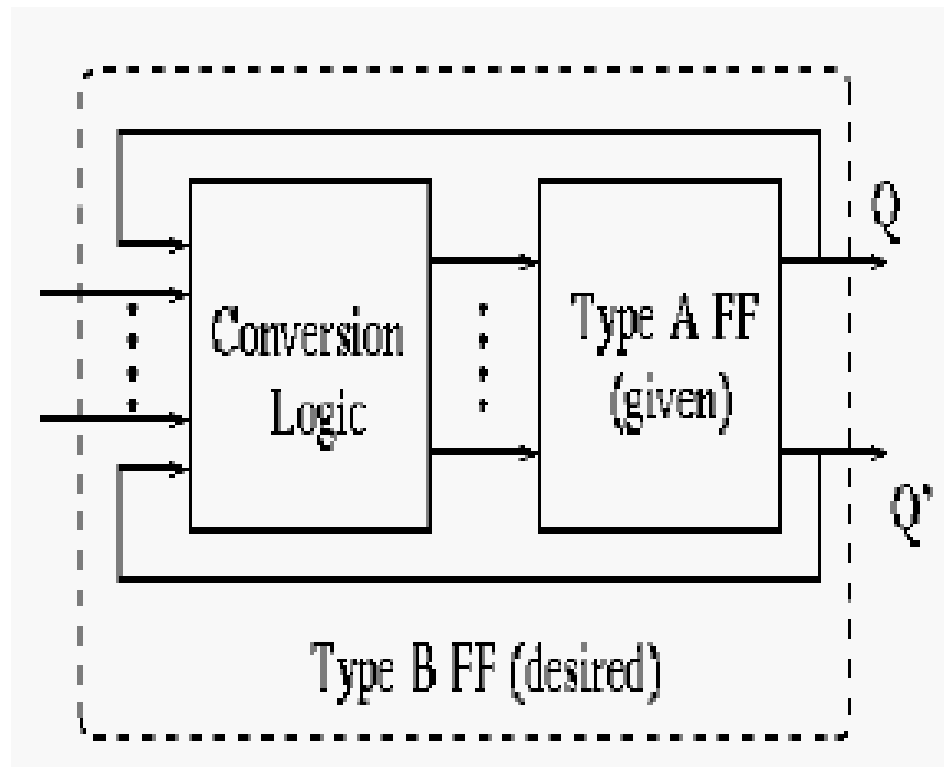


LECTURE 10

COMBINATIONAL DESIGN USING MSI DEVICES

Flipflop Conversions

The purpose is to convert a given type A FF to a desired type B FF using some conversion logic.



Excitation Table

The key here is to use the excitation table, which shows the necessary triggering signal (SR, JK, D and T) for a desired flip flop state transition

$Q_t - Q_{t+1}$:

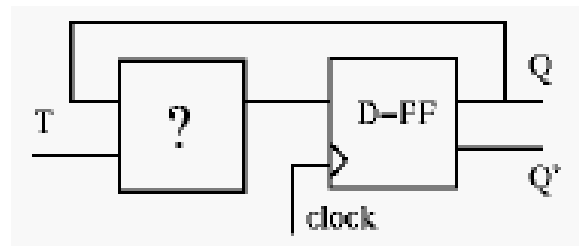
Q_t	Q_{t+1}	S	R	J	K	D	T
0	0	0	x	0	x	0	0
0	1	1	0	1	x	1	1
1	0	0	1	x	1	0	1
1	1	x	0	x	0	1	0

Excitation Table of Flip flops based on characteristics table

Convert a D-FF to a T-FF

The output of D flip flop should be as the output of T flip flop.

We need to design the circuit to generate the triggering signal D as a function of T and Q: $D = f(T, Q)$



Consider the excitation table of T and D Flip flops.

Write Down Excitation Table of T, Q_n and Q_{n+1} , D. For the K-map, consider T and Q_n As Input and D as output.

$D = TQ_n' + T'Q_n$ (Ex- OR gate)

T	Q_n	Q_{n+1}	D
0	0	0	0
1	0	1	1
1	1	0	0
0	1	1	1



Convert a D-FF to a T-FF

Treating as a function of and current FF state Q (Q_t), we have:

$$D = T'Q + TQ' = T \oplus Q$$

