

# CPE 100 Digital IC Design

MARCH 29, 2021

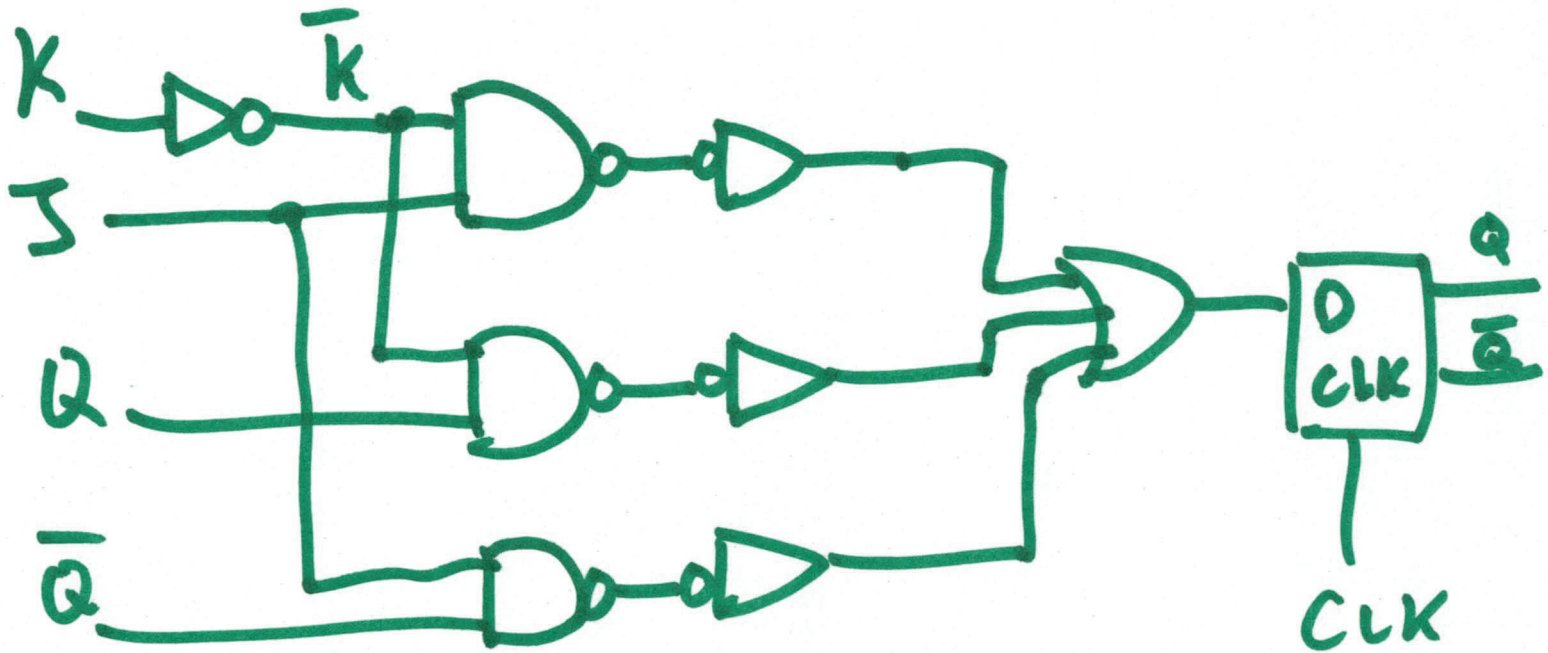
## Lecture 16

J	K	Q
0	0	Q
0	1	0
1	0	1
1	1	$\bar{Q}$

$$\begin{aligned} Q &= \bar{J}\bar{K} \cdot Q + \cancel{\bar{J}K \cdot Q} + \\ & J\bar{K} \cdot 1 + JK \cdot \bar{Q} \quad \bar{K} + \bar{Q} \\ &= \bar{J}\bar{K} \cdot Q + J \cdot (\bar{K} + K\bar{Q}) \\ &= \bar{J}\bar{K} \cdot Q + J\bar{K} + J\bar{Q} \\ &= \bar{K}(J + \bar{J}Q) + J\bar{Q} \end{aligned}$$

