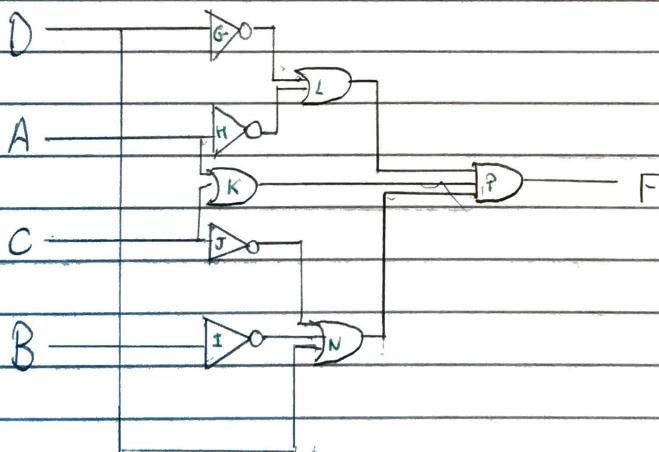


Digital Electronics Supervision II

- 1a A combinational logic block takes ~~boolean~~^{voltage} inputs in the form of high or low ~~voltage~~^{boolean} levels along wires, and, using logic gates, produces ~~boolean~~^{voltage} outputs
- b. A static hazard is when, due to propagation delay in the logic gates, even when the output should theoretically stay constant for a given change to the inputs, it briefly bounces to the opposite state before returning

A dynamic hazard is when the output is supposed to toggle to the opposite state in response to a change in the inputs, but briefly bounces back to its original state before settling.

