

XOR جواب سوال درود

x	y	Z = x ⊕ y
0	0	0
0	1	1
1	0	1
1	1	0

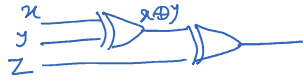
Exclusive OR

$$Z = x'y + xy'$$

$$x \oplus y = y \oplus x$$



$$x \oplus (y \oplus z) = (x \oplus y) \oplus z$$



x	y	Z
0	0	0
0	1	1
1	0	1
1	1	0

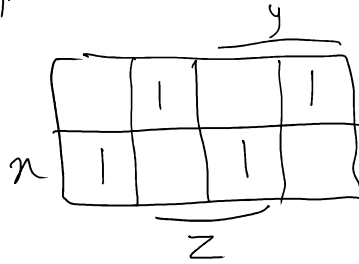
$$x \oplus 0 = x$$

$$x \oplus 1 = x'$$

$$x \oplus x = 0$$

$$x \oplus x' = 1$$

x	y	Z	(x ⊕ y ⊕ z)	F
0	0	0	0	0
0	0	1	1	1
0	1	0	1	1
0	1	1	0	0
1	0	0	1	1
1	0	1	0	0
1	1	0	0	0
1	1	1	1	1



$$F = x'y'z + x'yz' + xy'z' + xyz$$

$$= x'(y'z + yz') + x(y'z' + yz)$$

$$W = y'z + yz'$$

$$W' = (y'z + yz')'$$

$$= (y'z)' \cdot (yz')'$$

$$= (y+z')(y'+z) = yy' + yz + z'y + zz'$$

$$W' = yz + y'z'$$

$$F = x'W + xW' = x \oplus W = x \oplus (y'z + yz')$$

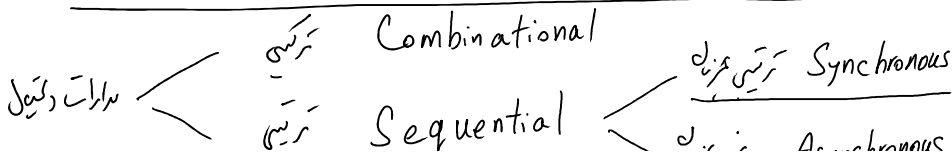
$$= x \oplus (y \oplus z)$$

XOR تابع فرد

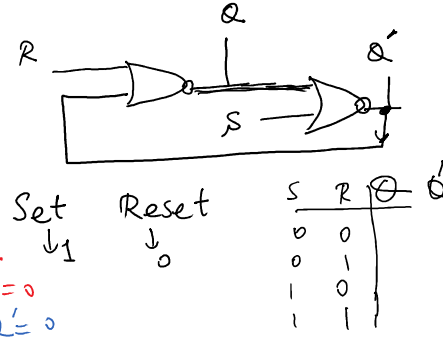
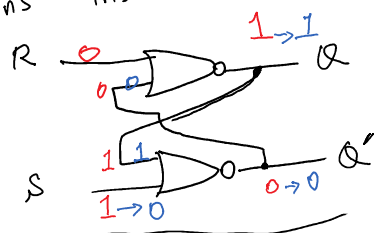
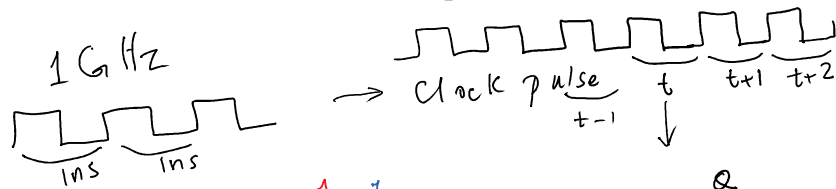
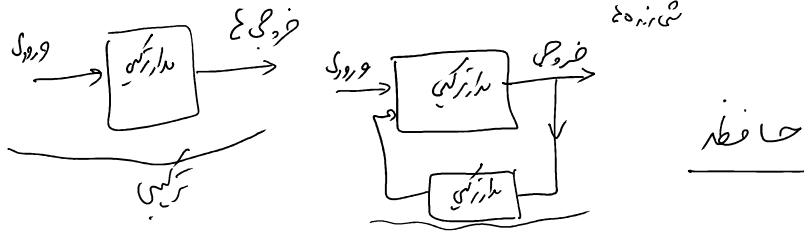
XNOR تابع زوج

A	B	A ⊕ B	(A ⊕ B)'
0	0	0	1
0	1	1	0
1	0	1	0
1	1	0	1

C = A'B' + AB



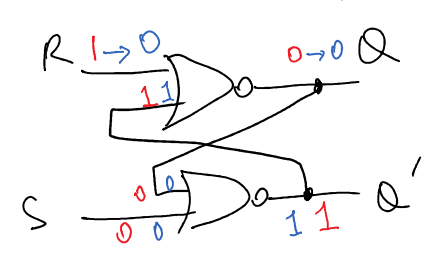
سلسلہ وار ترتیبی **Sequential** Synchronous ترتیبی Asynchronous غیر ترتیبی



