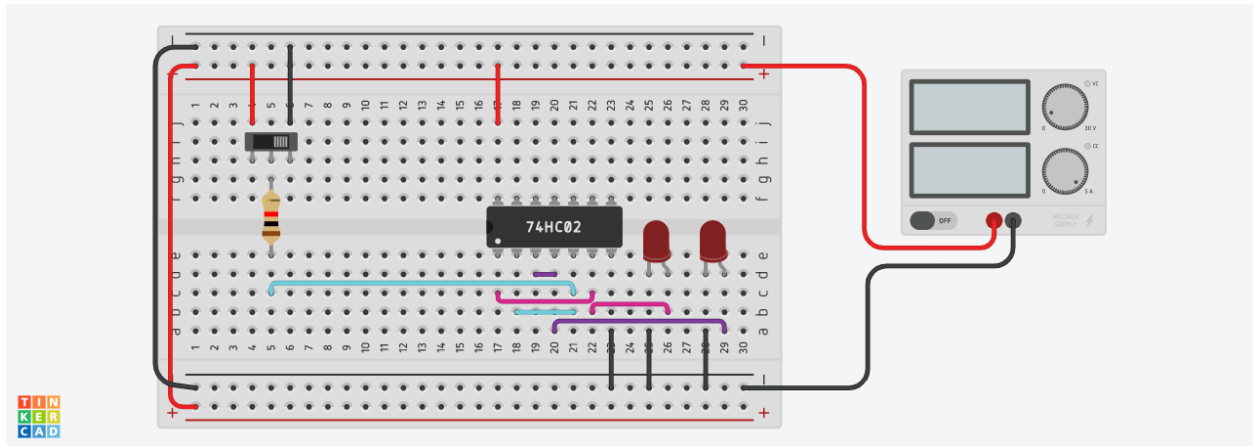
Components Used : 1 power supply , 2 resistors , 2 LEDs , 1 Quad NOR gate , 2 slide switches

TinkerCad Link :

https://www.tinkercad.com/things/h5czF48mJ4d-nor-latch/editel?sharecode=aEjlM1mUEN2YsbCldbLmSluNJra3i3gsQoA__UsfDHI

Screenshots :





Characteristics Table :

characteristic table

Q_n	S	R	Q_{n+1}
0	0	0	0
0	0	1	0
0	1	0	1
0	1	1	X
1	0	0	1
1	0	1	0
1	1	0	1
1	1	1	X

$Q_{n+1} = \sum m(2, 4, 6)$
 Dontcare = $\sum m(3, 7)$

Characteristics Equation :

Characteristic Eqⁿ.

$Q_{n+1} \backslash Q_n / SR$	00	01	11	10
00	0	0	ϕ	1
01	0	1	3	2
11	1	0	ϕ	1
10	4	5	2	6

$Q_{n+1} = Q_n \cdot \bar{R} + S$

Excitation Table :

Excitation table.

Q_n	Q_{n+1}	S	R
0	0	0	X
0	1	1	0
1	0	0	1
1	1	X	0

Observations :

<u>S</u>	0	0	1	0	0	1	0	1	0	1	1	0
<u>R</u>	1	0	0	0	1	0	1	1	0	0	1	0
<u>Q</u>	0	0	1	1	0	1	0	0	0	1	0	0
<u>Q'</u>	1	1	0	0	1	0	1	0	0	0	0	0

Applications :

1. It can be used to store a single bit as data
 2. It can be used to make alarms
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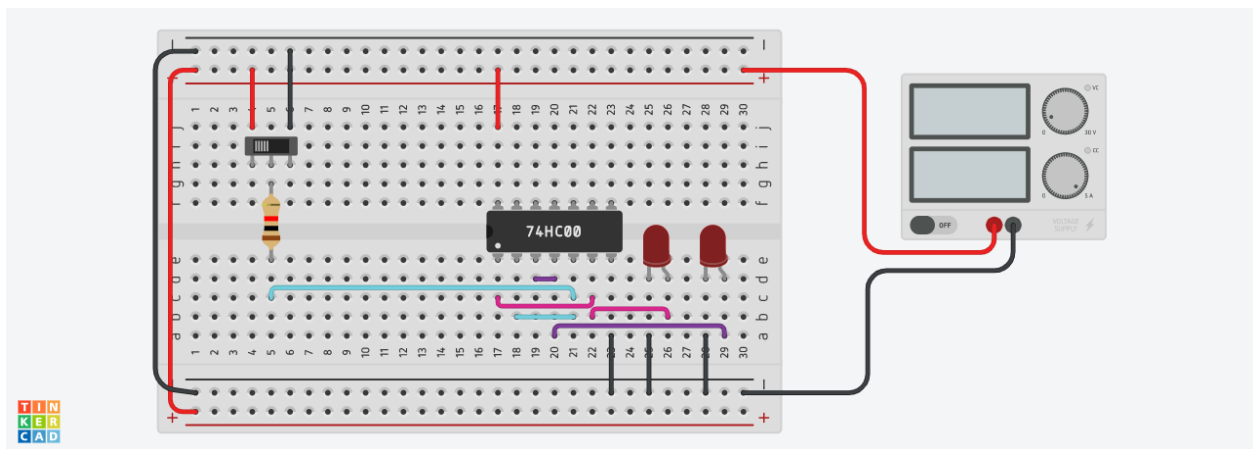
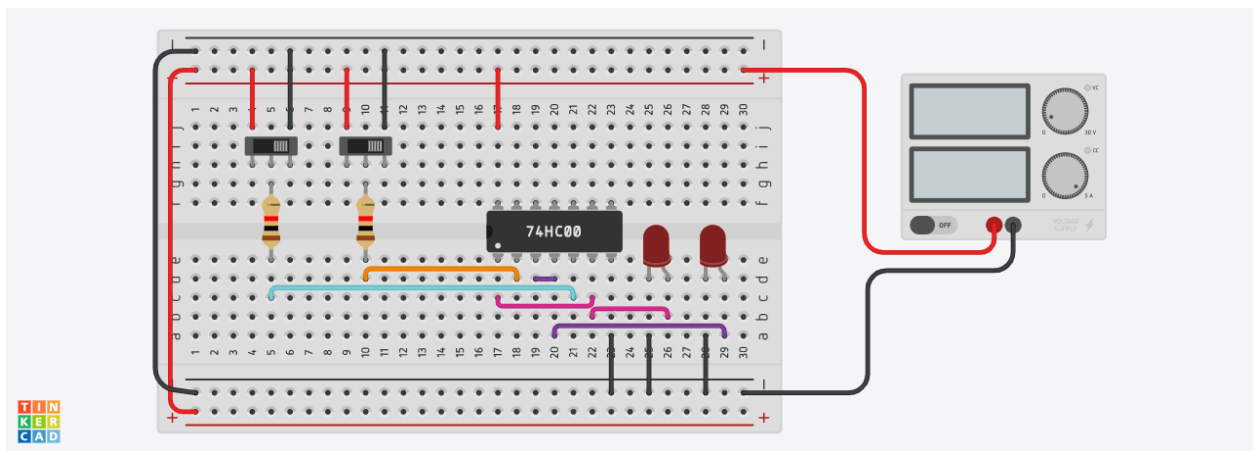
AIM 2 : NAND Latch using 74HC00 Quad 2- input NAND