2a

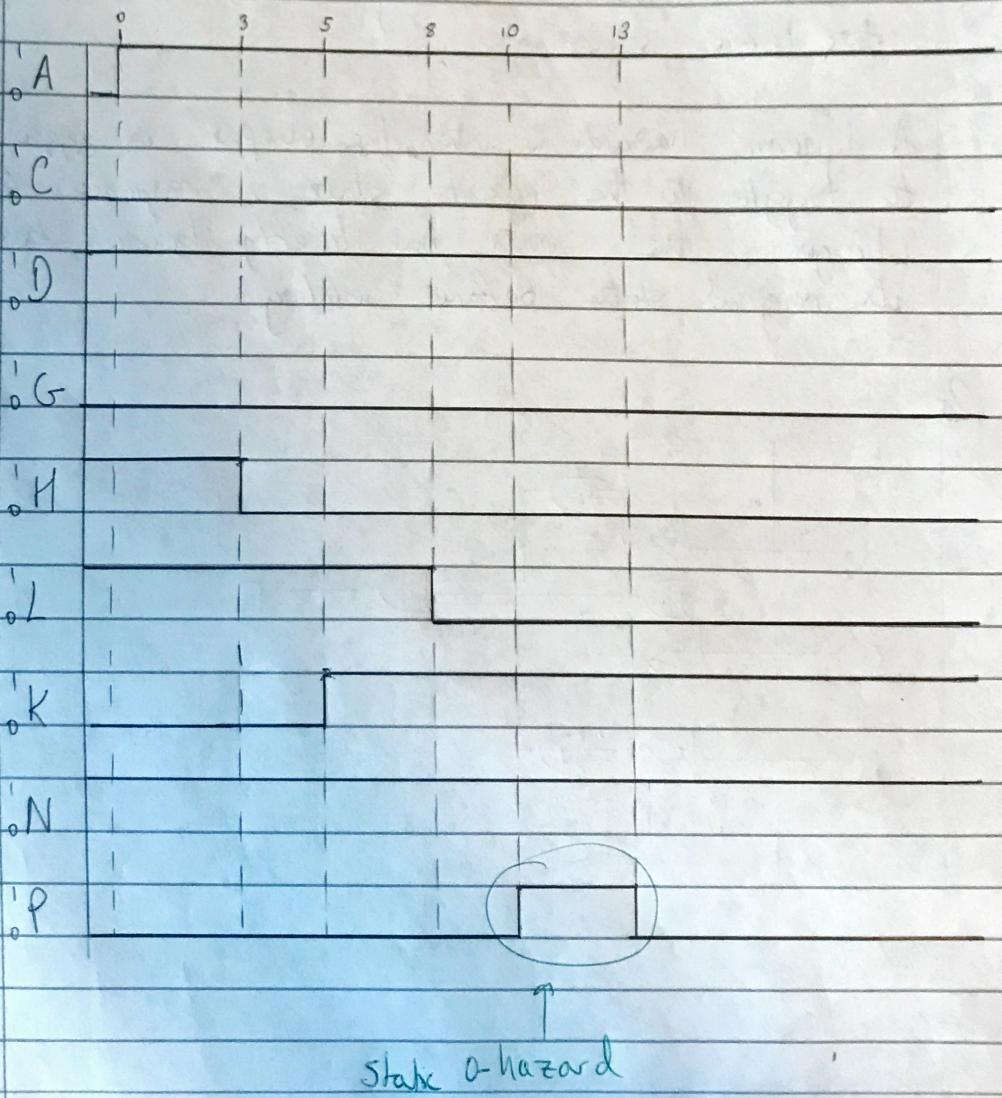


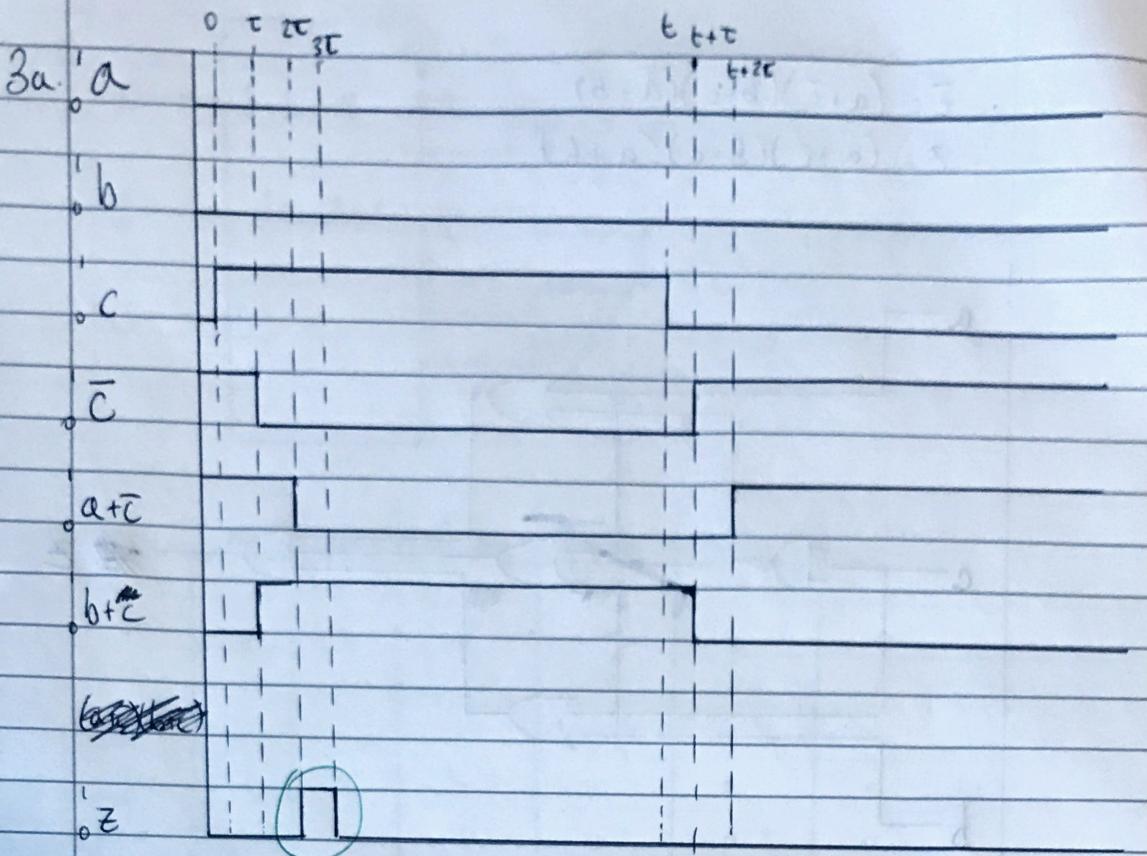
b

		AB		B		
		00	01	11	10	
CD		00	0	1	1	
D	01	0	0	0	0	
	11	1	1	0	0	
	10	1	0	0	1	

Eliminate the static 0-hazard by writing

$$F = (A+C)(\bar{A}+\bar{D})(\bar{B}+\bar{C}+D)(\bar{B}+C+\bar{D})(A+\bar{B}+D)(\bar{A}+\bar{B}+\bar{C})$$





