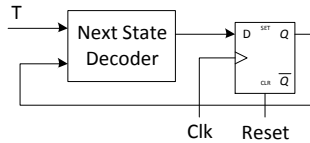


Homework #5

- Using sequential circuit design procedure beginning with a state diagram, convert a D-type flip-flop to a T-type flip-flop by adding input logic. Show that the logic obtained is an exclusive-OR gate.

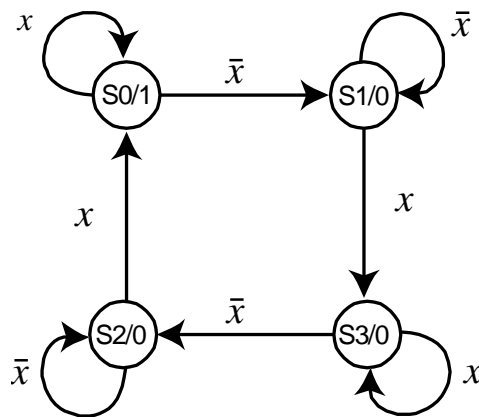


- Implement the following Boolean function with an 8-to-1 line multiplexer and a single inverter:

$$F(A, B, C, D) = \sum m(2,3,5,6,8,9,12,14)$$
- Design a sequential circuit using two D flip-flops A and B and combinational logic. Your circuit has one input X and one output Y, and is defined by the following state diagram — Traditional Design Solution

Present State		Inputs	Next State		Output
$Q_1(t)$	$Q_0(t)$		$D_1(t)$	$D_0(t)$	
0	0	0	0	1	1
0	0	1	0	0	1
0	1	0	0	1	0
0	1	1	1	1	0
1	0	0	1	0	0
1	0	1	0	0	0
1	1	0	1	0	0
1	1	1	1	1	0

- A sequential circuit has two flip-flops A and B, one input X and one output Y. The state diagram is shown below. Design the circuit with D flip-flops. — Design using One-Hot State Encoding



- Convert a D-type flip-flop into a JK flip-flop, using external gates. The gates can be derived by means of a sequential circuit design procedure starting from a state table with the D flip-flop output as the present state and its input as the next state and with J and K as circuit inputs.