

Surprise Quiz(CS230) Solutions

Q1. The minimum number of flip-flops needed to design a mod-258 counter is:

Options:

1. 9
2. 8
3. 512
4. 258

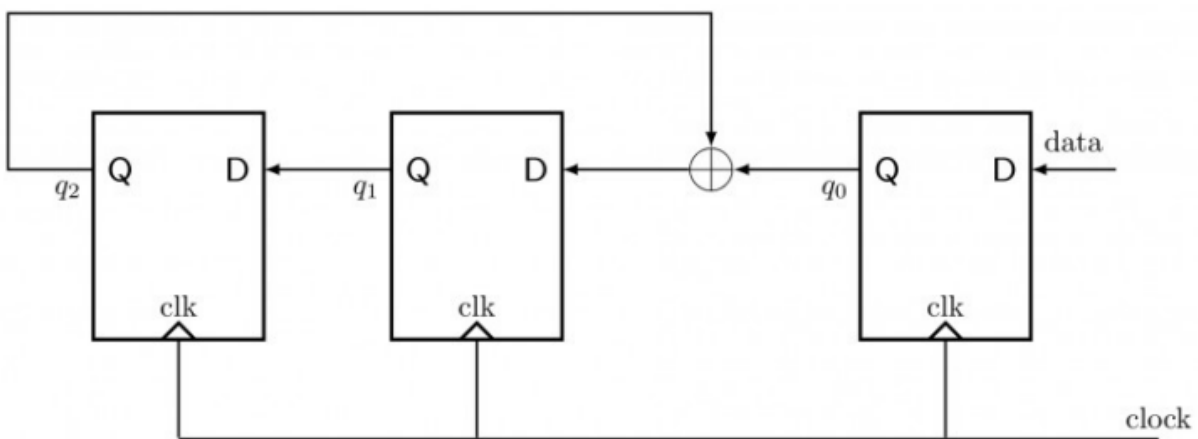
Solution:

Mod 258 counter has 258 states. We need to find no. of bits to represent 257 at max.

So, $2^n \geq 258$ ----> $n=9$

Answer is A.

Q2. Consider the circuit in the diagram. The operator represents Ex-OR. The D flip-flops are initialized to zeroes.



The following data: 10011 is supplied to the “data” terminal in 5 clock cycles. After that the values of $q_2q_1q_0$ are:

Note: System is big-endian(MSB to LSB).

Options:

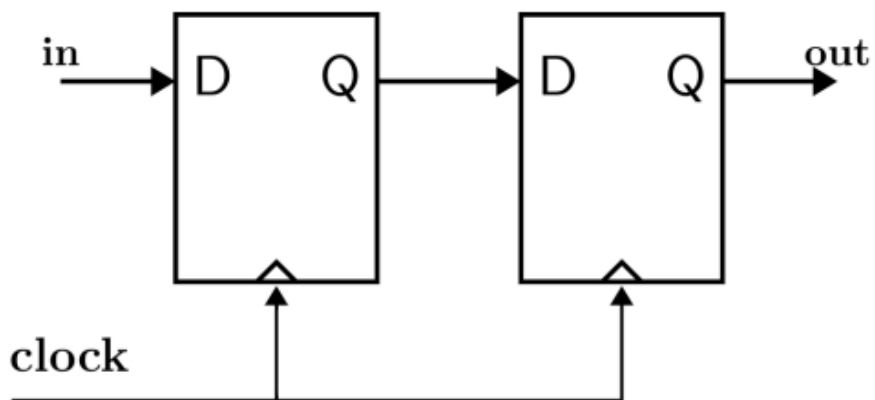
1. 000
2. 001
3. 010
4. 111

Solutions:

Ans is: 111

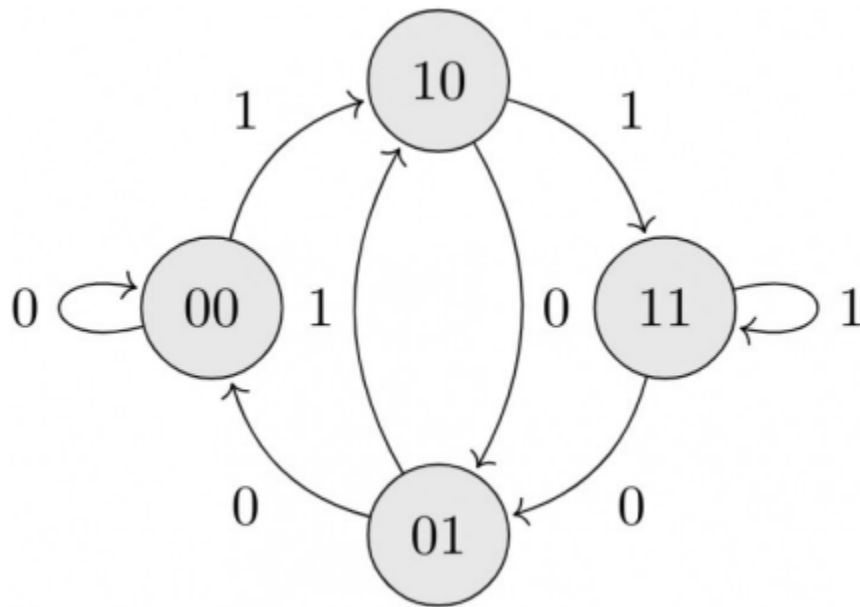
Clock	Data	Q_0	$Q_1 = Q_0(i-1) \oplus Q_2(i-1)$	Q_2
1	1	1	$0 = 0 \oplus 0$	0
2	0	0	$1 = 1 \oplus 0$	0
3	0	0	$0 = 0 \oplus 0$	0 1
4	1	1	$1 = 0 \oplus \text{1}$	0
5	1	1	$1 = 1 \oplus 0$	1

Q3. Consider the sequential circuit shown in the figure, where both flip-flops used are positive edge-triggered flip-flops.



The number of states in the state transition diagram of this circuit that have a transition back to the same state on some value of "in" is ____ ?

Solutions:



Here 00 on input 0 and 11 on input 1 have transition back to itself. So, **answer is 2.**