↑
static 0-hazard

$$b. z = (a + \bar{C})(b + c) = \overline{(a + \bar{c})} + \overline{(b + c)}$$

$$= \overline{\bar{a}c + b\bar{c}}$$

$$\therefore \bar{z} = \bar{a}c + b\bar{c}$$

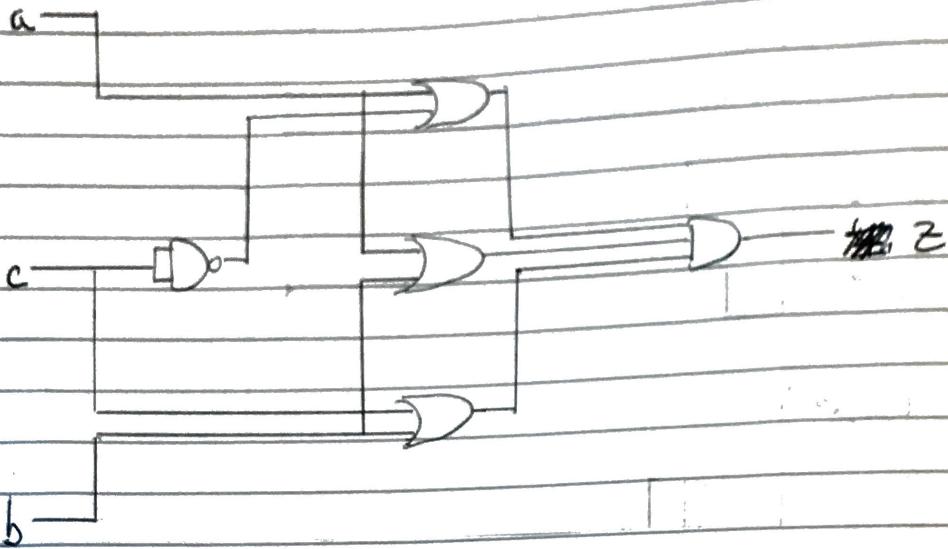
		b			
		00	01	11	10
\bar{z}	0	P	0	0	C
	1	1	1	0	0

$$\therefore \text{To fix the hazard: } \bar{z} = \bar{a}c + b\bar{c} + \bar{a}\bar{b}$$

