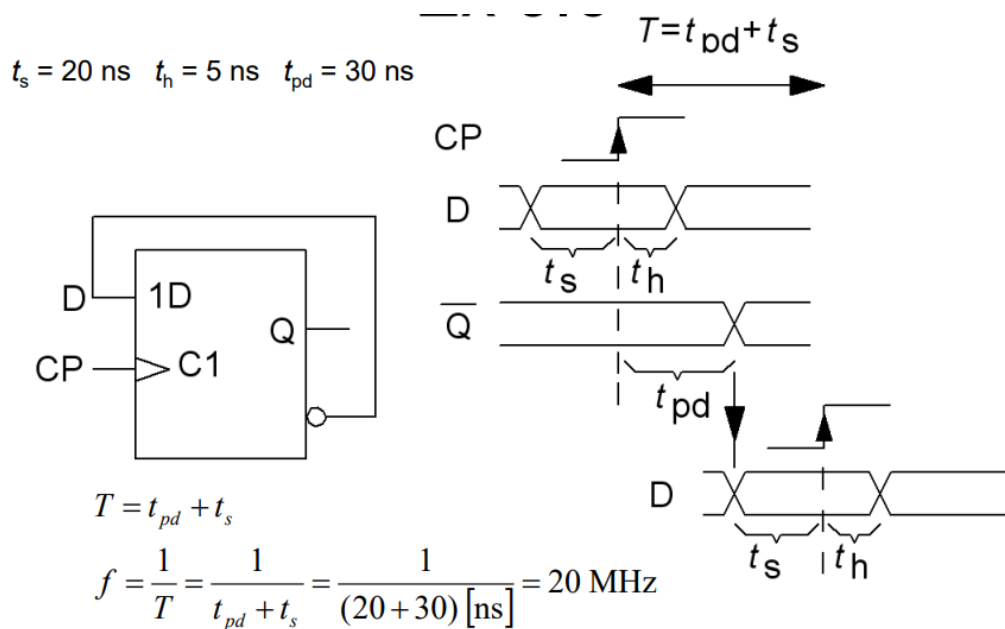


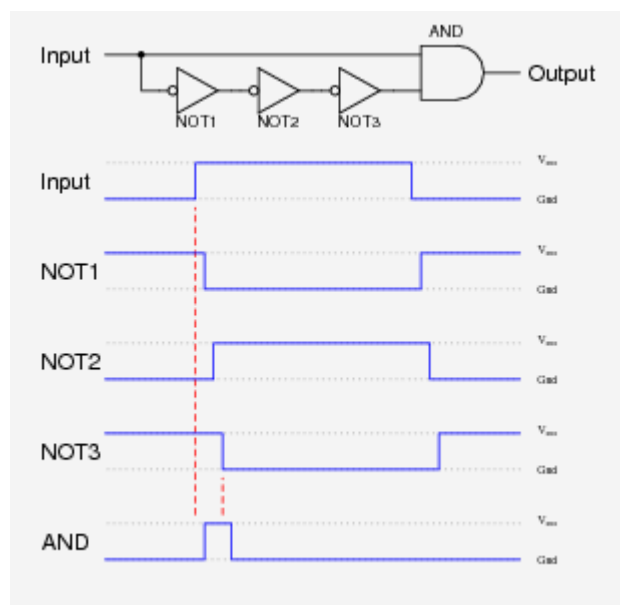
DSM Practice Sheet 4 Solutions

Q1

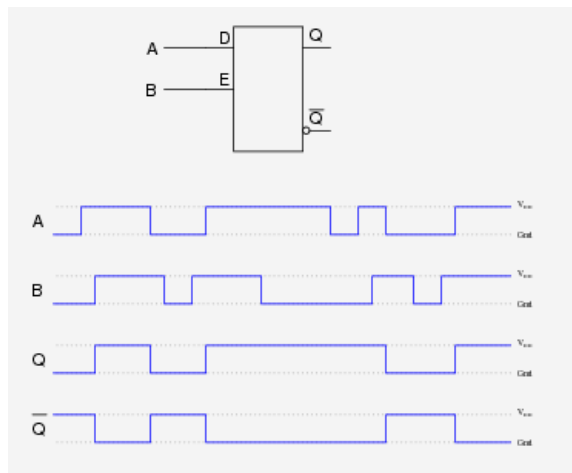


Q2

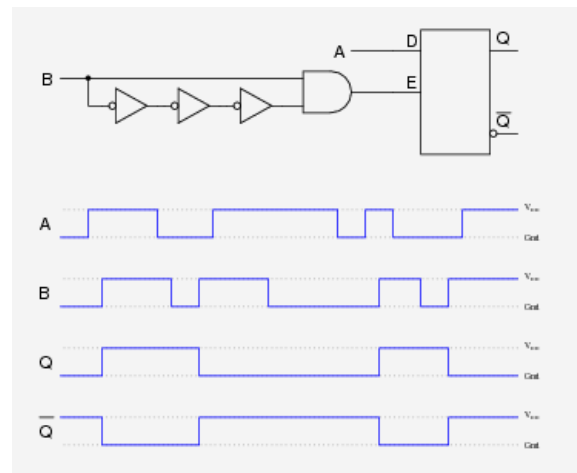
The circuit acts as a pulse generator.



The width of this pulse can be controlled by using not gates of specific delays, or by altering the number of NOT gates used.



normal latch behavior



flip-flop behavior

On adding the “pulse generator”, this latch now actually behaves like an edge-triggered flip-flop.

Q3