فرضیات  $S=1, R=0 \rightarrow Q=1, Q'=0$   
 $S=0, R=0 \rightarrow Q=1, Q'=0$

### Bistable Multi-Vibrator

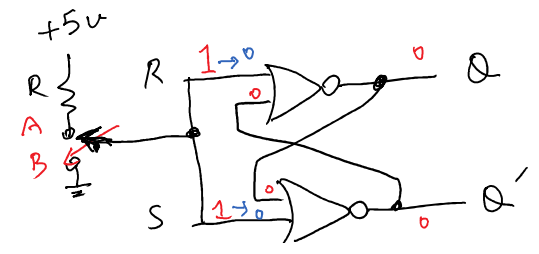
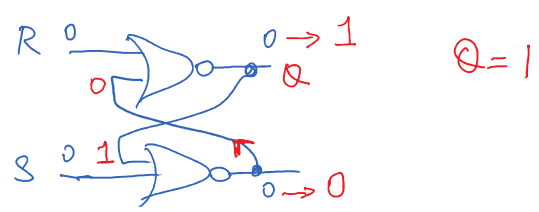
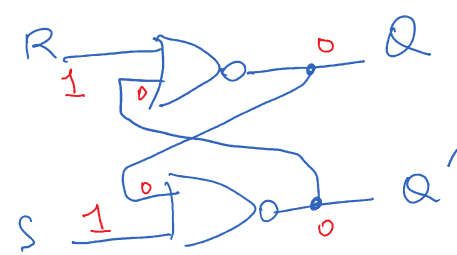
دو حالت Bi-stable  
 ایک حالت Mono-stable  
 A stable

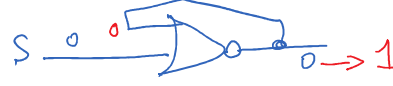
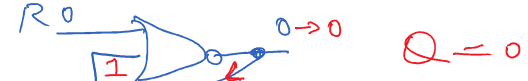


فرضیات  $S=0, R=1 \rightarrow Q=0, Q'=1$   
 $S=0, R=0 \rightarrow Q=0, Q'=1$

$S$	$R$	$Q$	$Q'$
0	0	حفظ حالت قبل	
0	1	0	1
1	0	1	0
1	1	0	0

حالت غیر مجاز  $\rightarrow$  غیر قابل قبول



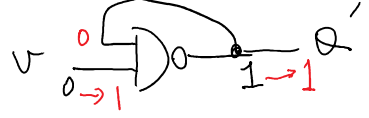
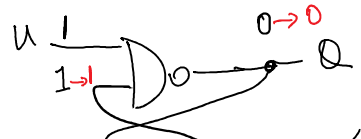
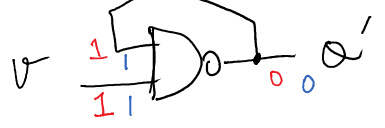
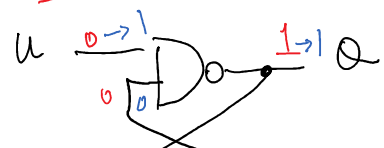


$S=1, R=0$

S	R	Q	Q'
0	0	0	1
0	1	1	0
1	0	0	1
1	1	X	X

غيري:   
 جدول انتقال

Characteristic Table



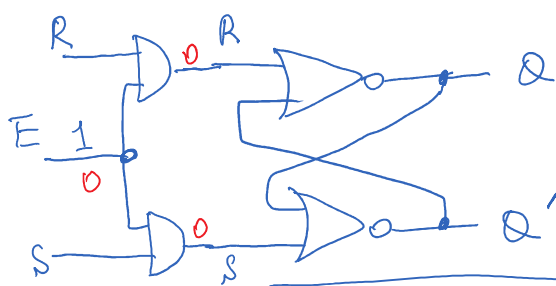
$u=1, v=0$   $Q=1$   $Q'=0$

$u=1, v=1$   $Q=1$   $Q'=0$   
حفظ حالت قبل

$u=0, v=1$   $Q=0$   $Q'=1$

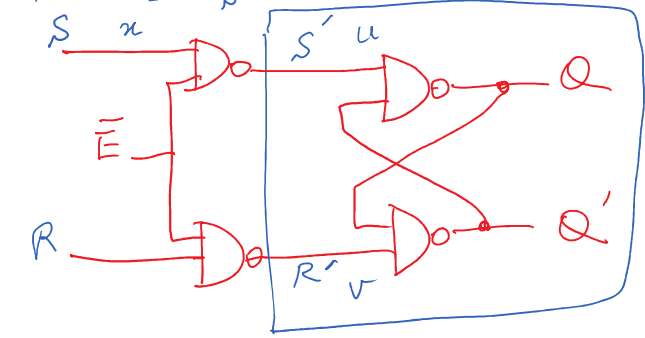
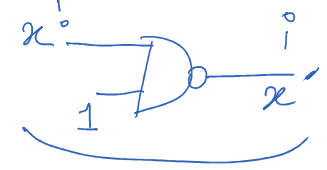
$u=1, v=1$   $Q=0, Q'=1$   
حفظ حالت قبل

