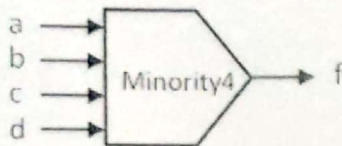


Left neighbour	Your Name	Your Entry No.	Right neighbour
—	AMAN AGRAWAL	2015CS10210	ANKUR SHARMA

COL215 Digital Logic and System Design Quiz 1 (Set B) 12.08.2016

Q 1. Consider a 4 input gate called "Minority4", which outputs a 1 if and only if the number of inputs equal to 1 is strictly less than those equal to 0. (a) Represent its function as a canonical SoP expression. (b) Derive its minimum SoP expression using Karnaugh Map.

3



$$f = \bar{a}\bar{b}\bar{c}d + \bar{a}\bar{b}c\bar{d} + \bar{a}b\bar{c}\bar{d} + \bar{a}b\bar{c}d + a\bar{b}\bar{c}\bar{d}$$

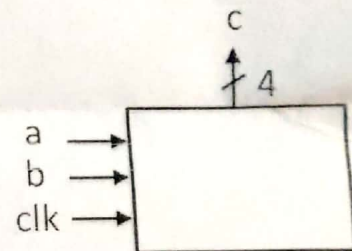
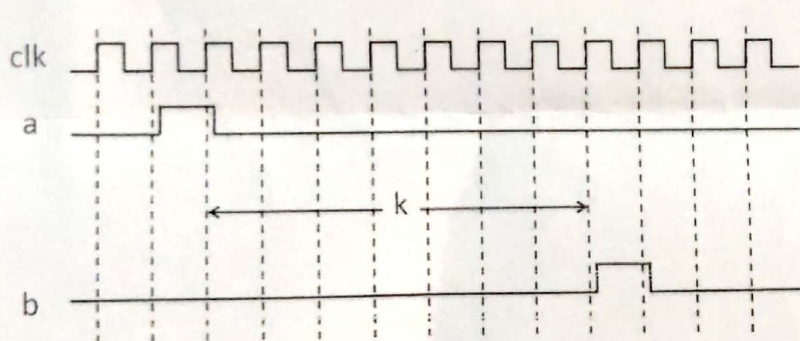
The output is one only when none of the outputs is 1 or when only one of the output is 1

The Kmap has 4 pairs

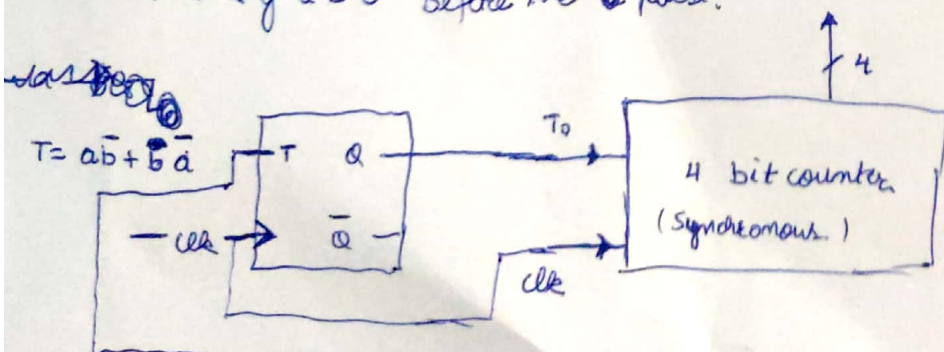
$$\therefore \text{Therefore } f = \bar{b}\bar{c}\bar{d} + \bar{a}\bar{c}\bar{d} + \bar{a}\bar{b}\bar{c} + \bar{a}\bar{b}\bar{d}$$

Please Turn over for working

Q 2. Design a circuit with inputs and outputs as shown. It outputs a number k on C where k is the number of clock periods between a pulse on A and a pulse on B.

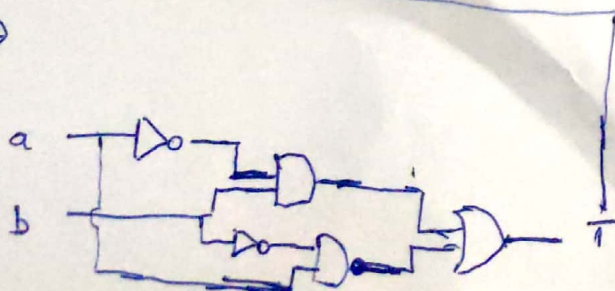


Assuming d = 0 before the A pulse.



2

T ⇒



Q1)

a	b	c	d	f
0	0	0	1	1
0	0	0	0	1
0	0	1	0	1
0	0	1	0	0
0	1	0	1	0
0	1	1	0	0
0	1	1	1	0
1	0	0	0	1
1	0	0	1	0
1	0	1	0	0
1	0	1	1	0
1	1	0	0	0
1	1	0	1	0
1	1	1	0	0
1	1	1	1	0

K-Map

	$\bar{c}\bar{d}$	$\bar{c}d$	cd	$c\bar{d}$
$\bar{a}\bar{b}$	1 0 1 1	1	3	2
$\bar{a}b$	1 4	5	7	6
$a\bar{b}$	12	13	15	14
ab	1 8	9	11	10