$$A(t+1) = A(t)x(t) + B(t)x(t) = x(t)(A(t) + B(t))$$

$$B(t+1) = \overline{A(t)}x(t)$$

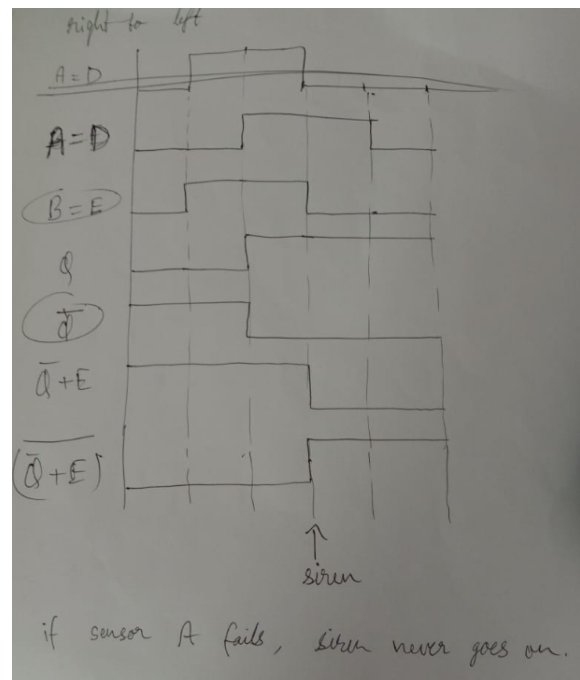
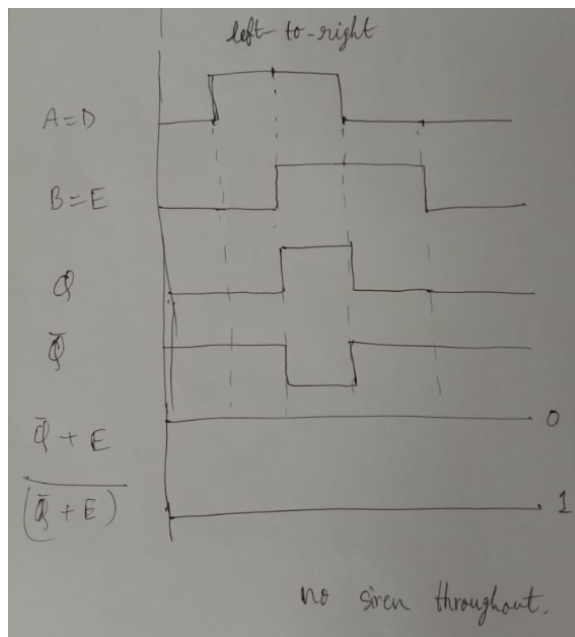
$$y(t) = \overline{x(t)}(A(t) + B(t))$$

signal	$t = -1$	$t = 0$	$t = 1$	$t = 2$	$t = 3$	$t = 4$
x	0	1	1	0	1	1
A	x	0	0	1	0	0
B	x	0	1	1	0	1
y	x	0	0	1	0	0

Can draw the trace (timing diagram) from here.

Q4

Left-to-right is the correct driving direction for this street.



If sensor A fails, alarm never goes high.

Q5

A binary number is a power of 2, if there is just one "1" in it.