Components Used : 1 power supply , 2 resistors , 2 LEDs , 1 Quad NAND gate, 2 slide switches

TinkerCad Link :

<https://www.tinkercad.com/things/gbr2dvAZQHU-nand-latch/editel?sharecode=kCKiYys26MqJQZj3qcMX49yEdn95tVyEboaqBopqLkU>

Screenshots :



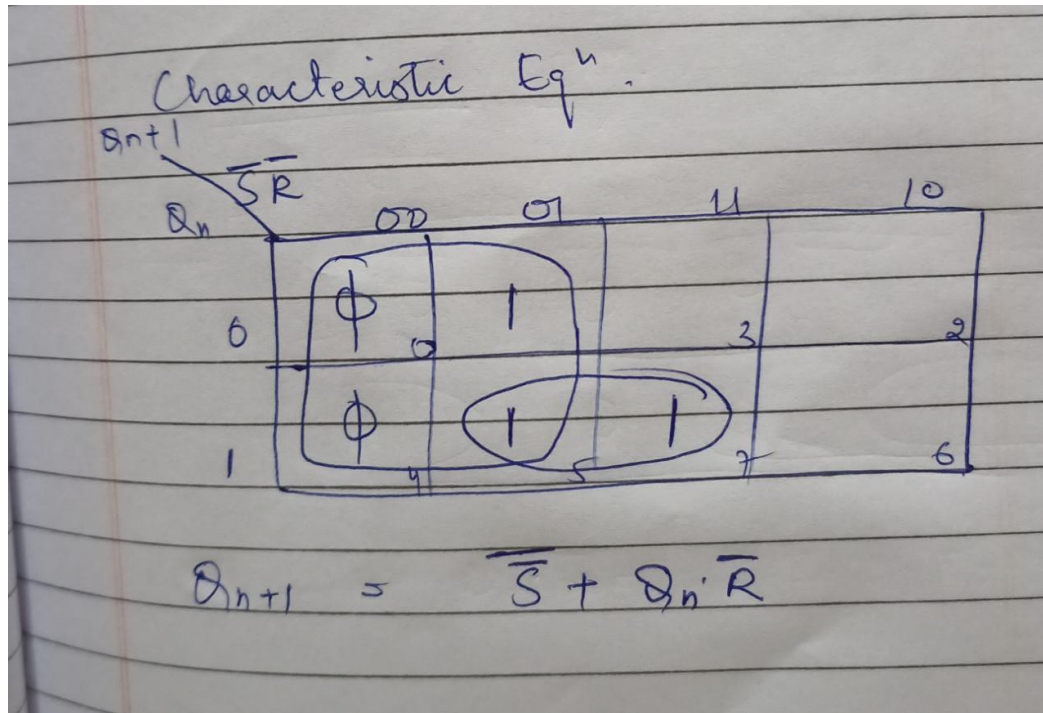
Characteristics Table :

Characteristic table

Q_n	\bar{S}	\bar{R}	Q_{n+1}
0	0	0	X
0	0	1	1
0	1	0	0
0	1	1	0
1	0	0	X
1	0	1	1
1	1	0	0
1	1	1	1

$Q_{n+1} = \sum m(1, 5, 7)$
Don't care = $\sum m(0, 4)$

Characteristics Equation :



Excitation Table :

Excitation table.

Q_{n+1}	Q_n	\bar{S}	\bar{R}
0	0	1	X
0	1	1	0
1	0	0	1
1	1	X	1

Observations :

<u>S'</u>	1	1	0	1	1	0	1	0	1	0	0	1
<u>R'</u>	0	1	1	1	0	1	0	0	1	1	0	1
<u>Q</u>	0	0	1	1	0	1	0	1	1	1	1	1
<u>Q'</u>	1	1	0	0	1	0	1	1	1	0	1	1

Applications :

1. it can be used to store a single bit as data
2. It can be used to pulse latches