$$= \overline{(a + \bar{c})} + \overline{(b + c)} + \overline{(a + b)}$$

$$\therefore \bar{Z} = (a + \bar{c})(b + c)(\bar{a} + b)$$

$$Z = (a + \bar{c})(b + c)(a + b)$$



U_A

A	0	1	2	3	4	5	6	7
	03	-	10	-	08	-	07	-

decoder

B

1

3

4

C

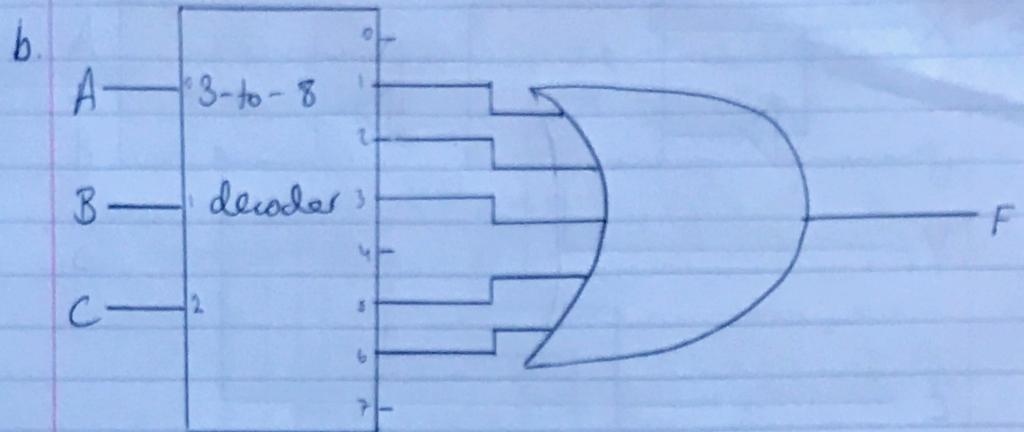
2

5

6

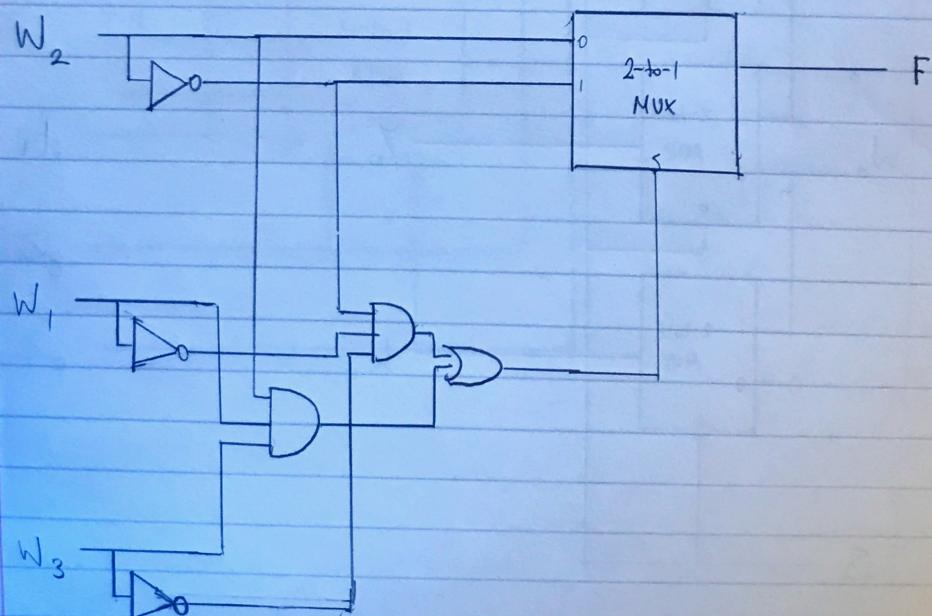
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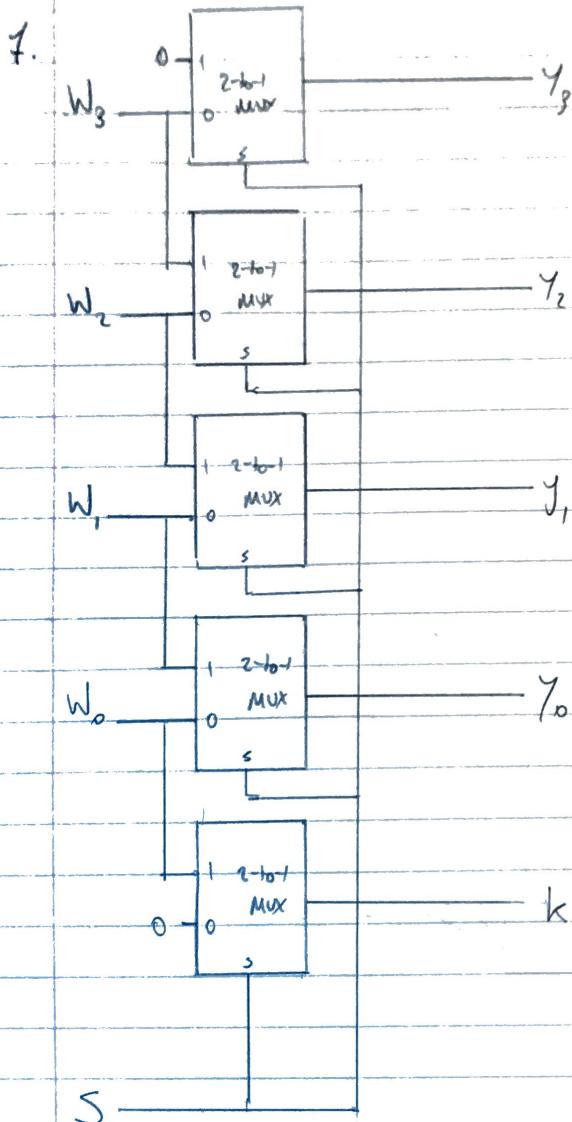
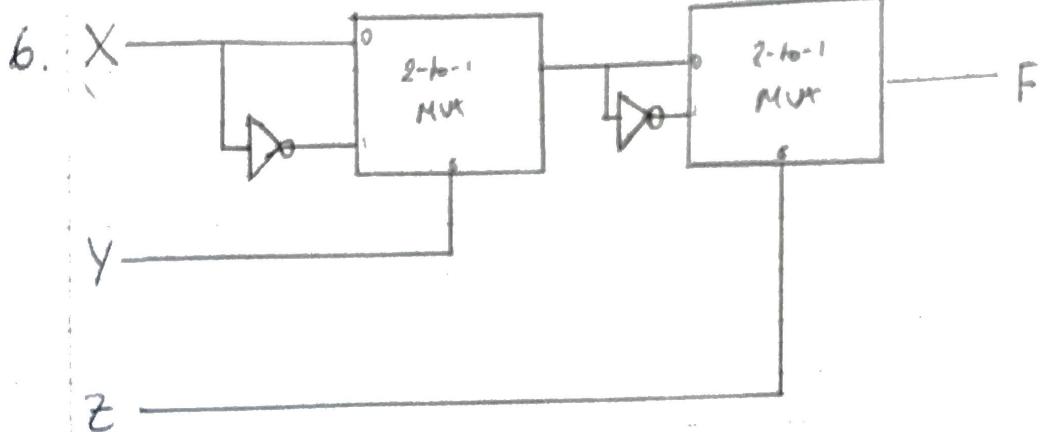
F



5

W_1	W_2	W_3	$\bar{W}_1 \bar{W}_3$	$W_2 \bar{W}_3$	$\bar{W}_1 W_2$	F
0	0	0	1	0	0	1
0	0	1	0	0	0	0
0	1	0	1	1	1	1
0	1	1	0	0	1	1
1	0	0	0	0	0	0
1	0	1	0	0	0	0
1	1	0	0	1	0	1
1	1	1	0	0	0	0





8.