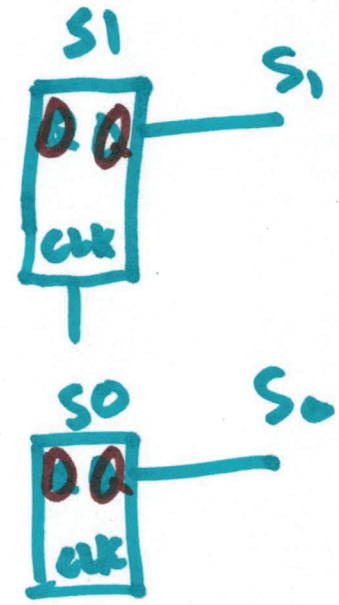
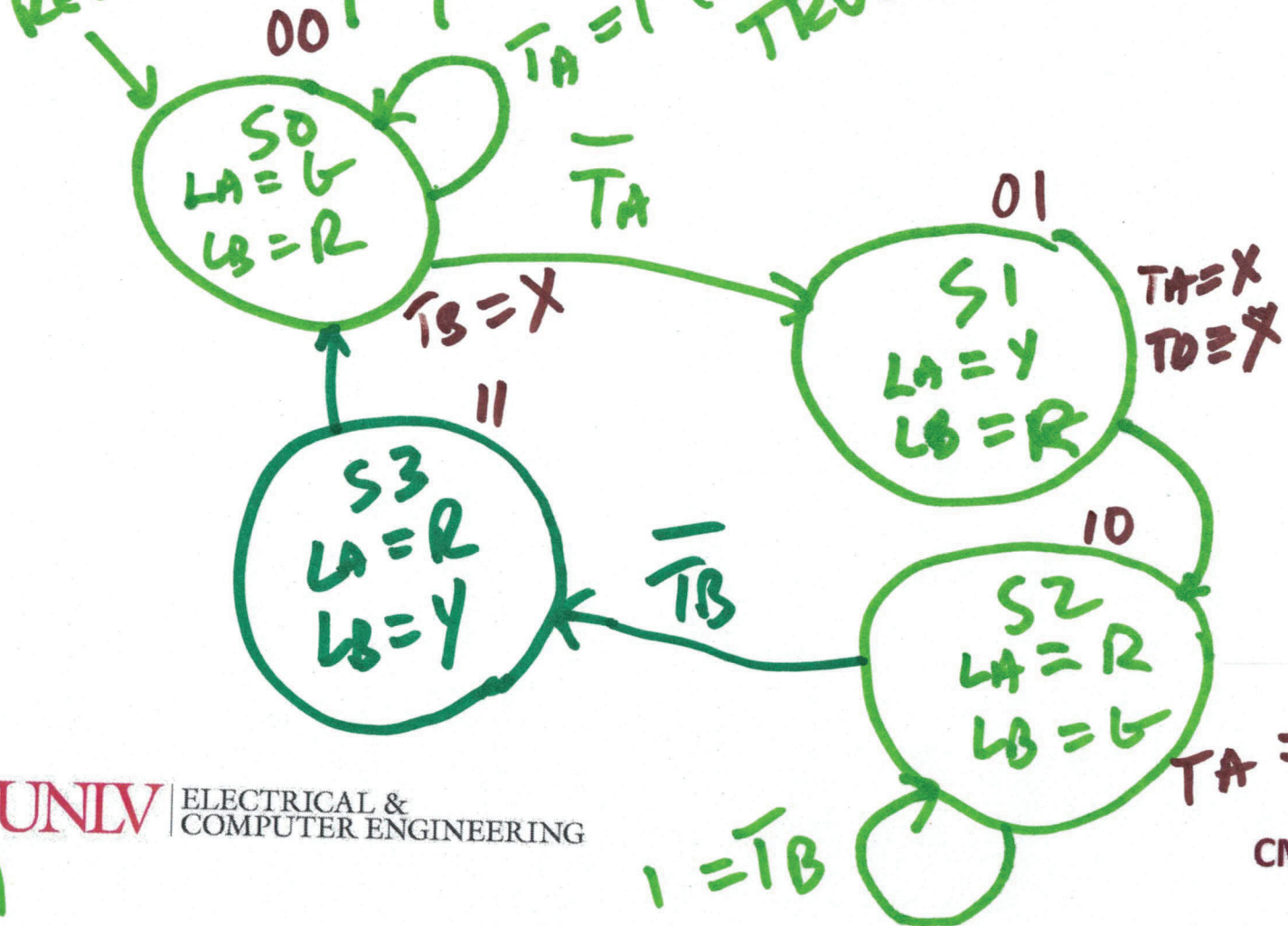
$$= \bar{k}(J + Q) + J\bar{Q}$$

$$= \bar{k}J + \bar{k}Q + J\bar{Q}$$





	S <sub>1</sub>	S <sub>0</sub>
S <sub>0</sub>	0	0
S <sub>1</sub>	0	1
S <sub>2</sub>	1	0
S <sub>3</sub>	1	1





$$G \rightarrow \begin{matrix} L_1 & L_0 \\ 0 & 0 \end{matrix}$$

$$Y \rightarrow \begin{matrix} 0 & 1 \end{matrix}$$

$$R \rightarrow \begin{matrix} 1 & 0 \end{matrix}$$

$$S_1' = \bar{S}_1 \cdot S_0 + S_1 \bar{S}_0 \bar{T}_B + S_1 \bar{S}_0 T_1$$

$$S_0' = \bar{S}_1 \bar{S}_0 \bar{T}_A + S_1 \bar{S}_0 \bar{T}_B$$

$$S_1' = \bar{S}_1 \cdot S_0 + S_1 \cdot \bar{S}_0$$

	CURRENT STATE				NEXT STATE	
	$S_1$	$S_0$	$T_A$	$T_B$	$S_1'$	$S_0'$
$S_0$	0	0	0	X	0	1
$S_0$	0	0	1	X	0	0
$S_1$	0	1	X	X	1	0
$S_2$	1	0	X	0	1	1
$S_2$	1	0	X	1	1	0
$S_3$	1	1	X	X	0	0

$$S_1' = \bar{S}_1 \cdot S_0 + S_1 \cdot \bar{S}_0$$

$$S_0' = \bar{S}_1 \bar{S}_0 \bar{T}_A + S_1 \bar{S}_0 \bar{T}_B$$