R'	u	v	Q
0	0	0	غيري
0	1	1	0
1	0	0	1
1	1	1	حفظ حالت قبل



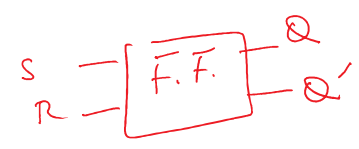
S	R	Q
0	0	حفظ حالت قبل
0	1	0
1	0	1
1	1	غيري

NOR



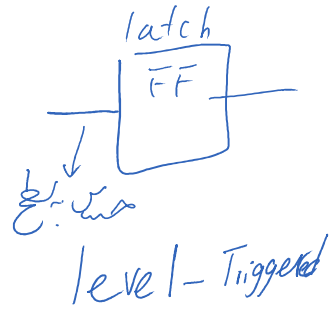
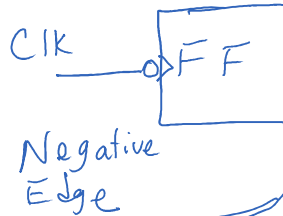
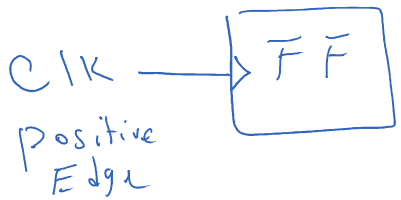
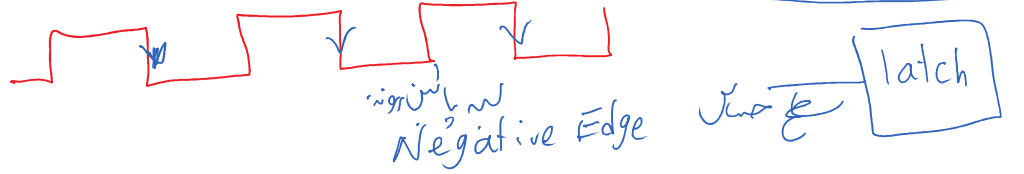
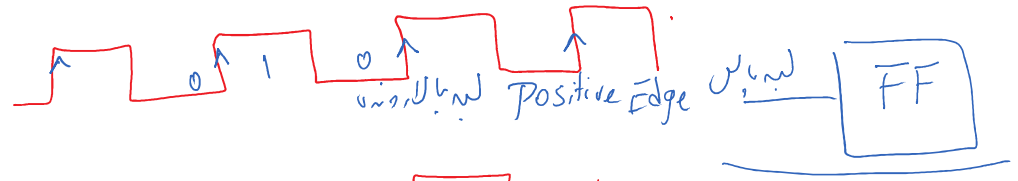
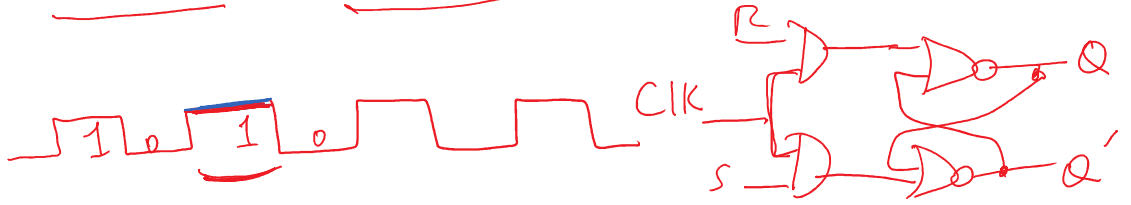
R	S	R'	S'	Q
1	1	0	0	غيري
1	0	0	1	0
0	1	1	0	1
0	0	1	1	حفظ حالت قبل

NAND

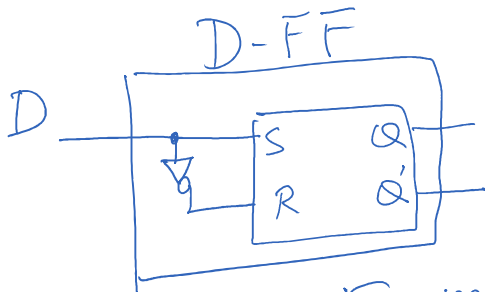


1	1	0	1
0	1	1	0

latch      Flip-Flop



Edge-Triggered



← Master-Slave ←

← Edge-Triggered ←

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